AN EXPLORATION OF THE ADOPTION OF PERSONAL NON-PHARMACEUTICAL INTERVENTION MEASURES BY STUDENTS AT A UNIVERSITY OF TECHNOLOGY IN RESPONSE TO THE COVID-19 PANDEMIC

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Declaration

This is to certify that the work is entirely my own and not of any other person, unless explicitly acknowledged (including citation of published and unpublished sources). The work has not previously been submitted in any form to the Durban University of Technology or to any other institution for assessment or for any other purpose.

_____ 1 July 2024

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ABSTRACT

Background

In March 2020 the World Health Organisation (WHO) declared coronavirus disease (COVID-19) to be a global pandemic. Due to the novel nature of the virus, there was no effective vaccine or established treatment methods, and public health officials turned to the personal non-pharmaceutical protective intervention (NPI) measures of physical distancing, hand sanitisation and the wearing of masks to interrupt disease transmission and 'flatten' the pandemic curve. Despite the WHO recommendation that NPIs should be included as part of any pandemic response, prior to the COVID-19 pandemic, little behavioural science research had been conducted on how to improve NPI adoption. During the COVID-19 pandemic, many Knowledge, Attitude and Practice (KAP) surveys investigated NPI compliance, but there is a dearth of qualitative literature to provide insight into the barriers and facilitators to adoption in specific populations.

Over the past two decades, the South African Higher education sector has largely been transformed to accommodate students from poor and rural backgrounds. As a result, students requiring accommodation in the urban centres where universities are often based, has dramatically increased. During the COVID-19 pandemic these students effectively became mobile members of their households, returning home at various times and lockdown levels, potentially spreading the disease to relatively isolated areas. In addition, studies have consistently found that young people were more likely to be considered non adopters of the COVID-19 NPIs, partly due to the increase in risk taking behaviour associated with adolescence. In South Africa, the risk behaviour of young people is also of significant public health concern in the context of HIV/AIDS, teenage pregnancy, substance abuse and violence, this is compounded by the limited success of large research interventions. Yet, despite the acknowledgement of the need for specificity in designing youth targeted interventions, there has been little exploration of how and why South African adolescents adopt positive behaviours. Knowledge of which would be useful to better understand behaviour motivation and inform strategies for positive behaviour change.

Aim

This study aimed to gain an understanding of the factors influencing the adoption of the personal NPIs in response to the COVID-19 pandemic, among students at a University of Technology (UOT). Insight into these factors was used to develop guidelines to inform the design of targeted interventions to promote positive behaviour change by South African adolescents.

Methodology

This exploratory, qualitative study sought to understand behaviour change using the Capability, Opportunity, Motivation, Behaviour (COM-B) model. Eighteen student participants at a UOT were selected using purposive, maximum variability sampling. Each participant was interviewed individually via Microsoft Teams. Data was transcribed verbatim and analysed both deductively and inductively. Deductive analysis was guided by Theoretical Domains Framework which was developed to integrate with the COM-B model. Where possible, participant statements were coded to the appropriate domain, statements relevant to the aim of the study but did not align with the TDF domains which were inductively analysed using the Tesch approach to qualitative analysis and Braun and Clarke (2006) thematic approach.

Findings

This study found that NPI adoption among students evolved over time, closely aligned to the available published literature regarding NPI efficacy and WHO recommendations, but not necessarily aligned to or in compliance with government regulations. A notable exception was the reduced compliance when interacting with loved ones. In these circumstances, despite high levels of both the psychological and physical capability to perform the protective behaviours, the participants lacked the social opportunity and emotional motivation to do so. Notable factors that facilitated NPI adoption included trust in international health organisations, personal experience of COVID-19 and an altruistic desire to protect others. Factors that acted as barriers to NPI adoption included in-group trust, government distrust and social disapproval for

adoption. The major themes that emerged included the need for autonomy in adolescent health decision making, the importance of social connection, the influence of social media, and the need to include young people in the development of targeted behaviour change interventions (BCIs).

Conclusion

This study contributes to the limited body of knowledge regarding the factors that served as barriers and facilitators to the adoption of positive health behaviours by South African adolescents in the context of the COVID-19 pandemic. These factors contributed to the development of guidelines which can be utilised by the relevant stakeholders when designing BCIs targeting this group.

Keywords: Adolescence, Behaviour change interventions, Health promotion, NPIs.

DEDICATION

This dissertation is dedicated to my extraordinary sister Gabi, who left us far too soon. Every day I try to be a better person by asking myself ‘What would Gab do?”

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GLOSSARY OF TERMS

Pandemic: A global epidemic or an epidemic that has spread to more than one continent.

Non-pharmaceutical Intervention measure: Community mitigation strategies that are not primarily based on medication to prevent the spread of communicable disease.

COVID-19: An acute disease in humans caused by the coronavirus, SARS-CoV-2 which is characterised by cough and fever but may progress to severe symptoms or death.

SARS-CoV-2: Severe acute respiratory syndrome coronavirus 2, the aetiological agent for coronavirus disease.

Excess deaths: The number of deaths that have occurred in the population beyond normal expectations (Bradshaw *et al.* 2022).

Behaviour change interventions: Sets of techniques, used together, which aim to change the health behaviours of individuals, communities or whole populations (National Insitute for Health and Care Excellence 2014).

Social media: Forms of electronic communication through which users create online communities to share information, ideas, personal messages and other content (Merriam-Webster Dictionary 2004).

Infodemic: An overabundance of information, some of which is misleading or harmful. Like a virus this may spread (World Health Organisation 2020a).

Misinformation: False information that is spread, regardless of intent to mislead (Dictionary.com 2022).

Disinformation: Deliberately misleading or biased information, manipulated facts and propaganda (Dictionary.com 2022).

Guideline: A noun that refers to a general rule, principle, or piece of advice.

LIST OF ABBREVIATIONS

Africa CDC	Africa Centres for Disease Control and Prevention
BCI	Behaviour Change Intervention
BCW	Behaviour Change Wheel
COM-B	Capability, Opportunity, Motivation, Behaviour
CDC	Centre for Disease Control and Prevention
COVID-19	Coronavirus disease
DUT	Durban University of Technology
ECDC	European Centre for the Disease Prevention and Control
HBM	Health Belief Model
HCW	Healthcare worker
KAP	Knowledge, Attitude and Practice
MERS	Middle East respiratory syndrome
NCID	National Institute of Communicable Disease
NPI	Non-pharmaceutical intervention
SARS	Severe acute respiratory syndrome
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
SMI	Social media influencer
TDF	Theoretical Domains Framework
TPB	Theory of Planned Behaviour
UOT	University of Technology
WHO	World Health Organisation

CHAPTER 1

OVERVIEW OF THE STUDY

1.1 INTRODUCTION AND BACKGROUND OF THE STUDY

The behavioural sciences aim to understand the psychological, biological, social and environmental factors that influence human behaviour. This information is then used to guide the design and implementation of public health interventions and policies to achieve predetermined changes in behaviour (West *et al.* 2020b). This study explored the factors influencing the adoption of the Coronavirus Disease (COVID-19) pandemic personal non-pharmaceutical intervention (NPI) measures by adolescents at a University of Technology (UOT).

On 11 March 2020 the World Health Organisation (WHO) declared COVID-19, caused by the novel coronavirus SARS-CoV-2, a global pandemic (Ghebreyesus 2020a). In the absence of established medical treatment or available vaccine, the international community turned to the personal protective NPIs of physical distancing, hand sanitisation and the wearing of face masks to control the spread of the infection (Ghebreyesus 2020b; West *et al.* 2020b). For these measures to be effective and reduce the demand on health services by 'flattening the (epidemic) curve', social compliance with significant individual and collective behavioural change was necessary (Atkins *et al.* 2017).

Behaviour change is a complex construct involving an interplay of capability and opportunity to affect change, along with the motivation to do so. This motivation is influenced by both automatic (habits or emotions) and reflective (choice) processes which are made within and impacted by an individual's physical and social environment (Michie, Atkins and West 2014). Thus, for any targeted behaviour change intervention (BCI) to be effective and produce lasting change, it is vital to understand the factors that influence these behaviours in the environment and context in which they occur (Atkins *et al.* 2017). Adolescence is associated with an increase in risk-taking behaviour and a strong need for social connection and peer approval (Andrews, Foulkes and Blakemore 2020). It is also a stage of life where BCI programmes have shown limited success (Yeager, Dahl and Dweck 2018a). South Africa has a youthful

population with 16% of the total population aged 15-24 years (Statistics South Africa 2020). As such, it is critical that the policy makers effectively target this group when designing BCIs.

This interpretative, qualitative, phenomenological study was guided by the COM-B model of behaviour change and utilised the Theoretical Domains Framework (TDF) and Behaviour Change Wheel (BCW), which were developed to integrate with the Capability, Opportunity, Motivation, Behaviour (COM-B) model. The TDF was used to perform a COM-B behavioural diagnosis of the NPIs, the BCW then structured the analysis of this diagnosis to assess the perceived influence of the interventions aimed at promoting NPI adoption. These validated frameworks were chosen due to their comprehensive nature and focus on behaviour in context.

1.2 PROBLEM STATEMENT

Negative health behaviours of today's youth are drivers of the future burden of disease on South Africa's public and private healthcare system. However, despite an increase in health promotion activities via traditional behaviour change programmes there has been limited success in changing behaviour in this group. There has been acknowledgement of the need for specificity in designing interventions for the youth, both in general and in response to future pandemics. However, there is a lack of contextualised understanding of the factors influencing the adoption of positive health behaviours in the South African youth itself.

1.3 AIM OF THE STUDY

This study aimed to gain an understanding of the factors influencing the adoption of the personal NPIs in response to the COVID-19 pandemic, among students at a University of Technology (UOT). Insight into these factors was used to develop guidelines to inform the design of targeted interventions to promote positive behaviour change by South African adolescents.

1.4 OBJECTIVES OF THE STUDY

The objectives of the study were to:

- Describe the adoption of NPIs by students at a UOT in response to the COVID-19 pandemic.
- Explore barriers to the adoption of NPIs by students at a UOT.
- Explore facilitators to the adoption of NPIs by students at a UOT.
- Explore the means through which the adoption of NPIs by students at a UOT in response to the COVID-19 pandemic was achieved.
- Develop guidelines for designing targeted behaviour change intervention strategies for promoting health among South African youth.

1.5 THE SIGNIFICANCE OF THE STUDY

The World Health Organisation (2023b) has launched a new initiative to improve pandemic preparedness. As NPIs are recommended by the World Health Organisation (2019c) to control the spread of disease in any pandemic, the recent COVID-19 pandemic provides an opportunity to examine the adoption of these behaviours and improve control measures in future pandemics. The World Health Organisation (2021) identified young people (aged 15-30 years) as a priority group to target for effective COVID-19 behaviour change, despite this, many studies have found that young people were more likely to be considered non adopters of the COVID-19 NPIs (Coroiu *et al.* 2020; Okello *et al.* 2020; Underschultz *et al.* 2020; Lang *et al.* 2021; Siddiquea *et al.* 2021; Hengartner, Waller and Wyl 2022).

Maughan-Brown *et al.* (2021) acknowledged the role that the South African youth played in the spread of COVID-19 as well as the need for customised messaging to target them for effective behaviour change. University students are potentially a key population to target as transformative efforts within the South African higher education sector have resulted in high numbers of students who require student accommodation during the academic term (Kruger 2023). These students return home, often to rural areas, during the holidays, acting as mobile members of the family unit. This is of

particular concern during pandemics where limitation of human migration is a key intervention.

In South Africa, the risk behaviour of young people is also of significant public health concern in the context of HIV/AIDS, teenage pregnancy, substance abuse and violence, (Khuzwayo, Taylor and Connolly 2020). The government response has focused on the provision of youth friendly health services using the Adolescent and Youth Friendly Service (AYFS) approach, with sub-optimal results (Geary *et al.* 2015; James *et al.* 2018). In addition, the National Department of Health (2017) developed the Adolescent and Youth Health Policy (AYHP) with the goal of adolescent health promotion and the provision of opportunities for social and behaviour change. Large research interventions have however shown limited success in effecting change (Harrison *et al.* 2010; National Department of Health 2012). This was in part, due to poor intervention design with the use of misaligned theoretical frameworks that did not consider cultural context (Mwale and Muula 2017). Despite this, there has been little exploration of how and why South African adolescents adopt positive behaviours. Knowledge of which, would be useful to better understand behaviour motivation and inform strategies for positive behaviour change (Baird *et al.* 1999). At the time of writing, no guidelines for the design of BCIs to target young South Africans existed.

1.6 STRUCTURE OF THE THESIS

This thesis is presented in nine chapters. This chapter introduced the study, outlined the aims and objectives to be achieved and highlighted its significance. Chapter two presents a review of the relevant literature. Chapter three discusses the BCW and TDF, the two interarticulating theoretical frameworks utilised to analyse the collected data. Chapter four describes the research design and details the methodology used in the study. The findings are then presented in Chapter five and discussed in Chapter six. Chapter seven provides guidelines for the design of BCIs, targeting South African adolescents, that were developed using both the relevant literature as well as the findings of this study. Chapter eight concludes the study with limitations and provides future recommendations. The next section lists the references used in this dissertation. Finally, documents such as the consent forms, the interview guide, coding guideline and permission documents are included as appendices.

1.7 SUMMARY OF THE CHAPTER

This chapter introduced the study, outlined the aims and objectives to be achieved and highlighted how this study adds to the current body of literature available. The following chapter will review the literature relevant to the topic. Finally different models of behaviour are discussed, and a model is chosen to frame the study.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter reviews the literature relevant to the study and assisted the researcher to identify the gaps in the existing body of knowledge. In preparation for this review, the researcher utilised commonly available search engines such as Google Scholar and PubMed to source published literature, using various search terms including: NPI; COVID-19, Hand washing; Hand hygiene; Face masks; Masking; Social distancing; Physical distancing; COVID-19 transmission prevention; Behaviour change models; Behaviour adoption; Adolescent brain; Adolescent behaviour change. Documents produced by the following international public health organisations like the World Health Organisation (WHO), the Centre for Disease Control and Prevention (CDC), the European Centre for the Disease Prevention and Control (ECDC) and the Africa Centres for Disease Control and Prevention (Africa CDC) were also reviewed. As this study was based in KwaZulu-Natal, South Africa, South African Government documents from the National Department of Health (DoH) and provincial department of health, as well as government gazettes, were included in the review.

2.2 THE COVID-19 PANDEMIC

2.2.1 Background to the COVID-19 Pandemic

On 11 March 2020 the WHO declared the corona virus disease (COVID-19) outbreak a pandemic (Ghebreyesus 2020b). The disease was caused by the highly transmissible, novel, severe acute respiratory syndrome coronavirus 2 or SARS-CoV-2 which spread from person to person, primarily via respiratory droplet and contact transmission (World Health Organisation 2020b). Droplet transmission occurs when an infected person speaks, coughs or sneezes, projecting contaminated droplets into the air, where a person within range can inhale the virus. Should the virus land on a surface, a person who touches the surface and then touches their mouth, nose or eyes could also be infected. Due to the novel nature of the virus, the global public health

and scientific community lacked a detailed understanding of the pathophysiology of the disease and there were no established medical treatment options and no available vaccine. As such, governments and the medical community turned to personal (and collective) non-pharmaceutical intervention (NPI) measures to decrease the rate of transmission and 'flatten the epidemic curve'. This sentiment was echoed by the Director General of the WHO, when he stated that "Every individual must understand that they are not helpless – there are things everyone should do to protect themselves and others. Your health is in your hands. That includes physical distancing, hand hygiene, covering coughs, staying home if you are sick, wearing masks where appropriate, and only sharing information from reliable sources" (Ghebreyesus 2020c).

2.2.2 The South African government response to the COVID-19 Pandemic

As part of the legacy of Apartheid, South Africa is one of the most unequal societies in the world, one that has been marred by systemic public system corruption (Chetty 2021). To slow infection rates, behavioural compliance by the poor was essential, even though they would bear the economic brunt of government regulations (Coetzee and Kagee 2020; Friedman 2021). The anti-science approach to the HIV/AIDS epidemic under former South African President Mbeki led to the unnecessary deaths of hundreds of thousands of mostly poor, black Africans which did little to build confidence in government epidemic/pandemic crises management (Chigwedere *et al.* 2008). To ensure that the response would 'follow the science' a Medical Advisory Council, headed by prominent South African infectious disease researcher Professor Salim Abdool Karim, was established to advise the National Department of Health Minister, Dr Zwelini Mkhize (Friedman 2021).

South Africa's COVID-19 response was categorised into eight strategic stages by Abdool Karim (2020):

- Stage 1: Preparation
- Stage 2: Primary prevention
- Stage 3: Lockdown
- Stage 4: Surveillance and active case finding
- Stage 5: Hotspots

- Stage 6: Medical care
- Stage 7: Bereavement and the aftermath
- Stage 8: Ongoing vigilance

On 26 March 2020, South Africa went into a hard national lockdown to control the COVID-19 pandemic, enforcing extreme physical distancing measures to give the state time to educate citizens, prepare the health system and initiate mass testing (Abdool Karim 2020). All citizens were required to stay at home. The only exceptions to this, were to get essential items like food and medicine or to perform essential services (Department of Co-operative Governance and Traditional Affairs (South Africa) 2020b). The national lockdown was gradually eased from 1 May 2020, via progressive alert levels (Figure 2.1), allowing citizens to leave their homes under strict conditions. People were advised to adapt to this 'new normal' and adopt the behaviours required by law (Department of Co-operative Governance and Traditional Affairs (South Africa) 2020a). As it was impossible for the state to police all citizens at all times, South African President Ramaphosa highlighted that it was each person's individual responsibility to maintain the protective behaviour changes in his televised speech on 24th May 2020' (Ramaphosa 2020).

By December 2022, over four million people in South Africa had tested positive for COVID-19 with 102,550 official recorded COVID-19 deaths (National Department of Health (South Africa) 2022a). It is however important to note that these deaths were significantly under-reported. In the final South African Medical Research Council (SAMRC) report on excess deaths (the number of deaths that have occurred in the population beyond normal expectations) from the beginning of the pandemic, Bradshaw *et al.* (2022) reported 339,146 excess deaths nationally and 14,109 excess deaths in the eThekwini municipality alone.

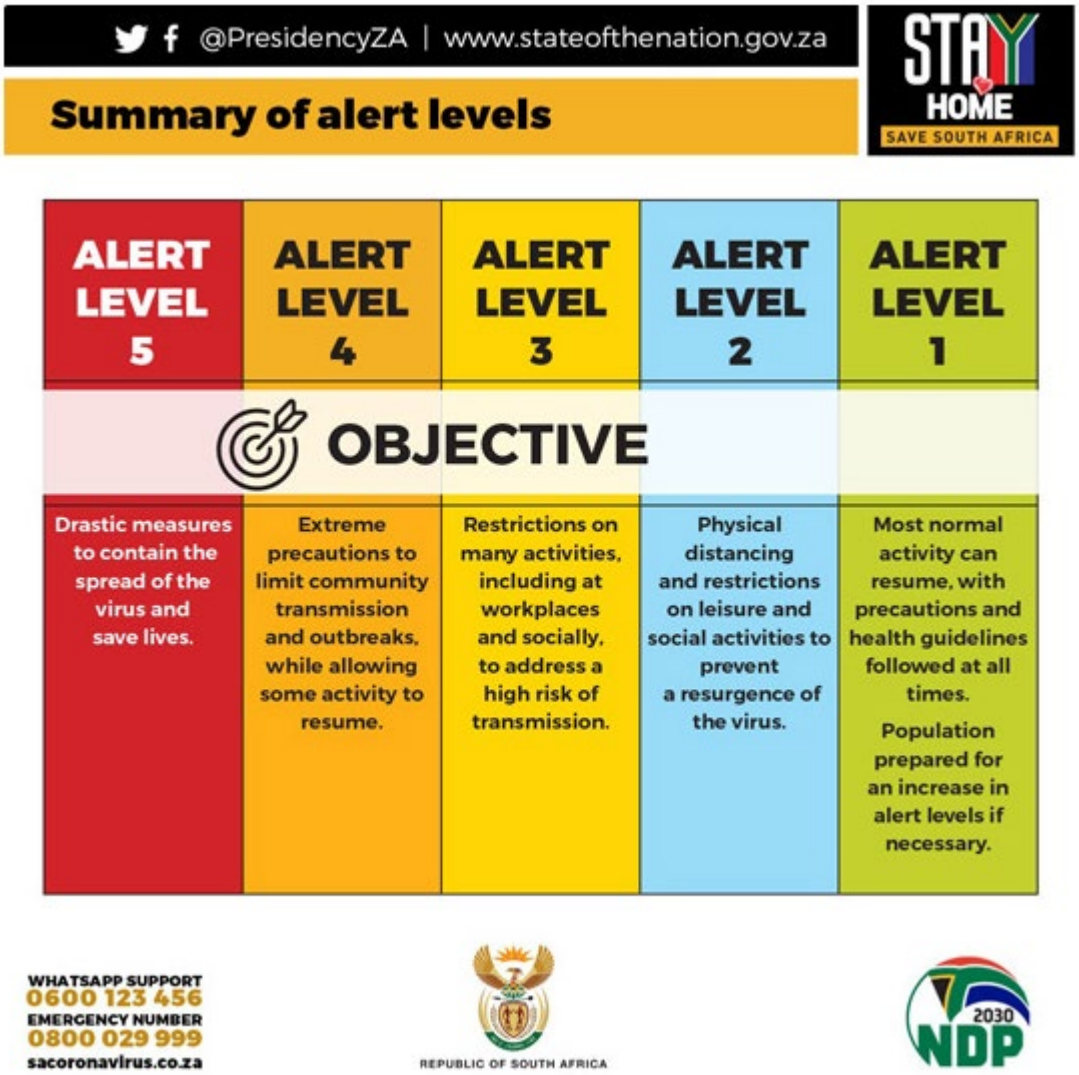

Figure 2.1. Summary of the alert levels during South Africa's COVID-19 pandemic response (Government of South Africa 2021)

2.2.3 Non-pharmaceutical Intervention (NPI) measures

The World Health Organisation (2019b) Health Emergency and Disaster Risk Management (Health-EDRM) Framework outlines two primary forms of pandemic planning preparedness: the government operational response and the identification and evaluation of applicable non-pharmaceutical intervention measures. The World Health Organisation (2019c) recommends the use of different combinations of NPI in accordance with the severity of the outbreak. Recommendations for any level of outbreak include respiratory etiquette, face masks for symptomatic individuals,

isolation of infected individuals, surface and object cleaning as well as travel advice. With increasing severity, additional recommendations include avoidance of large gatherings, face masks for the public and school closure. In extraordinary cases, workplace closure and travel restrictions are recommended.

NPIs have been utilised in the management of previous pandemics like the bubonic plague and 1918 influenza pandemic (colloquially called the 'Spanish flu') and more recently in the 2003 SARS outbreak (Odusanya *et al.* 2020). In fact, from the outset of the COVID-19 pandemic many parallels were drawn between it and the 'Spanish flu' pandemic, which was caused by an outbreak of a novel H1N1 virus. Similarly, very little was known about the transmission or pathophysiology of the disease and as such there were no vaccines or established treatment options available at the time (Odusanya *et al.* 2020).

In the context of COVID-19, the World Health Organisation (2020b) advised the avoidance of areas considered at high risk for COVID-19 transmission. These were summarised as the 'Three C's': crowded settings, close contact settings and, confined and enclosed spaces. Although strong evidence-based systematic behavioural studies for COVID-19 prevention were lacking, most of the evidence reviewed supported handwashing, the wearing of medical face masks and avoiding crowds, with the best evidence in terms of study design focusing on handwashing (Yang Chan *et al.* 2020). As such, from a behaviour change perspective, the original personal NPI requirements were primarily hand sanitization and physical distancing (West *et al.* 2020a). This was updated to include the use of masks by the public in areas of community transmission in June 2020 (Ghebreyesus 2020b). Although many studies have subsequently assessed the impact of the NPIs on the spread of COVID-19, methodological issues and a lack of standardisation in assessment practice have limited their practical value informing policy makers for future pandemics (Lison *et al.* 2023).

2.2.3.1 Handwashing

Handwashing is a well-established means of infection control as it destroys most pathogens. Water alone is however not effective as it only removes dirt (Global Handwashing Partnership 2020). In the case of SARS-CoV-2, the addition of soap, emulsifies the outer protective lipid membrane that surrounds the virus's genetic

material, rendering it harmless. As this process can take time, it is recommended that hands be washed for a minimum of 20 seconds. Alcohol acts in a similar manner, as such the alternative recommendation was to sanitise hands with an alcohol based hand sanitiser with a minimum 70% alcohol content (National Department of Health (South Africa) 2020b). The recommended guidance from the National Department of Health (South Africa) in the form of an infographic is shown in Figure 2.2.

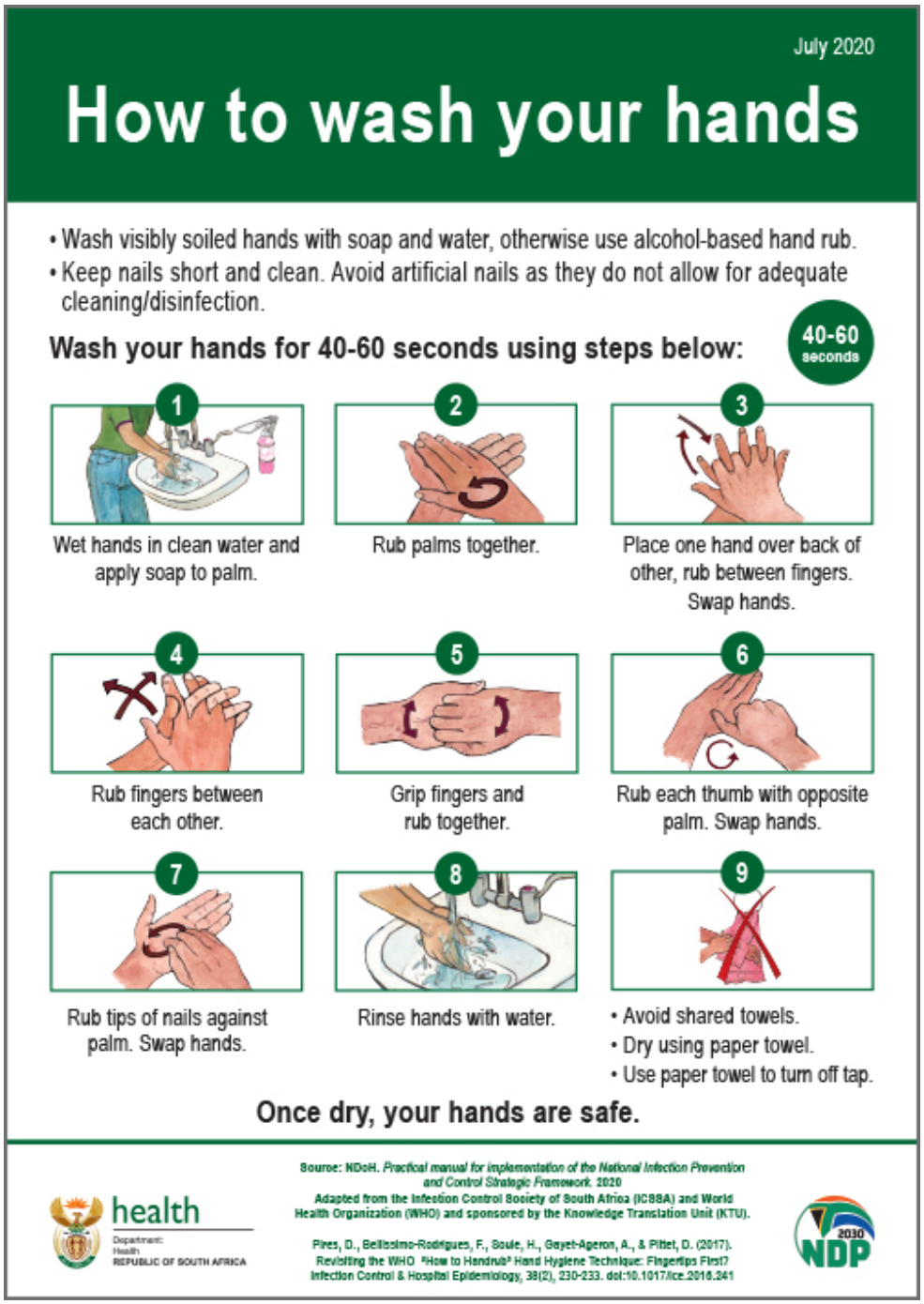

Figure 2.2: Guidance on handwashing from the National Department of Health (South Africa) (2020a)

2.2.3.2 Masking

At the beginning of the COVID-19 pandemic there was significant debate about the potential benefit of cloth face masks. While not likely to be 100% effective at preventing transmission, the rationale behind the use of such masks was to reduce the volume of SARS-CoV-2 emitted by an infected individual (Tam *et al.* 2021) by acting as a semipermeable barrier through which infective material must pass. Cloth masks however have varying degrees of porosity and have been shown to be less effective as a means of source control when compared to surgical masks (Tam *et al.* 2021). In South Africa, the wearing of cloth face masks in public was at first a recommendation,

Figure 2.3: Guidance on masking from the National Department of Health (South Africa) (2020a)

but it was later upgraded to mandatory (Department of Co-operative Governance and Traditional Affairs (South Africa) 2020a). The National Institute of Communicable Disease (2020) emphasised that mask wearing should not provide a false sense of security and that it did not reduce the need for hand hygiene and physical distancing. Guidance was also issued regarding the washing of cloth face masks and the importance of wearing a mask correctly (to always cover the mouth and nose) as illustrated in Figure 2.3.

2.2.3.3 Physical Distancing

Physical distancing is an established strategy to prevent the transmission of pathogens during respiratory-based outbreaks of disease. The rationale behind physical distancing is to break the chain of transmission, by physically preventing the virus from being able to reach another person. In doing so, it is possible to 'flatten the curve' of infections and protect those at risk of severe disease (African Centres for Disease Control and Prevention 2020). This can take place at various levels. For example, the national stay at home orders or 'lockdown' would be considered an example of extreme mandatory physical distancing, whereas at a community level there were restrictions on gatherings at schools, funerals, and churches. Finally, at an individual level physical distancing could be as simple as the use of non-contact greetings and staying at home or isolating oneself physically when sick (African Centres for Disease Control and Prevention 2020). While physical distancing regulations did change at different levels of the COVID-19 pandemic, people who did not reside together were advised to always keep a distance of at least 1.5m away from others wherever possible (Department of Co-operative Governance and Traditional Affairs (South Africa) 2020d). These are illustrated in Figure 2.4. It should be noted that colloquially the term 'social distancing' is often used synonymously with physical distancing, the former should be avoided as it can be associated with social isolation which is not necessarily true of physical distancing (African Centres for Disease Control and Prevention 2020).

Figure 2.4: Guidance on physical distancing from The National Institute for Communicable Diseases (2020)

2.3 THE ADOLESCENT PERSPECTIVE

2.3.1 Youth Population

The South African government aligned most of the pandemic response, including a nationwide lockdown, with prevailing international practices of the initial countries affected by the pandemic. This included most of Europe and the United States of America. However, Africa as a continent, is vastly different to these Western nations

in both a physical and social context. Aside from the obvious economic differences, there is a significant difference in the age of the populace. South Africa has a youthful population with ages 15-34 years comprising 34.7% of the total population (Statistics South Africa 2020). The median age of the country's population is 28 years, which is comparatively much younger than that of the United States of America (38.5 years), the United Kingdom (40.6 years), Spain (43.9 years) and Italy (46.5 years) (Central Intelligence Agency 2020). As young people were considered low risk for severe COVID-19 (Sharma, Mishra and Mudgal 2020) this could be viewed as a positive factor. However, as adolescence is characterised by an increase in risk taking behaviour (Steinberg 2008), the lowered personal risk perception could reduce the adoption of NPIs, increasing community transmission.

2.3.2 South African university student residence

As part of the transformation agenda, South African universities have attempted to improve access for students from lower socio-economic and rural backgrounds. This has resulted in a marked increase in the need for student accommodation. Currently only approximately 20% of students in higher education in South Africa reside in student accommodation (Kruger 2023). The Durban University of Technology (DUT) has however prioritised the provision of student accommodation and has the capacity to house more than 20 653 students, approximately two thirds of the student population (Durban University of Technology n.d).

During the COVID-19 Pandemic, general preventive measures were taken to reduce the spread of the virus. This included limiting human movement as much as possible. When the South African COVID-19 Alert level dropped to level 3 from 1 June 2020, despite the Department of Co-operative Governance and Traditional Affairs (South Africa) (2020c) declaration that eThekwini was a COVID-19 hotspot at the time, university students from around the country were permitted to return to campuses, (Department of Co-operative Governance and Traditional Affairs (South Africa) 2020d). During university recess, the students in residence would then return home, to relatively isolated rural areas, potentially carrying the virus with them and acting as mobile members of the family unit. It is worth noting that during the second (Beta) COVID-19 wave in December 2020, eThekwini had a huge spike of COVID-19 infections which overwhelmed the available medical facilities (National Institute of

Communicable Disease 2021). This coincided with the end of the second semester when DUT, and the student residences closed for recess. It is likely that students from DUT and other universities played a role in the spread of COVID-19 to rural areas at that time.

2.3.3 Adolescence

Adolescence is a time of morphological as well of physiological change in the human brain. Most notably, the significant development of both the prefrontal and parietal cortex, linked to executive function, with relatively slower development of the limbic system, linked to behavioural and emotional responses (Blakemore and Choudhury 2006). As a result, adolescence is also associated with an increase in risk-taking behaviour and a strong need for social connection and peer approval (Andrews, Foulkes and Blakemore 2020).

While there are various definitions of youth and adolescence, most literature acknowledges adolescence to span from puberty until the role of adult is assumed in society (Yeager, Dahl and Dweck 2018a). The current study has used the Andrews, Foulkes and Blakemore (2020) specific age criterion of 10 to 24 years as this aligns with the period of adolescent neurological ‘rewiring’. This is a sensitive time for neuroplasticity, where the nervous system develops its baseline plasticity, in both structure and function, in response to experiences (Fuhrmann, Knoll and Blakemore 2015). As this baseline is retained throughout life, should the adoption of healthy behaviours be achieved during adolescence, this could result in lasting change.

2.3.4 Youth Behaviour Change

Intervention campaigns are often unsuccessful in achieving positive behaviour change in adolescents (Yeager, Dahl and Dweck 2018a). This is especially true where the interventions are implemented and policed by adults or authority figures, as adolescents may feel their autonomy is undermined (Andrews, Foulkes and Blakemore 2020). As noted previously, this is a time associated with an increase in risk taking behaviour as well as lower general risk perception and increased emotional reactivity (Steinberg 2008). When combined with the strong need for social connection

and peer approval (Andrews, Foulkes and Blakemore 2020) it was hypothesised that the uptake of physical distancing would be resisted among the youth.

Young people were identified as ‘a priority target audience with specific experiences and behaviours’ by the World Health Organisation (2021) who released a policy brief entitled: Young people and COVID-19: behavioural considerations for promoting safe behaviours. This policy brief suggested that knowledge-based education interventions might not be sufficient and included insights from behavioural science to improve personal NPI adoption.

The recommendations included:

- The creation of an enabling environment with minimal barriers
- The promotion of positive behaviours as social norms within peer groups
- The promotion of a collective community
- The use of social media to communicate risk-prevention
- The promotion of the agency of young people in protecting themselves and their loved ones against disease
- The promotion of alternative means of interaction to mitigate negative mental health impacts
- The inclusion of young people in the COVID-19 community response

Subsequent studies have confirmed that young people were indeed more likely to be considered non-adopters of the COVID-19 NPIs (Coroiu *et al.* 2020; Okello *et al.* 2020; Underschultz *et al.* ; Lang *et al.* 2021; Siddiquea *et al.* 2021; Hengartner, Waller and Wyl 2022). The male gender was also associated with less adoption (Hager *et al.* 2020; Okello *et al.* 2020; Isah *et al.* 2021; Siddiquea *et al.* 2021; Hengartner, Waller and Wyl 2022). Almost all these studies have been cross sectional: knowledge, attitude and practices (KAP) quantitative studies with questionnaires of varied length. There is, however, a dearth of qualitative literature that provides insight into the complex reasons for NPI adoption or lack thereof in specific populations (Suk *et al.* 2022).

2.3.5 Youth Behaviour Change in South Africa

South African youth also displayed decreased NPI compliance during the COVID-19 pandemic. A lack of physical distancing and mask wearing at youth associated events resulted in 'superspreader events' where one or more individuals infected many people at a single event (Lewis 2021; National Institute of Communicable Disease 2021). One of these events, the Matric Rage (a KwaZulu- Natal based school leaving entertainment gathering where 94.6% of the attendees were aged 15-19 years) was potentially, partially responsible for the rapid increase in COVID-19 cases in the province in December 2020 which overwhelmed both public and private health care facilities (National Institute of Communicable Disease 2021).

Maughan-Brown *et al.* (2021) not only acknowledged the role that the South African youth played in the spread of COVID-19, but also highlighted the need for customised messaging to target the demographic for effective behaviour change in general. In South Africa, the risk behaviour of young people continues to exacerbate the persistent challenges of HIV/AIDS, teenage pregnancy, substance abuse and violence (Harrison *et al.* 2010; National Department of Health 2012; Khuzwayo, Taylor and Connolly 2020). In response, the National Department of Health (2017) developed the Adolescent and Youth Health Policy (AYHP) to promote the health and well-being of young South Africans via a pro-active, preventative focus on health promotion and management. This has however centered around the Adolescent and Youth Friendly Service (AYFS) approach, which has produced sub-optimal results (Geary *et al.* 2015; James *et al.* 2018). While the AYHP does advocate for the use of 'innovative youth-oriented programmes' to affect behaviour change, little guidance is provided in terms of the design of such interventions. This guidance is much needed as many of the locally implemented BCIs targeting this group have shown limited success, in part, due to poor design with misaligned theoretical focus and a lack of sociocultural context (Mwale and Muula 2017). Despite this, there has been little exploration of how and why South African adolescents adopt positive behaviours. This knowledge would be useful to better understand behaviour motivation and inform strategy (Baird *et al.* 1999). At the time of writing, no guidelines for the design of BCIs to target young South Africans were identified.

2.4 MODELS OF BEHAVIOUR

There are numerous models of behaviour prediction and change. In this review some of the most common models are described. These include the Health Belief Model (HBM), the theory of planned behaviour (TPB), the Capability, Opportunity, Motivation, Behaviour (COM-B) model of behaviour, as well as the evolution of behaviour over time via the Transtheoretical Model (Stages of Change). In deciding which model was best suited to the study factors like theoretical base, comprehensiveness, as well as 'fit for purpose' for the South African context were considered.

2.4.1 The Health Belief Model

The HBM is a well-established model of behaviour change that was developed by the United States Public Health Service in the 1950s, in response to a lack of uptake in tuberculosis screening (Janz and Becker 1984). The model originally consisted of six constructs that could predict the adoption of health promoting activities, self-efficacy was added as the seventh construct in 1998 to expand the use of the model to sustained health promoting behaviour as opposed to single actions like tuberculosis screening (Glanz, Rimer and Viswanath 2008). The seven constructs are:

- Perceived susceptibility, which is the extent to which the person believes that they might develop the disease (Janz and Becker 1984).
- Perceived severity, which is the extent to which the person believes the disease will impact the individual (Janz and Becker 1984).
- Perceived benefits, which is the extent to which the person believes that the desired behaviour will protect them from the disease (Janz and Becker 1984).
- Perceived barriers, which are any obstacles that the person believes will hamper their ability or desire to adopt the behaviour (Janz and Becker 1984).
- Modifying variables such as demographic and psychosocial factors that could influence individual perception (Rosenstock 1974).
- Cues to action, any factor that promotes healthy behaviours and initiates change (Janz and Becker 1984).
- Self-efficacy, which is the level of confidence the individual has in their ability to perform a desired behaviour (Glanz, Rimer and Viswanath 2008).

NPIs are classified as preventative health behaviours, or behaviours to prevent disease, which are most influenced by the 'perceived barriers' construct. By contrast,

sick role behaviours or behaviours undertaken to re-establish health when sick, are most influenced by the 'perceived benefits' construct. In addition, perceived severity is only weakly associated with prevention but strongly with sick role behaviours. (Janz and Becker 1984). In terms of the choice of model for this study, the HBM focusses on cognitive factors like beliefs and attitudes, excluding influences such as emotion, personal experience and environmental factors that might be beyond the control of the individual (Janz and Becker 1984). In a country with elevated inequality, environmental factors cannot be ignored. For example, most of the South African population use public transport to commute, where physical distancing is not possible. A graphic representation of the HBM is shown in Figure 2.5.

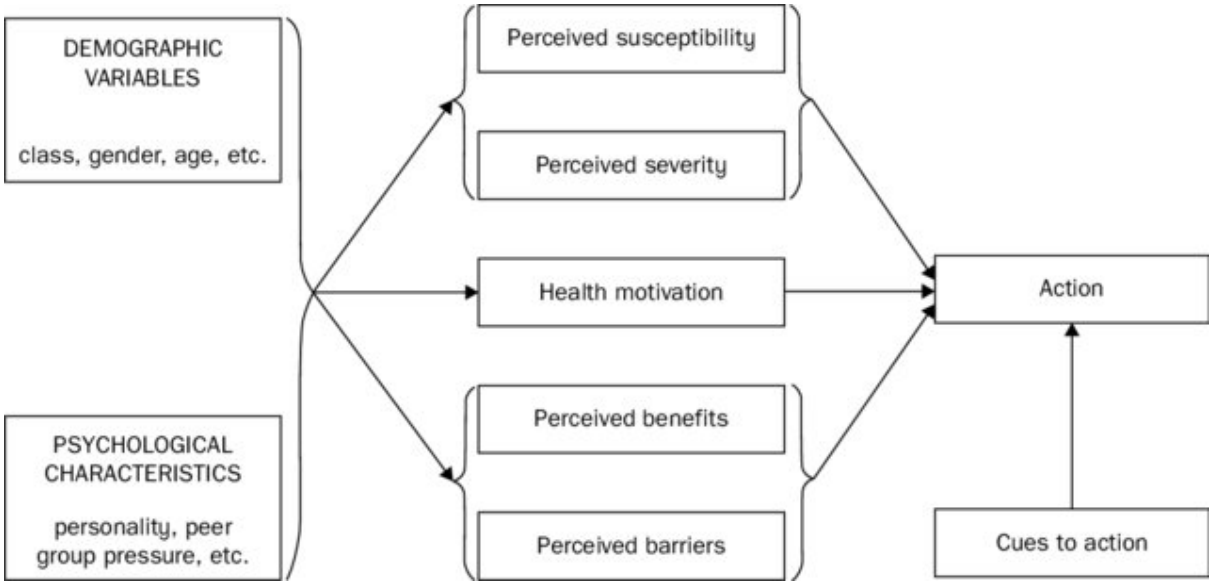

Figure 2.5: The Health Belief Model (Conner and Norman 2015)

2.4.2 The Theory of Planned Behaviour (TPB)

The TPB was developed as an extension to the 'Theory of Reasoned Action' in which Ajzen (1985) theorised that intentions were the primary predictors of behaviour. These intentions were in turn determined by attitude, subjective norms and perceived behavioural control. In this context attitudes were seen as the overall opinion of the behaviour whereas the subjective norms were influenced by opinion of others within the individual's social circle. This is represented in Figure 2.6. At a later stage, new constructs of moral norms, anticipated regret and habit were added to further develop the model (Parker, Manstead and Stradling 1995; Åberg 2001). In this context, moral

norm is the individual belief in what a person considers to be ‘right or wrong’ behaviour while the anticipated regret is the likely affective response to doing the ‘wrong’ thing (Parker, Manstead and Stradling 1995). Habit as a construct was added to include autonomic behaviours that were previously excluded (Åberg 2001).

Like the HBM, the TPB gives little consideration to emotive, socioeconomic or cultural factors that might limit an individual’s opportunity to adopt healthy behaviours, regardless of personal intention. Additionally, the model views behaviour as a linear concept and does not take the evolution of behaviour into account (LaMorte 2022).

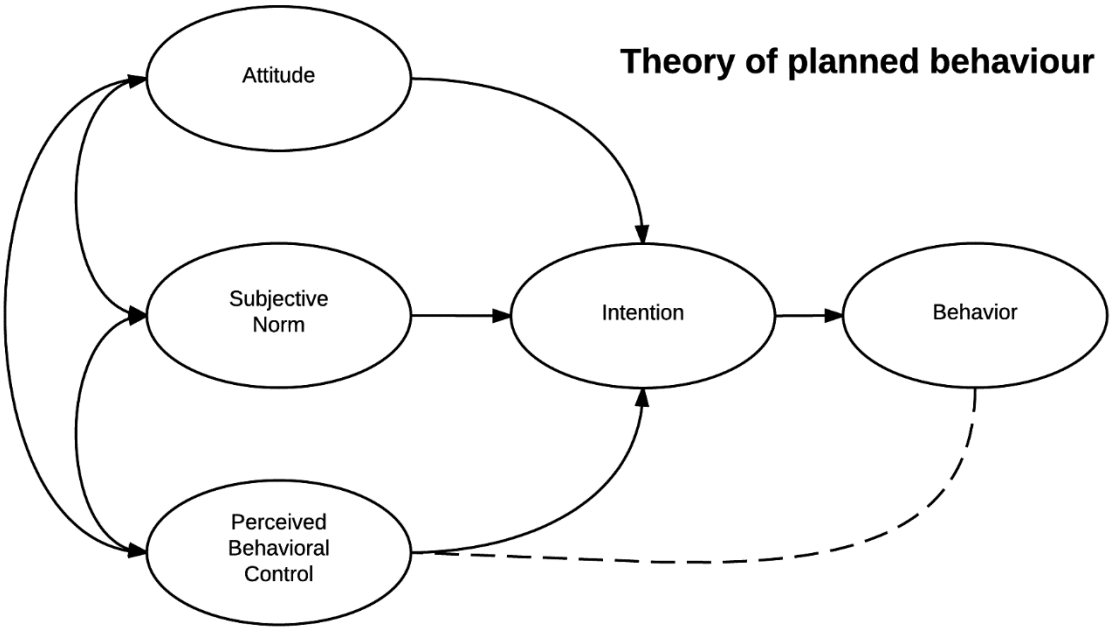

Figure 2.6: The Theory of Planned Behaviour (Orzanna 2015)

2.4.3 The Transtheoretical Model (Stages of Change)

Prochaska, DiClemente and Norcross (1992) describe five stages of behavioural change in the Transtheoretical Model (Stages of Change). Although this model was developed by studying addictive behaviours, it has been extrapolated for use across most problematic health behaviours. The first stage is precontemplation, where there is no intent to change behaviour, this is often due to a lack of information about the consequences of the said behaviour. The second stage is contemplation where

although commitment to change is absent, people begin to consider the required change, often by means of weighing up the pros and cons of the required change. This is followed by the preparation stage where there is mental commitment but not yet any physical action. Thereafter, is the action stage where individuals begin to alter their behaviour or environment to accommodate the required change which they will attempt to sustain during the maintenance phase. Unfortunately, regression to previous stages is common. Kissler *et al.* (2020) accurately projected that COVID-19 NPIs would be necessary for at least 18 months' duration. This required sustained behavioural change. While small changes in behaviour, like mask wearing can be reinforced when expected over a prolonged period, changes that require a great deal of sacrifice are more difficult to maintain. South Africa endured one of the longest and harshest lockdowns in the world, with a stringency rating of 87.96 (Hale *et al.* 2020) and yet still identified more than four million positive COVID-19 cases between 5 March 2020 and 23 January 2023 (World Health Organisation 2023a), potentially due to a lack of uptake of the required behaviours. Maughan-Brown *et al.* (2021) presented a comprehensive study of South Africa's behavioural response from May 2020 – December 2020, via the Coronavirus Rapid Mobile Survey (CRAM) 2020. This found that while self-reported mask wearing remained high, handwashing, and most significantly social distancing, dropped dramatically over time. In the age group 18-34 years there was an increase of 5.1% in mask wearing (most likely due to changes in policy and legislation mandating masking), a decrease of 18.2% in handwashing and decrease of 31.7% in physical distancing between May 2020 and December 2020. These behaviours were not generally found to be peer influenced, although this was not analysed by age group. In addition, COVID-19 fatigue was more likely in males and those who lived in larger, typically poorer households. The authors noted the limitations of the questionnaire format in that it did not address the frequency or manner in which the behaviours were adopted as it only spoke to the adherence to preventative measures, which were then correlated to demographic factors.

2.4.4 The Capability, Opportunity, Motivation and Behaviour (COM-B) Model

The COM-B model of behaviour was developed to address the failure of the dominant behavioural theories, to directly guide strategies to produce targeted changes in behaviour. By incorporating prominent theories, like the HBM and the TPB, Michie, van Stralen and West (2011) were able to produce a comprehensive model that could

be utilised for all behaviours. Three dynamic components were identified as sources of behaviour change: capability, opportunity and motivation. Each source may directly impact behaviour, but capacity and opportunity also interplay with motivation so that if an intervention were to increase an individual's capacity or opportunity to perform a behaviour, this would in turn increase their motivation (Michie, Atkins and West 2014). This is represented in Figure 2.7.

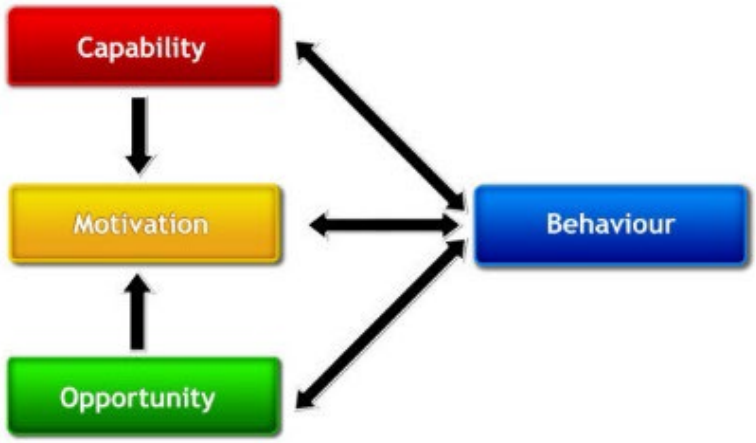

Figure 2.7 The COM-B Behaviour System (Michie, van Stralen and West 2011)

For change to occur an individual must be both physically and psychologically able to do so - this includes knowledge of the behaviour, how to perform the behaviour as well as an understanding of the need for the desired change in behaviour. Similarly, the individual must have a social and physical opportunity, as well as the motivation to make the change. The motivation aspect includes both choice based reflective processes and automatic motivation (Michie, van Stralen and West 2011). This is a key improvement from the HBM and the TPB which do not include automatic motivational factors like habit and emotions nor impulsivity and self-control (Michie, van Stralen and West 2011).

In terms of the COVID-19 pandemic, behaviour was likely to be influenced by socioeconomic status (Coetzee and Kagee 2020). As such, when exploring the NPI adoption in a developing country like South Africa, it was vital to use a model that included physical and social opportunity. The COM-B model was chosen due to the

emphasis on the behaviour in context, rather than focussing on cognitive processes. It should be noted that the COM-B model has been used by the European Centre for Disease Prevention and Control (2020) to develop principles for promoting NPI compliance and the World Health Organisation. Regional Office for Europe (2020) in their framework for the strategic planning to combat COVID-19 pandemic fatigue. The COM-B model has the additional benefit of integrating with the Behaviour Change Wheel (BCW) and the Theoretical Domains Framework (TDF) which will form the overarching theoretical frameworks for the study.

2.5 COVID-19 NPI VIA THE COM-B MODEL SOURCES OF BEHAVIOUR

A review of the relevant literature related to each source (capability, opportunity and motivation) follows.

2.5.1 Capability

To develop the capability for positive behaviour change, individuals need to understand what changes are required, why they are important and how the changes can be achieved (West *et al.* 2020b).

As part of stage one and two of the South African government's response to the COVID-19 pandemic, there was a widespread campaign to educate the population on COVID-19 and measures that could prevent transmission of the virus. This included television and radio announcements as well as the deployment of community health workers (Abdool Karim 2020). Information is, however, only useful if it is understood and considered to be truthful and accurate. While the concepts of handwashing, masking and physical distancing do not require high levels of cognition and are fairly easy to understand (Woodland *et al.* 2022), information regarding COVID-19 transmission and risk was largely presented by public health officials who were not always considered to be trustworthy. Trust in government communication is significantly associated with a higher perceived threat of disease, but inversely associated with a higher perceived risk of infection or death (Lim *et al.* 2021). Unfortunately, in the case of a novel disease, inconsistencies due to rapidly evolving health guidance can decrease government credibility and resultant risk perception (Cava *et al.* 2005)

Knowledge alone is not however enough to affect behaviour change, as it excludes social and emotive factors. Yeager, Dahl and Dweck (2018a) highlight that educational behaviour change campaigns often fail among the youth, more so where the information is seen to come from adults or the older generation, as the authoritative nature of the exchange undermines the youth autonomy. To combat this, Andrews, Foulkes and Blakemore (2020) have suggested the inclusion of young people in both the design and communication of youth targeted BCI. It is worth noting that at the commencement of the pandemic the South African president, Cyril Ramaphosa, and the minister in charge of promulgating the regulations, Dr Nkosazana Dlamini-Zuma, were 67 and 71 years of age respectively (Department of Planning Monitoring and Evaluation (South Africa) 2023a, 2023b). This may have contributed to youth non-adoption and requires further investigation.

2.5.1.1 Health Communication

Health communication is a key part of any intervention strategy and played an important role in the effectiveness of NPI uptake (Williams *et al.* 2023). From the outset of any novel, communicable pandemic, the public needs to understand how the disease spreads and what symptoms an infected person is likely to display. In a review of the effectiveness of communications in enhancing the adoption or adherence to NPIs, Williams *et al.* (2023) highlighted the importance of clear and non- conflicting messaging, from trusted sources, that was authoritative but not controlling in tone. This messaging should convey the realistic risk of infection but focus on how the NPIs can protect not only individuals from getting the disease, but on how individuals can protect others (Van Bavel *et al.* 2020; Lang *et al.* 2021; Hatteberg and Kollath-Cattano 2022; Leather *et al.* 2022). COVID-19 pandemic health communication in South Africa was via a variety of mediums. The major pandemic announcements were made by President Ramaphosa on television. These were augmented with finer details via televised ministerial announcements, as well as print and social media campaigns (Wasserman and Madrid-Morales 2022). In rural areas where digital access was limited, communication was via public meetings or health care workers (Cotterill 2021).

2.5.1.2 Social Media

Social media can be defined as ‘forms of electronic communication (such as websites for social networking and microblogging) through which users create online

communities to share information, ideas, personal messages, and other content (such as videos)' (Merriam-Webster Dictionary 2004). More simply, social media widely refers to internet-based tools that allow for user participation in the generation, distribution and search for information online. This would be different to legacy print and web-based media. which is centred around the content producer, with the consumers as passive recipients.

Social media has become a vital component of health communication to improve health literacy and health promotion (Salmon and Atkin 2003). Indeed, despite persistent issues of inequality and the digital divide, several initiatives (Carter 2014; Lewis 2014; O'Donnell 2015) have demonstrated the benefits of social media use in health campaigns on the African continent. Social media offers public health authorities the opportunity to modernise public health communication as well as the ability to disseminate information in a rapid yet cost effective manner (Kostygina *et al.* 2020). This information can be tailored to different platforms and/or formats to target specific audiences. For example: TikTok users share video-based content whereas Twitter (now X) is effective at distributing summarised messaging with infographics. Social media platforms also allow for additional benefits like the collection of data with insights into audience reception which can in turn be used to inform future strategies (Eichstaedt *et al.* 2015).

Historically, the media has been able to drive specific narratives to shape public discourse which has created a sense of distrust in the mainstream media. In Africa this distrust has been worsened by concerns about state-owned media and in South Africa specifically, by the legacy of 'Stratcom', the Apartheid government strategic communications or media propaganda division (Joseph 2019). During the COVID-19 pandemic, trust was further eroded by corruption scandals, including allegations of 'kick backs' from an outsourced COVID-19 health communication agency to the then Minster of Health, Dr Mkhize (Cotterill 2021). As a result, many turned to social media platforms as a primary news source. Unfortunately, due to a lack of any meaningful regulation, social media has very little accountability which has resulted in the rapid dissemination of fake news or 'misleading information spread via social media to manipulate the media and the public' (Fitzpatrick 2018).

The World Health Organisation (2020a) described the COVID-19 'overabundance of information, some of which was misleading or harmful' as an 'infodemic' and warned

that it could make it more challenging for people to identify accurate, evidence-based information while increasing distrust and even animosity towards public health messages. People could also follow incorrect and dangerous advice, putting themselves or others at risk of disease. The South African government considered these risks as so great to the national response to the COVID-19 pandemic that the State of Disaster regulations categorised the spread COVID-19 misinformation as a criminal offence, which was punishable by a fine and/or imprisonment (Department of Co-operative Governance and Traditional Affairs (South Africa) 2020b).

2.5.2 Opportunity

In Africa there were additional challenges regarding the logistics of hand hygiene and physical distancing. The 2022 South African Census estimated that 8.7% of South African households had no access to piped water while another 8.9% could only access piped water via a shared access point. An estimated one in twelve (8.1%) of the population lived in informal dwellings, where entire families may share a single bedroom (Statistics South Africa 2023). This made self-isolation for infected individuals almost impossible. These living conditions made the ‘stay at home’ order much more difficult to maintain. In addition, most of the country’s work force use public transport, such as taxis. While the loading of taxis was originally restricted to 70% capacity, this was later changed to allow for full occupancy, making physical distancing impossible (Department of Co-operative Governance and Traditional Affairs (South Africa) 2020d). Social opportunity can also influence the adoption of NPIs via the exposure to opinions of friends, family and other groups, with the development of group norms. In addition, leadership within groups from family heads to political leaders can also influence societal norms (Bellato 2020).

2.5.3 Motivation

The PRIME (plans, responses, impulses, motives and evaluations) theory of motivation separates motivation into reflective processes, where an individual weighs up the pros and cons of a given situation, and automatic processes like habit and emotion (Michie, Atkins and West 2014). The most significant risk factor for severe COVID-19 was age. The Centre for Disease Control (CDC) estimating that persons aged 85 and over were 630 times more likely to die of the disease than individuals aged 18-29 years (Centre for Disease Control 2020). Most students at this University

of Technology (UOT) were under the age of 25 years and considered to be very low risk for severe disease. Given the need for social interaction during adolescence, physical distancing required the greatest sacrifice (Kollamparambil and Oyenubi 2021). Physical distancing is distinct from quarantine as it occurs regardless of one's disease status and requires healthy individuals to physically separate themselves from others. The behaviour change research directly involving COVID-19 was fairly sparse early in the COVID-19 pandemic but seemed to correspond with evidence from previous coronavirus epidemics such as SARS and Middle East Respiratory Syndrome (MERS). As the COVID-19 pandemic progressed and more research became available, perceived risk of infection was found to be a strong predictor of NPI adoption in both local and international COVID-19 studies (Jorgensen, Bor and Petersen 2021; Kollamparambil and Oyenubi 2021; Lim *et al.* 2021). Younger people from low socioeconomic groups, however, perceived themselves to be at a low risk of infection (Kollamparambil and Oyenubi 2021) and were more likely to be motivated by an altruistic concern for others (Oosterhoff *et al.* 2020).

Automatic motivation via emotional factors influenced NPI adoption both positively and negatively. While fear is an effective motivator for behaviour change in the early stages of a pandemic, over time, fear wanes and compliance decreases as pandemic fatigue sets in (World Health Organisation. Regional Office for Europe 2020). A lack of trust in local leadership and misplaced trust of in-group members were also associated with non-adoption of NPIs (European Centre for Disease Control and Prevention 2020; Jorgensen, Bor and Petersen 2021; Postill *et al.* 2022).

It should also be noted that behavioural compliance with one behaviour, did not necessarily mean compliance of another as individual behaviours are influenced by other factors such as attitudes, descriptive norms in social groups and key demographics (Wismans *et al.* 2020).

2.6 SUMMARY OF THE REVIEWED LITERATURE

This chapter has presented the literature relevant to this study, literature that continues to evolve. This includes a background to the COVID-19 pandemic and a description of each of the NPIs. Adolescence was identified as a priority group due to a potential lack of adoption, which was confirmed by the literature. This warrants the exploration

of the behaviours adopted by adolescents in South Africa, as well as any barriers or facilitating factors. Some well-known theories of behaviour were discussed along with the rationale for the specific model of behaviour chosen for this study, the COM-B model. The relevant, evolving literature regarding the adoption of each NPI was then reviewed under the COM-B sources of behaviour: capability, opportunity and motivation. Due to the novel nature of COVID-19, health communication in terms of the pandemic and social media was also discussed. While there have been publications that include behavioural guidance in the form of 'principles for promoting compliance' of the COVID-19 NPIs, at the time of writing no guidelines for the design of adolescent targeted strategies existed. The next chapter discusses the Behaviour Change Wheel and the Theoretical Domains Framework as the theoretical frameworks chosen to guide the study.

CHAPTER 3

THEORETICAL FRAMEWORK

3.1 INTRODUCTION

Chapter two introduced the COVID-19 pandemic and the related personal non-pharmaceutical intervention (NPI) measures. Various models of behaviour were described and ultimately the Capability, Opportunity, Motivation, Behaviour (COM-B) model was chosen to frame the study. This chapter will provide details about the COM-B integrated theoretical frameworks which were used to guide the study: The Theoretical Domains Framework (TDF) and the Behaviour Change Wheel (BCW).

3.2 CONCEPTUAL AND THEORETICAL FRAMEWORKS IN RESEARCH

A coherent framework is essential for any study. It runs through every part of the study from the need for the study and formulation of the research problem, through to the analysis and interpretation of the results (Ravitch and Riggan 2014). There is a lack of consensus regarding the terms conceptual and theoretical framework. While some authors use the terms interchangeably (Maxwell 2013), there are multiple definitions for each used by those who choose to distinguish between them. For the purposes of this study, the author will adopt the definitions by Ravitch and Riggan (2014) where a conceptual framework is viewed as ‘an argument about why the topic one wishes to study matters, and why the means proposed to study it are appropriate and rigorous’. This argument consists of two parts, first the rationale behind the study and second, the alignment among the research questions, data collection and analysis as well scientific rigour of the study. When using this definition, the conceptual framework runs through multiple chapters of this dissertation but is mostly included in Chapters one, three and four, and is guided by the literature reviewed in Chapter two. By contrast, Ravitch and Riggan (2014) describe a theoretical framework as a published and identifiable theory that allows for exploration of the relationships embedded in the conceptual framework. As such the theoretical framework is a part of the greater conceptual framework and is the focus of this chapter.

3.3 THEORETCIAL FRAMEWORKS TO GUIDE THE STUDY

3.3.1 The Theoretical Domains Framework

The TDF is a comprehensive theoretical framework to identify the factors that influence behaviour in exploratory health related research (McGowan, Powell and French 2020). This framework provides a theoretical lens through which to view the cognitive, affective, social and environmental influences on behaviour and has been used for a variety of study designs with objectives including exploration of barriers and facilitators to the implementation of behaviours, systematic intervention design through to designing broader intervention strategies (Atkins *et al.* 2017). The original TDF was developed by integrating 128 theoretical constructs (component parts of behavioural theories) and 33 theories of behaviour and behaviour change into 12 domains, each encompassing a set of similar theoretical constructs (Michie *et al.* 2005). This was revised upon validation to 83 constructs which were grouped into 14 domains in 2012.

The current framework (v2) consists of 14 domains: (1) knowledge, an awareness of the existence of something; (2) skills, an competency acquired through practice; (3) social/professional role and identity, a collection of displayed personal qualities of an individual in a social or work setting ; (4) beliefs, about capacities the confidence that one has ability to produce a desired result; (5) optimism, a sense of positivity that the desired goals will be attained; (6) beliefs, about consequences; preconceived notions about the outcomes of a behaviour in a given situation (7) reinforcement, the process of establishing a dependent relationship between a response and a given stimulus; (8) intentions, a plan to perform a specific behaviour; (9) goals, an aim for a desired outcome; (10) memory, attention and decision processes, the cognitive ability to retain information, focus on appropriate aspect of the environment and make relevant choices; (11) environmental context and resources, any aspect of a person's physical environment or a salient event that impacts their ability to perform a behaviour; (12) social influences, any interpersonal processes that have the capacity to cause individuals to change their thoughts, feelings or behaviours; (13) emotion, complex mental states associated with thoughts, feelings and behavioural responses and (14) behavioural regulation, the ability to manage one's behaviour.

As described in the previous chapter, the COM-B model of behaviour was chosen to frame this study due to the emphasis on exploring behaviour within context, the

inclusion of automatic processes as well as its use in the development of behavioural considerations for COVID-19 NPI adoption provided by both (European Centre for Disease Prevention and Control 2020) and the World Health Organisation. Regional Office for Europe (2020). The TDF can be viewed as a variation of the COM-B model of behaviour which further subdivides the sources of behaviour (Michie, Atkins and West 2014).

- **Psychological capability**: Knowledge; Memory, Attention and Decision Processes; Behavioural Regulation
- **Physical capability:** Physical Skills
- **Social opportunity**: Social influences
- **Physical opportunity**: Environmental Context and Resources
- **Automatic motivation**: Reinforcement, Emotions
- **Reflective motivation**: Social/Professional Role and Identity; Beliefs about Capabilities; Optimism; Intentions; Goals; Beliefs about Consequence

Figure 3.1 combines the COM-B model of behaviour and the TDF. Each domain (in yellow) is assigned to a specific source of behaviour (in green):

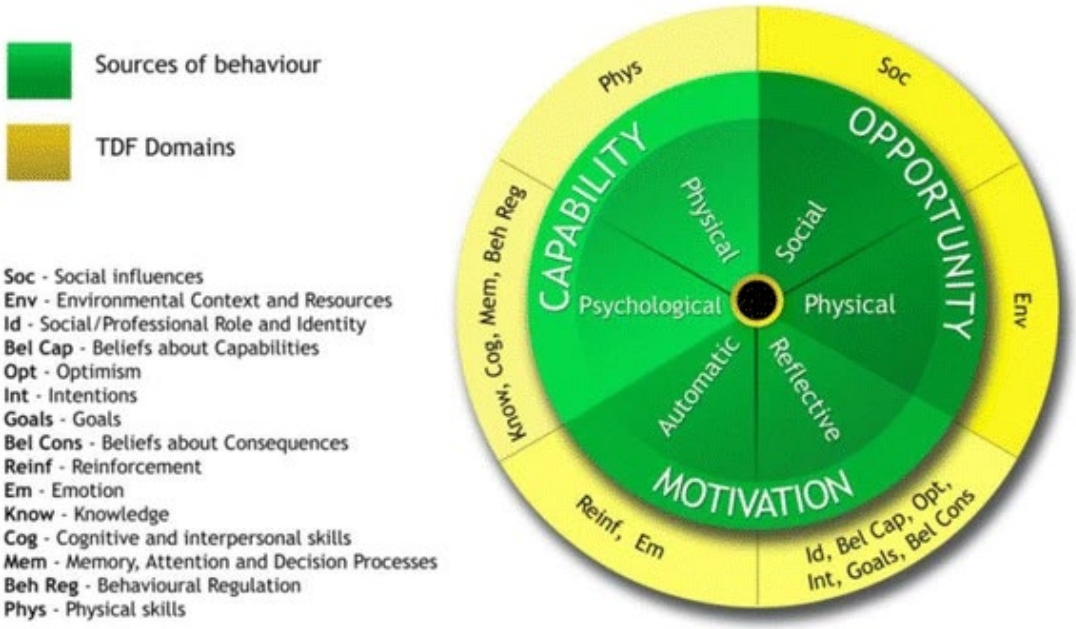

Figure 3.1: Mapping the Theoretical Domains Framework and the COM-B Model of Behaviour (Atkins et al. 2017)

The TDF provides a tool to categorise the factors influencing behaviour into the relevant domain. Domains that fall under the same source of behaviour are then analysed together to form what is known as a COM-B diagnosis (Michie, Atkins and West 2014). This diagnosis is the starting point for any behaviour change intervention design using the BCW. While the TDF has been specifically linked to the BCW, the individual domains can also be used to identify other theories or frameworks (Atkins *et al.* 2017). Whilst all frameworks and models have their limitations in terms of the oversimplification of complex problems and the potential exclusion of valuable data, this can be mitigated by the inclusion of inductive analysis of data that is relevant to the research problem but not specific to the framework or model (McGowan, Powell and French 2020).

3.3.2 The Behaviour Change Wheel

Michie, van Stralen and West (2011) have stressed the importance of evaluating the success of behaviour change interventions to inform future intervention design and implementation. However, in a review of 19 frameworks of behaviour change, very few of these frameworks spoke to an established model of behaviour and none of them included a full complement of intervention functions and policy categories to support the intervention strategies (Michie, van Stralen and West 2011). In response, a new framework called the BCW, was developed and evaluated, to gain a better understanding of behaviour within a given context.

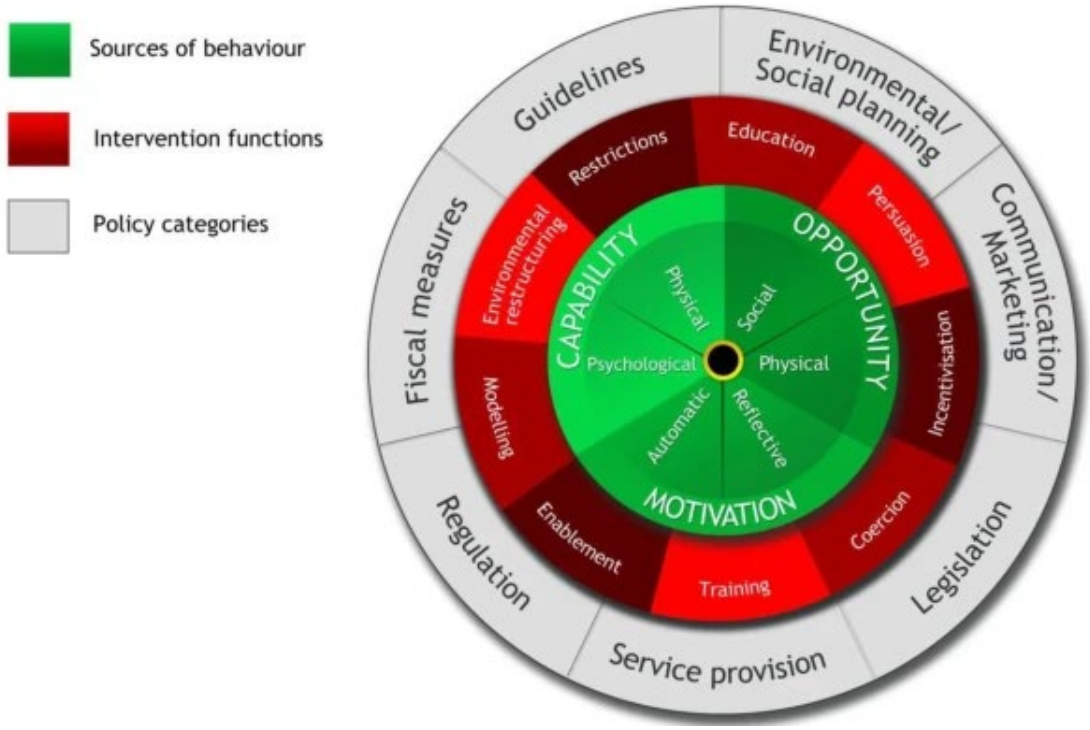

Figure 3.2 The Behaviour Change Wheel (Michie, van Stralen and West 2011)

Like the TDF, the BCW centres around the COM-B model of behaviour. This is illustrated in Figure 3.2 which represents the interaction between the COM-B system of behaviour (in green), the nine intervention functions (in red) and the seven policy categories (in grey). Intervention functions are the ways in which a behaviour can be changed. The term 'function' rather than 'type' is purposeful as one intervention may serve more than one function (Michie, Atkins and West 2014). For example, a marketing campaign may include educational elements, but might also use persuasive techniques. The different intervention functions are defined in Table 3.1.

Table 3.1: Definitions of the BCW Intervention Functions (Michie, van Stralen and West 2011)

Intervention	Definition
Education	Increasing knowledge or comprehension
Persuasion	The use of communication to induce positive or negative feeling or action
Incentivisation	Creating an expectation of reward
Coercion	Creating an expectation of penalty
Training	Developing skills
Restriction	Reduction in the opportunity to enact competing behaviours
Environmental restructuring	Altering the physical or social context
Modelling	Providing a positive example to emulate
Enablement	Facilitating behaviour by increasing capability or opportunity or reducing barriers

3.3.2.1 The BCW Intervention Design Process

Michie, Atkins and West (2014) outline the BCW intervention design process via eight, detailed steps, grouped into three stages. The first stage, where one attempts to understand the behaviour, consists of four steps:

1. Define the target behaviour in behavioural terms.
2. Select the target behaviour.
3. Specify the target behaviour.
4. Identify what needs to change.

During stage one it is important to be as specific as possible, which includes who needs to perform the behaviour and when and where the behaviour should be

performed. Stage four requires a COM-B diagnosis to determine which sources of behaviour should be targeted by the intervention. The second stage, where one identifies intervention options, consists of two steps:

5. Identify intervention functions.
6. Identify policy categories.

Table 3.2 illustrates the link between the sources of behaviour and intervention functions by mapping the intervention functions recommended for each source of behaviour. This allows one to consider all available intervention opportunities. By means of example: when attempting to increase a person's psychological capability to improve hand hygiene, the relevant marked intervention functions to consider would be education, training and enablement. At this stage potential intervention functions should be assessed for suitability via the APEASE criteria: affordability, practicability, effectiveness/cost-effectiveness, acceptability, side-effects, equity (Michie, Atkins and West 2014).

Table 3.2: Matrix table linking Sources of Behaviour to Intervention Function (Michie, Atkins and West 2014)

	Education	Persuasion	Incentivisation	Coercion	Training	Restriction	Environmental restructuring	Modelling	Enablement
Capability Physical					✓				✓
Capability Psychological	✓				✓				✓
Opportunity Physical					✓	✓	✓		✓
Opportunity Social						✓	✓	✓	✓
Motivation Automatic		✓	✓	✓	✓		✓	✓	✓
Motivation Reflective	✓	✓	✓	✓					

Once policy makers have identified the specific intervention functions that target the source of behaviour, the appropriate policy categories to support or enable the interventions can be selected. The link between the intervention functions and policies is shown in Table 3.3. To continue with the previous example, the intervention functions to consider when increasing the psychological capability to improve hand hygiene, were identified as education, training and enablement. In terms of education (highlighted in blue), policy makers could consider a variety of options including marketing via the media and the development and distribution of guidelines. Training (highlighted in green) could include regulating hand hygiene

education in curricula and enablement (highlighted in yellow) could include environmental facilitation, such as freely available hand washing stations or hand sanitiser. Some or all these intervention functions might be regulated by a relevant authority body.

Table 3.3: Matrix table linking the BCW Intervention Functions and Policy Categories (Michie, Atkins and West 2014)

		Intervention functions								
		Education	Persuasion	Incentivisation	Coercion	Training	Restriction	Environmental restructuring	Modelling	Enablement
Policy categories	Communication Marketing	✓	✓	✓	✓				✓	
	Guidelines	✓	✓	✓	✓	✓	✓	✓		✓
	Fiscal			✓	✓	✓		✓		✓
	Regulation	✓	✓	✓	✓	✓	✓	✓		✓
	Legislation	✓	✓	✓	✓	✓	✓	✓		✓
	Environmental/ social planning							✓		✓
	Service provision	✓	✓	✓	✓	✓			✓	✓

At this stage the potential policy categories should again be assessed for the APEASE criteria. Once the appropriate intervention functions and policy categories have been identified, intervention designers move on to stage 3:

7. Identify behaviour change techniques.
8. Determine the mode of intervention delivery.

A behaviour change technique (BCT) is defined as 'an active component of an intervention designed to change behaviour' which is both observable and replicable (Michie, Atkins and West 2014). These include techniques such as habit formation, goal setting and self-monitoring of behaviour. Cane *et al.* (2015) have provided additional guidance by mapping the relevant BCTs to both the TDF domains and the BCW intervention functions. The final step in the design process is to determine the mode of delivery of the intervention, which could be face- to- face or remote and could utilise a variety of media options. It should be noted that the mode of delivery is one of seven components of a BCI to consider during intervention design. The others include content, provider, setting, recipient, duration and fidelity (Davidson *et al.* 2003). At this stage the APEASE criteria should again be considered.

Although the presentation of the BCW in stages implies a linear process, any intervention design should form a cycle of development, feasibility and piloting, evaluation and implementation as represented in Figure 3.3 (Craig *et al.* 2008). The BCW can also be used to evaluate BCIs and investigate the functions played by the various BCTs.

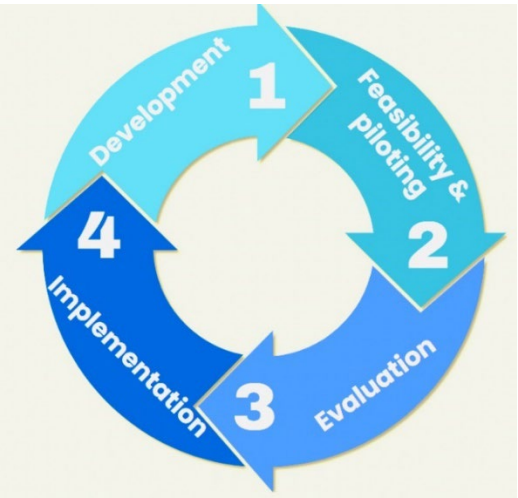

Figure 3.3: BCI development and evaluation process (Craig et al. 2008)

3.4 SUMMARY OF THE CHAPTER

The chapter explored the difference between a conceptual and theoretical framework. The two theoretical frameworks utilised in this study were described in detail with an emphasis on their relation to the COM-B model of behaviour described in the literature review. When used together, these interarticulating frameworks allow for a seamless transition from the investigation of the factors that influence a specific behaviour to the development of BCI that address the behaviour in context. The next chapter, discusses the methodological underpinning of the study.

CHAPTER 4

RESEARCH METHODOLOGY

4.1 INTRODUCTION

This chapter discusses the methodological choice and research design of this study. Reflexivity within qualitative studies as well as the researcher's personal reflections are then explored. In addition, the chapter describes the steps that were taken to collect, analyse and report data as well as actions taken to ensure study trustworthiness. Finally, as all research should be conducted in an ethical manner, ethical considerations are described.

4.2 RESEARCH DESIGN

An interpretative, phenomenological qualitative study design was chosen as this type of study design is appropriate to explain human behaviour within the environment and context in which it occurs.

4.2.1 Qualitative Research

While quantitative studies focus on extrapolating meaning by examining the numerical relationships among variables, qualitative studies aim to give meaning by examining how and why people respond to different experiences (Austin and Sutton 2014). To achieve this, a researcher must collect detailed data that is rich in meaning. Typical data collection methods used include interviews and focus group discussions where the researcher can ask probing questions to gain insight into the experiences of participants, as well as seek clarity where needed. In this study data was collected via individual interviews.

4.2.1.1 Reflexivity in qualitative research

In qualitative research the researcher is a part of the research process and as such will influence the formulation of the study, the way the data is collected and analysed (Flick, von Kardoff and Steinke 2004). While Husserl (1962), the founder of Phenomenology, advised 'bracketing' one's personal bias when using a

Phenomenological design, modern researchers have argued that it is impossible to eliminate this element of subjectivity and that merely acknowledging this is insufficient for trustworthy research (Olmos-Vega *et al.* 2022). Instead, researchers should consider the various reflective issues (personal, interpersonal, methodological and contextual) throughout the study (Olmos-Vega *et al.* 2022).

4.2.1.1.1 Personal reflexivity

The researcher should be transparent about his/her own world view and describe any potential biases or assumptions. Austin and Sutton (2014) suggest approaching this by exploring the following four questions:

Why am I interested in this topic?

What do I really think the answer is?

What am I getting out of this?

What will my professional community think of this work and me?

These questions will be addressed in chapter six.

4.2.1.1.2 Interpersonal reflexivity

The relationship between the researcher and the participants must also be considered as this may influence how the participants receive the questions and how the researcher understands their responses (Olmos-Vega *et al.* 2022). This study pretested the interview guide with participant peers to develop a common interpretation of what was being asked of participants. In addition, the matrix accompanying the interview guide was based on a previous study by (Huijg *et al.* 2014) which informed the coding guideline. It should be noted that the researcher is an academic at the institution from which the student participants were selected. This may have influenced the interviews of participants from the same faculty. The remaining 15 participants were students registered within other faculties and unknown to the researcher.

4.2.1.1.3 Methodological reflexivity

Methodological choices may also impact the data generated by a study, as such researchers should consider how the chosen paradigm, conceptual and theoretical

framework may influence their results throughout the study and adjust if necessary (Olmos-Vega *et al.* 2022). Various methodologies are commonly used in qualitative research, including ethnography, grounded theory and phenomenology. Ethnography generally centres around the observation of participants in their natural setting over a period of time; Grounded theory produces an abstract theory about how the world works and phenomenology seeks a common understanding of a particular experience (Austin and Sutton 2014). Phenomenology was selected as the most appropriate methodology for this study.

4.2.1.1.4 Contextual reflexivity

For research to be authentic and ethical, the social context must be considered. This can be achieved by examining the study setting and reflecting accordingly (Olmos-Vega *et al.* 2022).

4.2.2 Interpretive phenomenology

Phenomenology is a philosophical term that refers to both the objective and subjective experiences of all perceived phenomena. This includes not only the way in which we experience things, but also the meaning that we attribute to such an experience (Omona 2013). As such, research questions associated with phenomenology tend to ask questions about what it is like for an individual to experience a particular situation (Holloway and Todres 2003) so that the researcher can gain a detailed understanding, from which they can then derive essences of such an experience. Heidegger (1962) developed interpretive, hermeneutic phenomenology as a particular philosophical approach to phenomenology which incorporates the concept of 'lifeworld' or view that the life experience is influenced by external factors, which in turn guide the individual understanding and engagement with their 'lifeworld'. These influences cannot be separated from the experiences (Heidegger 1962) and extend to the researcher themselves due to 'pre-understandings' or preconceived notions that will influence the interpretation of the data. While the researcher acknowledges the similarities between a qualitative descriptive design, a descriptive phenomenological and an interpretive phenomenological design, an interpretive phenomenological design was specifically chosen for this study due to the following reasons. This study aimed to not only describe the adoption of the personal non-pharmacological intervention (NPI) measures by students at a University of Technology, it also aimed to understand the

adoption in terms of the greater global context as interpreted by the participants as it seemed to them at the time, essentially what it was like for these students to adopt these NPIs during the COVID-19 pandemic (van Manen 2017). The COVID-19 pandemic was unprecedented in terms of state control and nationwide fear in post-apartheid South Africa, as well as the first novel, global pandemic with the limitless potential for the spread of social media misinformation (Friedman 2021).

As Michie, Atkins and West (2014) highlight the importance of both the individual's physical and social environment in behaviour change, this study adopted an interpretivist approach where a researcher gains an understanding of human experience within a socially constructed reality.

4.3 STUDY SETTING

eThekwini is the largest city in the province of KwaZulu-Natal, and the third largest city in South Africa. It has a population of over three million residents. According to the Statistics South Africa (2016) Community Survey statistical release, eThekwini's demographics are similar to national statistics. The mean age of the residents was 27 years with 33.5% of the population aged 15-34 years. Living conditions in the city were suboptimal; only 60.8% of households had piped water to their dwellings and 13.3% of households were informal in nature. The number of people living in each household averaged four. As of December 2022, KwaZulu-Natal had 724,619 confirmed COVID-19 infections, 16,290 confirmed COVID-19 related deaths (National Department of Health (South Africa) 2022a) and eThekwini had an estimated 14 107 excess natural deaths of persons aged over one year (Bradshaw *et al.* 2022).

4.4 STUDY POPULATION

The population of this study consisted of students at the Durban University of Technology (DUT). DUT is the second largest higher education institution in KwaZulu-Natal and is located primarily in the eThekwini municipality. Of the approximately 33 000 registered students at the university, almost two thirds are accommodated in student residences (Durban University of Technology n.d). The racial breakdown of the student body is mainly black African race (89%), followed by 9% Indian, 1% Coloured and 1% Caucasian (Durban University of Technology 2020). The university

has six faculties: Accounting and Informatics, Applied Sciences, Arts and Design, Engineering, Health Sciences and Management Sciences.

4.5 SAMPLING PROCESS

Polit and Beck (2010) describe sampling as a cohort of individuals chosen to represent the total population. Purposive sampling, a form of non-probability sampling, was chosen to gather data that was rich in meaning. A maximum variation sample of participants from all faculties was selected to ensure a non-homogenous sample that would allow for the identification of key variable features of the experience of the adoption of the non-pharmaceutical intervention (NPI) measures from varied contexts. This type of design may include participants from different perspectives or backgrounds to ensure that the experience is portrayed with valid complexity (Omona 2013) and has been described as an appropriate technique for use with the Theoretical Domains Framework (TDF) (Atkins *et al.* 2017). As the study focused on the adoption of NPI, maximum variation was considered in terms of compliance and non-compliance. To achieve this, potential participants were screened using a screening tool (Appendix A), where respondents were asked if they believed that they had mostly complied or not complied with the required COVID-19 precautions. Those with ambiguous adoption were excluded.

4.5.1 Sample Size

In qualitative research, there is no predetermined sample size (Creswell *et al.* 2007; Creswell 2014) stated data collection continues until data saturation has been achieved (Lincoln and Guba 1985). This is reached at the point where no new analytical information is found and the maximum amount of information on the phenomenon has been obtained (Atkins *et al.* 2017). While Moser and Korstjens (2018) state that phenomenological studies require fewer than ten participants, Francis *et al.* (2009) recommend a minimum of ten participants when using the TDF. The minimum number of participants for this study was set at 12. Ultimately 18 participants were interviewed with three participants from each faculty. Each participant was interviewed individually, on a single occasion.

4.5.2 Inclusion Criteria

- Any DUT student that had been registered at DUT for the duration of the COVID-19 pandemic (i.e., from March 2020 up to the period of data collection).
- Students who perceived themselves to have complied with the required NPIs most of the time or students who perceived themselves to have minimally altered their behaviour to comply with the NPIs (not neutral perception of adoption).
- Students aged 18-24 years at the time of interview.

4.5.3 Exclusion Criteria

- DUT students under the age of 18 years or over the age of 24 years at the time of interview.
- DUT students who participated in the study pretesting focus group discussion.
- DUT students who did not provide informed consent.

4.6 RECRUITMENT PROCESS

Invitations (Appendix C) were sent to all university students via their student email accounts by way of the student 'Pinboard' to comply with the POPI Act. Students who were interested in participating in the study were invited to contact the researcher telephonically or by email for further information. All potential participants were screened for eligibility for the study (Appendix A). Once eligibility was established, potential participants were sent a letter of information and informed consent (Appendix D) to read, sign and return prior to interview. As the data collection took place during the National State of Disaster due to the COVID-19 pandemic, an individual online interview, via Microsoft Teams, was then arranged.

While there was no pressure or coercion to participate, participants did receive a data voucher to a value of between R80-R99 as compensation for data used during the interview. This value was dependent on the options available on the participant's chosen cellular network: Cell C – R80; Vodacom – R85; Telkom mobile and MTN - R99.

4.7 DATA COLLECTION PROCESS

Data collection is a process of gathering information to meet the aims and objectives of the study and solve the research problem (Polit and Beck 2010). Once written informed consent was received, the researcher conducted individual, in-depth, semi-structured interviews using an interview guide (Appendix B) where participants were asked about their personal experience of NPI adoption in response to the COVID-19 pandemic. These interviews were a maximum of 45 minutes in duration and were recorded, with permission to include only the audio. The interviews were transcribed verbatim. At the time of transcription, a participant code was allocated, and all personal identifying information removed to ensure confidentiality. The interview guide included a section for biographical details like age and gender which were also recorded.

4.7.1 Data collection instrument

The interview guide was developed to include an open question for the personal, lived experience of the adoption of each NPI during the COVID-19 Pandemic, with follow up prompts factoring their individual capacity, opportunity and motivation for the adoption of behaviours. These prompts also explored personal barriers or facilitators of change, as well as personal perception of the influence of the different interventions. A matrix of individual prompts for every TDF domain, under each NPI was developed under guidance from Huijg *et al.* (2014) for use in conjunction with the interview guide. This ensured that all domains were explored for each NPI.

The interview guide underwent pretesting to ensure applicability in a 'real world' setting via a focus group discussion. The focus group consisted of the researcher, a supervisor and three student participants. Although no data was collected, written informed consent (Appendix E) was obtained prior to the focus group discussion. The focus group did not result in any changes and the interview guide was finalised. A coding guideline (Appendix F) was developed for deductive analysis by the researcher and a research assistant to minimise any discrepancies in coding. This guideline consisted of a set of statements of how the TDF would be applied to the data set.

4.8 DATA ANALYSIS

Data analysis is a process whereby the researcher organises the data in an attempt to gain a greater understanding of the content (Creswell *et al.* 2007).

The transcribed interviews were uploaded to NVivo Release 1.7.1 for organisation, storage and analysis. In this study, data analysis was separated into deductive and inductive analysis.

4.8.1 Deductive analysis

Deductive analysis occurs where qualitative data is coded into predetermined categories. These categories are often guided by established theory or hypotheses (Thomas 2016). Deductive analysis was achieved by coding responses into each NPI or the appropriate domain. Where more than one domain was applicable, responses were coded into all identified domains to avoid loss of context. The coded data then underwent further analysis, where responses were grouped to create subthemes of common ideas and/or statements of common beliefs underpinning each response. The subthemes represent factors perceived to influence behaviour, whereas a belief statement is a collection of responses whereby a similar belief influences adoption of the target behaviour (Francis *et al.* 2009). Each subtheme or belief statement was counted once per participant and included in the results as a frequency across all interviews. The strategy was also used for the inductive analysis.

While all of the domains were considered, their degree of relevance was determined by the following criteria (Patey *et al.* 2012).

1) Relatively high frequency of specific beliefs.
2) Presence of conflicting beliefs.
3) Evidence of strong beliefs that may affect target behaviour.

4.8.2 Inductive analysis

McGowan, Powell and French (2020) found that TDF studies that included inductive analysis of non-TDF data resulted in a greater understanding of the determinants of behaviour and how these determinants interact in context. Participant statements that were relevant to the aim of the study but did not align with the TDF domains were

analysed inductively via the Tesch (1992) method and Braun and Clarke (2006) approach.

1) The transcript was read it its entirety.
2) The researcher reflected on the underlying meaning of the information.
3) A list of themes was drawn up.
4) Information was coded to the appropriate theme.
5) Themes were categorised by descriptive wording.
6) Categories were coded.
7) Preliminary analysis.
8) Recoding (if necessary).

4.9 DEVELOPMENT OF GUIDELINES FOR THE DESIGN OF BCIs TARGETING SOUTH AFRICAN ADOLESCENTS

Large scale behaviour change interventions (BCIs) targeting South African youth have been unsuccessful, in part, due to poor design and the use of theoretical frameworks that do not take sociocultural context into account (Mwale and Muula 2017). The Behaviour Change Wheel (BCW) was chosen as the framework to design BCI in South Africa due to its comprehensive nature and focus on behaviour in context (Michie, Atkins and West 2014). The BCW design process involves eight steps in three stages as illustrated in Figure 4.1.

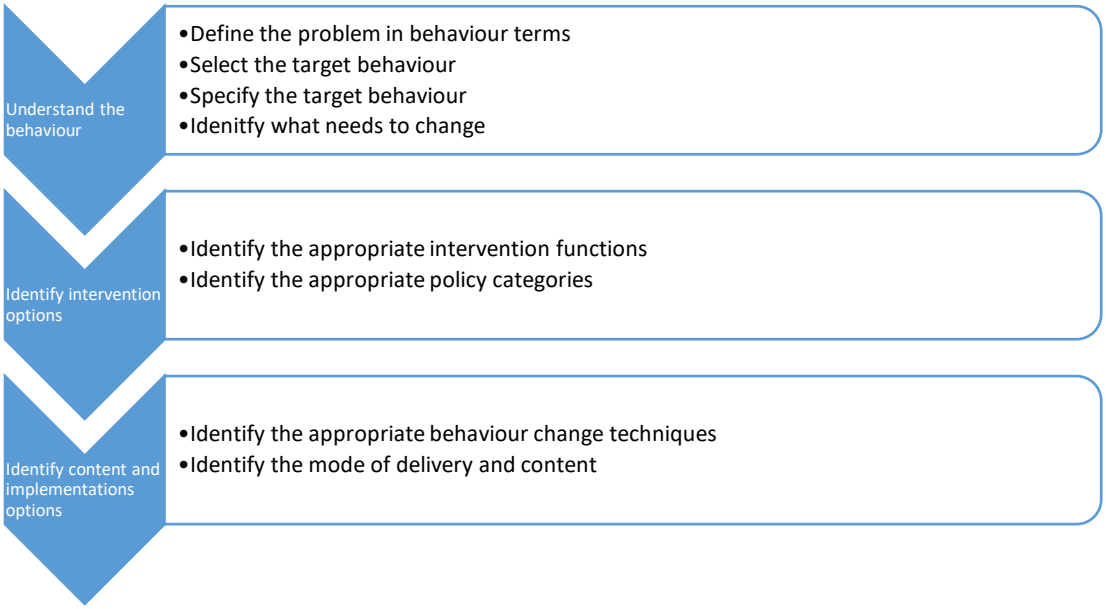

Figure 4.1: BCW design process (Michie, Atkins and West 2014)

The BCW however, lacks specificity in terms of the design of interventions to target adolescents. The researcher developed these guidelines by following the World Health Organisation (WHO) fundamental steps for guideline development (World Health Organisation 2019a). These five steps consisted of two conceptual considerations: scoping of guidelines and formulating questions and methodological considerations: synthesising the evidence; grading of the evidence and finally formulating recommendations. The final step requires consideration of the WHO-INTEGRATE evidence-to-decision framework, a comprehensive framework founded on the norms and values of the WHO to provide for ethical health-based interventions at various levels. The WHO-INTEGRATE evidence-to-decision framework includes the balance of health benefits and harms; human rights and sociocultural acceptability, health equity; equality and non-discrimination; societal implications; financial and economic considerations, feasibility and health system considerations and the meta-criterion of quality of evidence (Rehfuess *et al.* 2019).

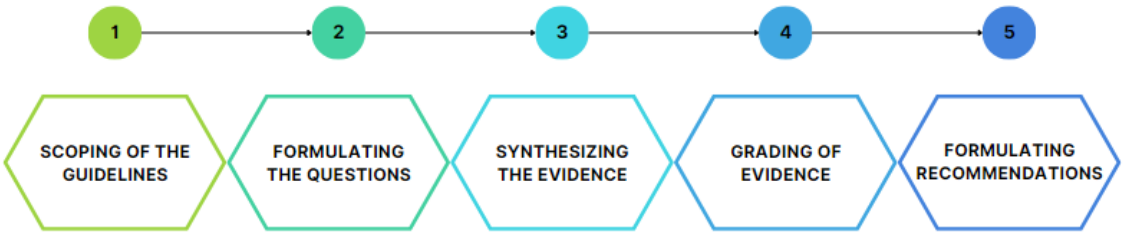

Figure 4.2 Process of Guideline Development

(World Health Organisation 2019a)

To ensure content validity, clarity and applicability, guidelines should undergo external review (Woolf *et al.* 2012). These guidelines were reviewed by a psychologist with expertise in neuropsychology and behavioural medicine.

4.10 RESEARCH TRUSTWORTHINESS

Lincoln and Guba (1985) outlined four criteria for trustworthy qualitative research as credibility, dependability, confirmability and transferability. Authenticity was added as relevant to constructivist/ interpretivist research a decade later (Guba and Lincoln 1994).

4.10.1 Credibility

Polit and Beck (2014) consider the confidence in not only the findings but the study itself to be the most important criterion in establishing trustworthiness. Strategies to achieve credibility in the data collection and analysis included the audio recording of interviews with member reflection (previously referred to as checking) (Olmos-Vega *et al.* 2022), verbatim transcription and co-analysis of the collected data.

4.10.2 Dependability

Dependability is the reliability equivalent in quantitative research and refers to the stability of data over time (Polit and Beck 2014). Dependability was achieved by accurate record keeping and process logs. A research assistant was employed to assist with transcription and to act as a second coder. The results and recommendations were discussed with an external advisor, with expertise in the field.

4.10.3 Confirmability

Confirmability is the degree of consistency of the findings and potential for repetition, equivalent to objectivity in quantitative research (Polit and Beck 2014). To ensure confirmability, detailed records (including voice recordings and verbatim transcripts) were kept of all research activities and analysis throughout the study. This allowed for peer analysis via a second coder. Where there were discrepancies in the coding, this was resolved through dialogue.

4.10.4 Transferability

Transferability refers to the extent to which the findings would be applicable to other population groups or similar groups in different settings (Polit and Beck 2014). For this to be achieved the researcher has provided a detailed description of the research setting and process. This will allow for future studies to add to this body of work.

4.10.5 Authenticity

While the first four criteria are primarily concerned with methodology, authenticity addresses issues like empowerment and accountability. This requires that participants be drawn from all relevant groups as well as being fully informed of all processes throughout the study to enable a trusting, transparent researcher-participant relationship (Guba and Lincoln 1994). As such the findings of qualitative studies can only be authentic when all participants are treated equally, and data is both collected and analysed in an impartial manner (Lincoln and Guba 1986). To achieve this, all participants were interviewed using the same interview guide, member checking and peer analysis was utilised. In addition, the participant demographics equally represented the relevant genders and DUT faculties.

4.11 ETHICAL CONSIDERATIONS

All research should be conducted in an ethical manner and in accordance with the Ethics in Health Research: Principles, Processes and Structures as set out by the National Department of Health (2015). Ethical approval to conduct this study was obtained from the Institutional Research and Ethics Committee (IREC) of the Durban University of Technology (DUT): ethical clearance number IREC 176/21 (Appendix G). In addition, gatekeeper permission (Appendix H) was obtained from the Director of

Research at DUT prior to the distribution of the invitation to participate. The participants were provided with a letter of information and consent (Appendices D) and signed written consent was obtained prior to data collection. Participation was voluntary and participants were reminded that withdrawal from the study was possible at any time.

The identities of all participants were protected, and any identifying information was removed in all data, except for the signed informed consent form. Each participant was assigned a reference code for record keeping and data collection. All data was collected electronically and is stored under password protection. This data will be kept for a period of five years; after which it will be destroyed.

The principles of research ethics, namely autonomy, non-maleficence, beneficence and justice, were maintained in the study.

4.11.1 Autonomy

Autonomy refers to the ability of the participants to engage in independent decision making (Polit and Beck 2010). To do so, participants must be provided with sufficient information about the study and what is expected of those who participate so that they can make an informed decision about whether they wish to enrol. All participants were provided with a letter of information and consent form. There was no pressure to participate and while there was compensation for data used, this was not viewed as an incentive. It would not be fair to expect students to use their personal data at their own cost to participate in this study. This was not required by any participant.

4.11.2 Non-Maleficence

Researchers must take all possible steps to prevent any harm to participants that may occur by virtue of their participation in research (Polit and Beck 2010). Due to the nature of the study, there were very few potential risks for participants. Provision was made for referral to student services should a participant become distressed recalling traumatic events related to the COVID-19 pandemic.

4.11.3 Beneficence

The purpose of research is to gain new knowledge that is useful to society. A researcher must maximize benefits for participants while minimizing the risks. This study aimed to benefit participants by improving future adolescent behaviour change interventions while placing participants at very little risk. In addition, financial risk was mitigated by the compensation of data used for the online interview. Confidentiality was also maintained throughout to protect participants from reputational risk.

4.11.4 Justice

Justice refers to fairness in how the benefit and risks of the study are distributed. Care must be taken when choosing an appropriate sample population that accurately reflects those targeted by the research. In this study, participants were selected evenly across males and females, and all six faculties. The demographic breakdown was representative of the regional population group.

4.12 SUMMARY OF THE CHAPTER

This chapter described the research design of the study, describing qualitative research and the importance of reflexivity when conducting such research. The study setting and research procedure was then detailed including the process of data collection and both deductive and inductive analysis. The strategies to develop guidelines were outlined via established methods. Finally, the steps taken to ensure trustworthiness of the study as well as ethical considerations and the principles of ethical research were discussed.

CHAPTER 5

PRESENTATION OF FINDINGS

5.1 INTRODUCTION

The previous chapter described the research design for this study and provided the steps that were taken to collect and analyse the interview data. This chapter describes the participants of the study and presents the findings that were elicited by the analysis of the data collected. These findings are presented in the following order: the participant demographics, the adoption of the three specific non-pharmaceutical intervention (NPI) measures, the facilitators and barriers to NPI adoption via each Capability, Opportunity, Motivation, Behaviour (COM-B) model sources of behaviour, and themes relevant to the study aim that were elicited via inductive analysis.

5.2 PARTICIPANT DEMOGRAPHICS

The participants of the study comprised 18 DUT students distributed evenly across six faculties. All major South African racial groups were included in proportions that broadly represent the provincial and institutional statistics: most participants were Black African (78%, n = 14), followed by Indian (11%, n = 2) with a single participant from each of the Caucasian and Coloured racial categories. While male and female participants were equal in number, with nine participants from each gender, this was not intentional. Slightly more than half (n=10) lived within the family home for the entirety of the COVID-19 pandemic, up until the time of data collection. The remaining eight participants had resided at different places during the pandemic with four residing at the family home during stricter restriction levels and in student resident accommodation when the government issued regulations allowed for them to do so.

The demographic data of the participants is depicted in Table 5.1

Table 5.1: Demographic data of participants

Code	Age	Gender	Race	Place of residence during the COVID-19 Pandemic
PA 1	23	M	Black African	Family home and Student residence
PA2	21	F	Coloured	Family home
PA 3	22	F	Caucasian	Family home
PA 4	22	M	Black African	Family home
PA 5	22	M	Black African	Primarily Student residence
PA 6	23	M	Black African	Primarily Student residence
PA 7	21	M	Indian	Family home
PA 8	24	F	Black African	Family home (Rural)
PA 9	21	M	Black African	Primarily Student residence
PA 10	21	M	Black African	Family home
PA 11	20	F	Black African	Primarily Student residence
PA 12	21	F	Black African	Family home and Student residence
PA 13	23	M	Black African	Family home
PA 14	20	F	Black African	Family home
PA 15	22	M	Black African	Family home
PA 16	21	F	Indian	Family home
PA 17	23	F	Black African	Private residence
PA 18	21	F	Black African	Family home and Student residence

5.3 ANALYSIS OF THE STUDY DATA

The data was analysed both deductively and inductively, as described in the previous chapter. This analysis is illustrated in Figure 5.1. For deductive analysis, data was coded into each NPI or Theoretical Domains Framework (TDF) domain. The findings present each domain under the appropriate source of behaviour: Capacity, Opportunity and Motivation as per the COM-B model of behaviour. Emergent themes that did not align to the TDF domains but were applicable to the aim of the study were analysed using thematic analysis. Specific belief statements were generated from each participant response to express the central thought. These belief statements are presented in Table 5.2; 5.3; 5.4; 5.5 and 5.6. Where a similar belief was expressed by multiple participants, a common belief statement or subtheme was generated to capture core thought and the frequency was noted (Patey *et al.* 2012). A selection of verbatim quotes were included in each table to add context and transparency. Quotes are however also included in the written section of the findings for continuity and ease of reading.

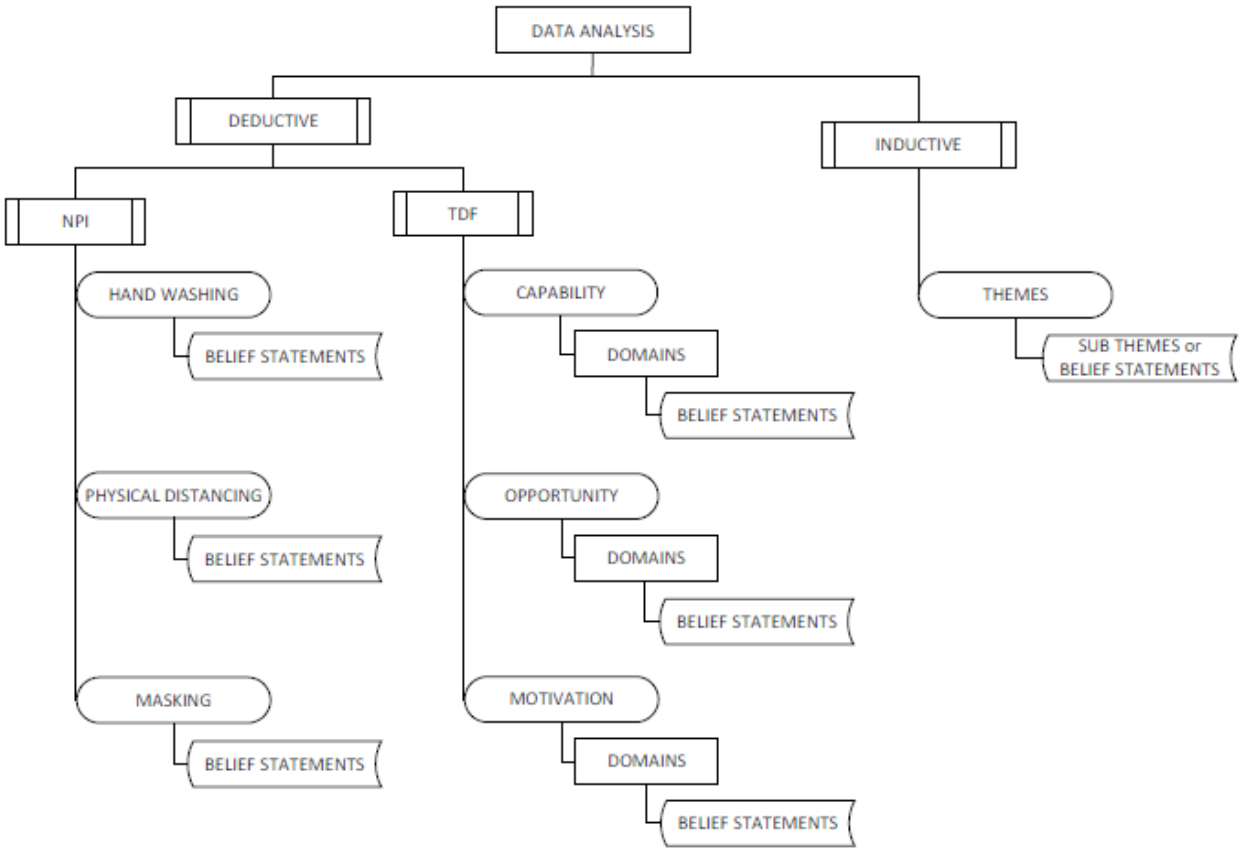

Figure 5.1: Flow diagram of data analysis

5.4 DEDUCTIVE ANALYSIS OF SPECIFIC NPI ADOPTION

The South African government legislated a range of regulations, requiring mandatory adoption of the three personal NPIs of hand sanitisation, mask wearing and physical distancing. Interviews were deductively analysed to compile belief statements for these specific behaviours which are presented in Table 5.2. Adoption evolved over time and was comparable to that of developed countries (Kollamparambil and Oyenubi 2021). Predictably, mask wearing increased when mandated, while physical distancing declined as the restrictions were lifted. Participants of this study did not necessarily adopt all of the NPIs equally, nor were there any notable differences associated with adoption and gender or residence. Hand sanitising was generally accepted as good hygienic practice and something that should be done regardless of the COVID-19 pandemic.

PA1: The one of the hands, I think that one is most important, even with or without COVID.

The main negative sentiment expressed, was being forced to sanitise when entering every shop or university entrance.

PA10: It is kind of irritating. Especially if you go into a mall where like every store that you go into you need to sanitise, going to another store, you sanitize

Overtime, masking was normalized as participants adapted to wearing them. Masks were mostly worn when in public or crowded areas with little compliance when outdoors or alone. Masking did however hamper breathing and some participants removed their masks when exercising. Both masking and physical distancing were unlikely to occur when with loved ones.

PA13: If I am at home, maybe with my friends, there was no social distancing.

PA18: I don't wear mask when I'm at home [or] when I'm around family and friends.

Table 5.2: NPI specific beliefs and behaviours

NPI	Belief statement/Sub theme	Examples	Frequency
Hand washing/sanitising	Sanitising hands makes sense in general due to germs	PA1: The one of the hands, I think that one is most important, even with or without COVID. Taking the fact that there are so many germs that we have got around the area. Even on everything you touch. I think that one, it's very nice and its hygienic and it makes sense to me. PA18: And the sanitizing. I think it does make a difference. Uh, because we touch a lot of things each and every day that passes by. So, having to clean your hands and get rid of the germs and bacteria. I think it does make a difference.	6
	I had my own personal sanitiser	PA9: If I go into a taxi I am going to bring my own sanitizer. PA12: I also have a hand sanitizer with me in my car and one in my bag. So my school bag and in my handbag for on the go if I need to sanitize my hands after I've touched anything.	5
	It's pointless to sanitise one's hands at each entrance	PA10: It is kind of irritating. Especially if you go into a mall where like every store that you go into you need to sanitise, going to another store, you sanitize PA12: Because literally you would walk out of another campus, maybe cross the road and go to the library. You get sanitized there as well. So, wherever you go, it's just sanitise, sanitise, sanitise.	3
	I didn't sanitise when alone	PA10: but when I was living alone, obviously there's like if I have it, it's kind of late at that point, so it's kind of useless putting on hand sanitizer. PA12: I most likely not to do it [sanitise] when I'm in my own personal space.	3

Physical distancing	With friends and family there was very little to no physical distancing	PA13: And also wearing a mask, like if I am at home, maybe with my friends, there was no social distancing. PA10: then when they were at my house there was absolutely no physical distancing.	5
Masking	I don’t wear masks around my friends and/or family	PA10: They don't live with me but at the same time I feel like I can still not wear my mask because they're very close. PA11: I never wear my mask with my family PA18: I don't wear mask when I'm at home, when I'm around family and friends.	9
	I don’t wear masks outdoors	PA12: So even when I go out now, I will wear it just to show, but once I'm outside, far away, I just put it down. I'm like, well, I need to breathe PA3: but if I go outside, and walk on the road, I won't even take one. If I go down to the beach just to be out in the open, I won't take a mask.	7
	I wear a mask in public/crowded areas	PA10: I don't wear my mask unless obviously we're out in a public area. PA6: Let's say I'm walking out of res, since I don't have a car and I'm a student, during that time I don’t wear it because there is no one next to me and I don’t like wearing it. But the moment I see that I’m in a crowded place, I normally wear it.	4
	I didn’t wear a mask when alone or in my personal space	PA16: When I'm like alone because I was alone many a time at campus, like the only person in the room, or if it was just me and another friend who I was like close with. Pretty much those times. PA3: You know, if I'm walking alone and there's nobody around me, is it really necessary to be wearing my mask?	4
	I didn’t wear a mask when exercising	PA3: If I go to the gym, they make you wear it unless you do high intensity workouts and it's very difficult to wear a mask and do any form of exercise or movement really?	2

		PA7: I was running on the treadmill I had to sort of take off my mask because it was obscuring my view from what's beneath me, like my feet and I didn't want to stumble and fall. So in that regard, I took off my mask.	
	I took my mask off to breathe	PA18: It's hot outside, you're sweating and everything, and you have to wear mask on top of that, you can barely breathe. So I think uh, me not breathing is the reason why I took my mask off. PA13: So even when I go out now, I will wear it just to show, but once I'm outside, far away, I just put it down. I'm like, well, I need to breathe.	2
	I got used to wearing a mask	PA14: So I tried to keep it on all the time. So yeah. The change at first it was hard to adapt to, but now it's become the new norm PA18: That's weird because we have kind of gotten used to the fact that we are wearing masks now.	6

5.5 DEDUCTIVE ANALYSIS USING THE TDF

Data was independently analysed deductively by coding data into the TDF domains by matching statements with their appropriate domain. The results are presented under the sources of behaviour according to the COM-B model: capability, opportunity and motivation. In each section the appropriate domains are presented in order of significance.

5.5.1 Capability to adopt the NPIs

As previously stated, for behaviour change to occur, a person needs to understand what changes are required, why they are important and how they can be achieved (West *et al.* 2020b). The facilitators and barriers identified in this study that are associated with the capability to perform the NPIs are summarised in Figure 5.2. Facilitating factors included trust in international organisations, the scientific community and health care workers (HCW), the ability to discern reliable sources of information, access to accurate, practical information and the demonstration of necessary skills. By contrast, factors that acted as barriers to adoption included distrust in government with confusion relating to changing guidance, misinformation, misalignment of government regulations and academic literature, and forgetfulness.

Figure 5.2 Facilitators and Barriers associated with capability to adopt the NPIs

The belief statements coded to the domains under capability, along with examples and frequency are presented in Table 5.3.

5.5.1.1 Domain: Knowledge

This domain was the most pronounced domain within the capability section. This domain was included in every interview with a total of 168 references throughout the study. As SARS-CoV-2 was a novel virus at the beginning of the pandemic, little was known about the virus. Participants showed an active interest in gaining knowledge about COVID-19 by doing their own research. The main information sources identified were the internet, international organisations like the World Health Organisation (WHO), government broadcasts and notices as well as health care workers (HCW). Participants were aware of the presence of false information which resulted in uncertainty about what information was accurate.

PA8: Honestly, at this point I don't even know what's true, and I don't even know what to believe.

HCW were however a common and trusted source of information.

PA11: My neighbour is a nurse. She updates me.

Risk factors for severe disease were well understood with both advanced age and diabetes highlighted in this regard. In addition, most participants had an adequate understanding of the NPIs, how to perform them correctly and the rationale behind them. Hand sanitising was seen as a valuable tool to protect against SARS-CoV-2 as well as other pathogens. It was understood that COVID-19 was spread via droplet spread and how masks helped to prevent this from occurring indoors and in crowded spaces. The converse was true when outdoors. This understanding was not universal as approximately one third of participants did not believe masks to be effective in preventing the transmission of COVID-19.

PA16: because of personal experiences and information that I do know about masks and how ineffective they can be.

Two male participants doubted the existence of COVID-19 and believed that the pandemic might have been politically motivated. Both participants were distrustful of the governing party.

PA1: I came to a conclusion that, maybe there's no COVID, that maybe this thing is politically affiliated or what.

5.5.1.2 Domain: Memory, attention and decision processes

Twenty-four individual statements from nine participants were coded to this domain. Except for handwashing, the NPIs were not commonly practised behaviours prior to the COVID-19 pandemic and at times each behaviour was forgotten. Visual cues or witnessing other people performing the behaviour were viewed as useful reminders.

PA1: But I tend to forget it and honestly, I tend to forget that I got sanitizer but once I see it, then I use it. Even if there's no reason, I just use it when I see it.

5.5.1.3 Domain: Behavioural regulation

Thirteen statements from nine participants were coded to this domain. At the beginning of the pandemic participants frequently forgot their masks but as the pandemic progressed some participants planned ahead to ensure that they had their own sanitiser and masks available. Some participants reported carrying their own sanitiser with them for reasons of convenience, quality and preference of consistency and fragrance.

PA12: I resorted to buying my own sanitiser. So instead of using the security guards one at the gate, I just take my own one, that was a gel that was comfortable for me to use.

5.5.1.4 Domain: Skills

Fourteen statements from nine participants were coded to this domain. No participants reported difficulty in performing the NPIs. Skills were acquired via demonstration and reinforced with colloquial names such as doing ‘the 20 second shuffle’ when washing hands.

PA14: I would say I have the privilege of having a mom that’s a nurse. So she told me the steps of washing hands, the proper steps that gives washing your hands. So I tried to practice them for a few times, but then I was just like this is just a lot.

Two participants used the ‘fist bump’ when greeting others rather than shaking hands.

Table 5.3: Belief statements/sub themes of domains listed under capability

Domain	Belief statement/Sub theme	Examples	Frequency
Knowledge	I did my own research	PA5: I am comfortable because I did my research, my own research about the COVID. PA13: I can listen to something, but I won't directly believe, or maybe take it in, but I will go out and do more research. PA18: So, in 2020 I did a lot of research I think, because every time I had a question, I will go on the Internet.	6
	I got information from health care workers	PA11: My neighbour is a nurse. She updates me. Even my jab. My first jab I got it from her, you know, she was really helpful throughout the whole yeah process. PA12: I was following that the government page online and my aunt, she is a senior manager in the health section. So, she would always tell us information PA14: I would say I have the privilege of having a mom that's a nurse. So, she told me the steps of washing hands, the proper steps that gives washing your hands. So, I tried to practice them for a few times, but then I was just like this is just a lot.	5
	I don't know who to trust or what is true	PA2: And you don't know what's true. PA6: I am not sure whether to trust anyone at this point in time. PA8: Honestly, at this point I don't even know what's true, and I don't even know what to believe. PA18: So, now how do I know what is written in this website is true?	5
	COVID is novel and we do not fully understand it	PA8: We didn't have the full understanding of how this works PA16: I still believe we do not know a lot about the virus	4

	COVID-19 is droplet spread/airborne	PA14: Yeah, I would say the mask. As it is an airborne disease, I feel like, you know, something that's most likely to spread an airborne disease is your mouth. So having to cover up your mouth, I think that reduces the spread of, you know, the COVID virus. So, the mask I do feel like it's a good way to prevent the spread of the virus PA3: Where there's a lot of touching everything and then it's mostly the speaking because you get your physical germs on everything that way	4
	I was not sure COVID-19 existed	PA1: So for me not to wear mask at first is, that I really don't believe in COVID PA8: Because at first, I didn't really believe that there was really COVID and people were really dying.	2
	COVID-19 could be politically motivated	PA1: I came to a conclusion that, maybe there's no COVID, that maybe this thing is politically affiliated or what PA3: I have a funny feeling it's to do with politics at the end of it	2
	COVID-19 has been exaggerated	PA6: The way things have been so exaggerated; it has cost the economy so much. I do believe that when it is time for anyone to die, it will happen PA3: I don't see the real urgency of COVID, that maybe a lot of other people are seeing. I don't feel it's as bad as everybody thinks it might be	2
	People with COVID-19 will show symptoms	PA3: Also, very real about the fact that if you're not feeling well, rather just don't see them, PA10: If I did feel any symptoms, then I was like no. You guys aren't allowed to come to me for like the next week or two.	3
	I know how to wash my hands correctly	PA1: Most young people, they know how to wash from 30 seconds to one minute. We know and we see the need. PA14: I would say I have the privilege of having a mom that's a nurse. So, she told me the steps of washing hands, the proper steps that gives washing your hands	4

	We should wash our hands to remove germs regardless	PA1: But with the one of the hands, I think that one is most important, even with or without COVID. Taking the fact that there are so many germs that we have got around the area. Even on everything you touch. PA18: And the sanitizing. I think it does make a difference. Uh, because we touch a lot of things each and every day that passes by. So having to clean your hands and get rid of the germs and bacteria	4
	Older people are at risk for severe COVID-19	PA1: We have got that thing that says that 'COVID only affects older people'. PA6: Yes, according to science, the older you are the more you are at risk.	5
	Diabetics are at risk for severe COVID-19	PA4: I don't think that there would be that much risk because she is not that old and she has no diabetes. PA7: I don't want her to contract the virus because she also has some underlying health issues such as diabetes, so in terms of that, that will detrimental to her health.	3
	I know how to wear a mask correctly	PA10: I definitely wear the mask. I wear my mask the proper way. I don't put it like under my nose or over my mouth.	1
	Masks are not effective at preventing transmission of COVID-19	PA1: what is the point of wearing a mask? Other people, they are now making their own masks to cover their faces, but there may be pores or holes in that cloth which means that if there are germs, if you cough, they might come out. So even now we're still questioning why we have to wear masks, because I can just make my own mask from my own clothing where it seems like I am covering my mouth but when I am coughing, it's possible that bacteria can come out. PA16: Yes', because I do believe that, okay it has some value and 'no' because of personal experiences and information that I do know about masks and how ineffective they can be. So, I also thought it was stupid over time.	5
	Wearing a mask when alone is unnecessary	PA16: Most of the time, because I'm completely alone. Even the place where I go running or whatever, I was pretty much the only person there.	3

		PA6: But just when you're walking alone and then they expect you to put on your mask. I will never support that and it's wrong.	
	Wearing a mask outdoors is unnecessary	PA5: it's basically in the open spaces, like for example, if I'm walking for long distances, so it's draining to have a mask 24/7. I usually put it on when I'm closer to the place or the shops or the campus. PA7: when I'm outside or at other venues, I try to be in well ventilated venues and venues that aren't overcrowded because of obvious the reasons.	2
	I know the physical distancing requirements	PA1: I know there was a rule that said when you're in the shop you have to give the front person a space that is equal to your trolley, PA10: Because If I'm at the store I'll stand 2 meters behind or 1.5 just like the general.	5
	Funerals are high risk places to contract COVID-19	PA15: Or maybe it's a close neighbour or close family member, then I go to that funeral, but I won't be attending funerals because I know the impact of COVID.	1
Memory, attention	I forgot to sanitise my hands	PA1: But I tend to forget it and honestly, I tend to forget that I got sanitizer but once I see it, then I use it. Even if there's no reason, I just use it when I see it. PA14: So, adapting to it [sanitising hands], I would sometimes forget	2
	I forgot my mask	PA10: Actually, for a really long time I forgot my mask when I had to go out and I'd have to like stop halfway and drive back or walk back. PA14: So having social media and having something that pops up and reminding you to keep your distance. Reminding you to wear your mask. It i did help because it did remind me to. You know, there is this thing still going on, so do not forget about it.	2

	I forgot to social distance	PA14: we will just stand in a group forgetting about the two meters PA11: I actually forgot about that [physical distancing] most of the time	2
Behavioural regulation	I carry my own sanitiser	PA17: I used to buy those pocket sized sanitizers that fit in your pocket so it's easy for me, even if I'm out and I don't have like a huge handbag with me. I know that I have a pocket hand sanitiser that I use to sanitise. PA7: always have a bottle of sanitizer in the car and would sanitize her hands and feet before entering the car	4
	I had a personal forehead thermometer	PA12: That infrared forehead thermometer thing, so I checked their temperature and stuff like that. Then I would take off my mask.	1
Skills	I use the fist bump	PA5: I don't do the elbow bump, but I do the fist bump. PA7: It's always an elbow touch or fist bump	2
	I wash my hands correctly	PA7: When it comes to washing hands I do the 20 seconds shuffle. PA14: So she told me the steps of washing hands, the proper steps that gives washing your hands. So I tried to practice them for a few times, but then I was just like this is just a lot.	2
	I wear my mask correctly	PA10: Yes, indeed I do. I definitely wear the mask. I wear my mask the proper way. I don't put it like under my nose or over my mouth.	1

5.5.2 Opportunity to adopt the NPIS

For a person to adopt a change in behaviour, they must be given the physical and social opportunity to do so (West *et al.* 2020b). The facilitators and barriers identified in this study that are associated with the opportunity to perform the NPIs are summarised in Figure 5.3. The facilitators included ease of access to sanitisers, personal experience of COVID-19, the optics of death, the lack of opportunity to access social venues due to closure and the positive influence of family members or other influential individuals. Factors that acted as barriers to adoption included high density living, the use of public transport, non-adoption by family members or other forms of social disapproval for NPI adoption.

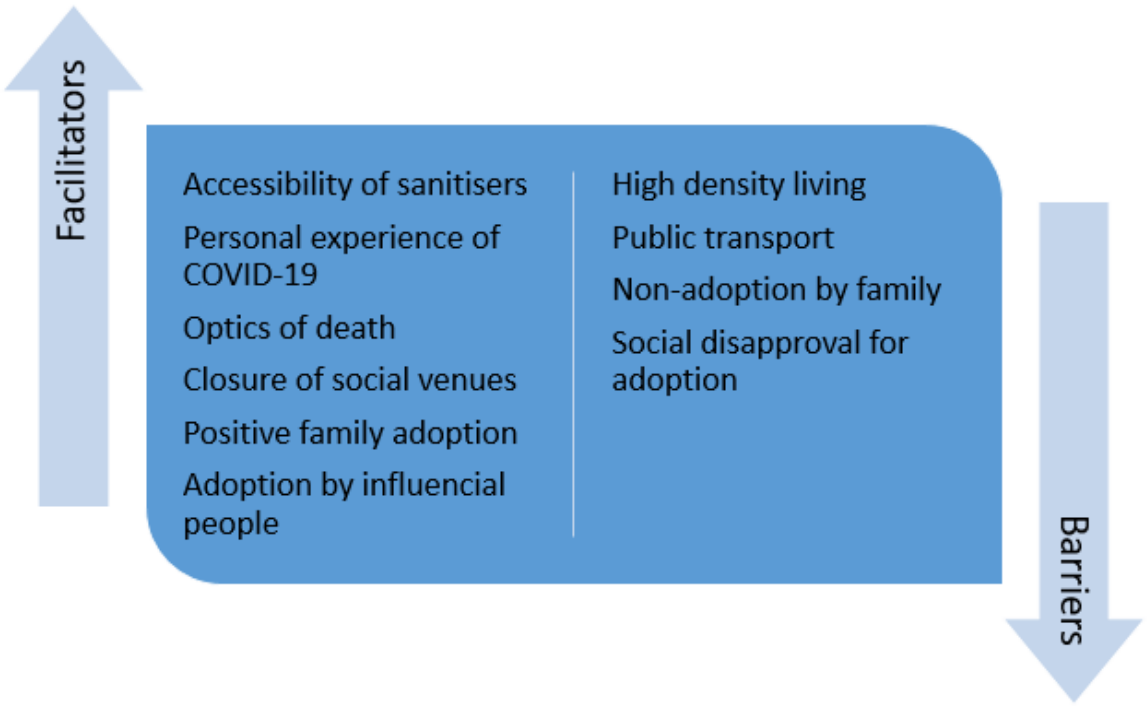

Figure 5.3 Facilitators and barriers associated with opportunity to adopt the NPIs

The belief statements coded to the domains under opportunity, along with examples and frequency are presented in Table 5.4

5.5.2.1 Domain: Environmental context and resources

Environmental context and resources was the second most pronounced domain and was included in every interview with 100 coded statements. Masking was the NPI

that was most influenced by the weather. Many participants would wear masks in crowded or public areas, but not outdoors or when it was hot.

PA18: It's hot outside, you're sweating and everything, and you have to wear mask on top of that, you can barely breathe. So I think uh, me not breathing is the reason why I took my mask off.

A third of the participants only wore a mask where it was deemed compulsory, for example in shopping malls. Sanitising was met with less resistance with reminders to sanitise considered helpful, only two participants would only sanitise when it was compulsory.

PA13: the only time I wear mask was when I'm going to shop, like I am in a mall or maybe come when there's a lot of gathering.

Living in shared accommodation such as student residence made NPI adoption more challenging as common areas could not be regularly sanitised.

PA9: And we share the same shower, he touches the handle, I touch it too. We are sharing a microwave; you know there are those same basic things that we are all going to use…. And there is no sanitation of that.

In terms of a salient event or personal experience of COVID-19, almost half of the participants reported taking COVID-19 more seriously once someone close to them became infected.

PA11: my other sister at the beginning of COVID, she contracted COVID-19. And that was just a wake-up call for all of us at home that this thing is real.

Another explained this experience as follows

PA9: Because once you have never had a close encounter with something, you really don't get it. When you see something, or feel something that is near to you, then you start realizing, oh, something like this is real. And you start perhaps changing your behaviour.

Others stated that they took it seriously when they saw the high number of people dying, either via the media or presence of funerals in their community. One participant who did adopt the NPIs reasonably well and had no personal experience with COVID-19 postulated that if a family member had become seriously ill, she would have increased her levels of compliance.

PA14: I think it would be someone in my family having [severe] COVID, someone close to me. Maybe for example my mum. I think if she had to be infected by the virus then I would have taken extreme measures.

5.5.2.2 Domain: Social influences

Social influence was the fourth most pronounced domain with 80 coded statements from 17 participants. Most participants were less compliant across all NPIs when with loved ones. Although some participants, especially those who resided in the family home, were positively influenced by their family members in terms of their adoption, others were negatively influenced.

PA14: But if I arrive in a room with my family members in there and they're not wearing a mask, I will also not wear it.

One participant expressed concern that wearing a mask around loved ones could indicate haughtiness or a lack of trust.

PA16: Like if you're my close friend and I come over and I keep my mask on around you, you are a snob. You know? Like "I don't have COVID. Why are you doing that?' Like it comes off as impersonal. Like it's borderline insulting.

The same participant felt it was easier to adopt the same behaviours as other family members at a gathering, rather than enter into potentially controversial discussions.

PA16: A lot of the times it [wearing a mask] would start discussions that I frankly didn't want to have. My family's very opinionated.

Smaller gatherings were viewed as less risky with decreased need for masking. The adoption of the NPIs by public figures was seen as a positive factor in compliance although social media influencers were viewed as untrustworthy.

Table 5.4: Belief statements/sub themes of domains listed under opportunity

Domain	Belief statement/Sub theme	Examples	Frequency
Environment	I don't wear a mask outdoors	PA5: it's basically in the open spaces, like for example, if I'm walking for long distances, so it's draining to have a mask 24/7. I usually put it on when I'm closer to the place or the shops or the campus. PA15: You can walk from maybe home to the store without wearing a mask because it's just an open space.	7
	I wear a mask in public/crowded areas	PA6: But the moment I see that I'm in a crowded place, I normally wear it. PA9: But one thing of which I still stood on was that when I leave the residence, I believe I should have the mask on.	6
	I took my mask off when it was hot	PA6: So, imagine like you're in a room and cooking, you're doing all that you're doing and its summer. The air-con is not working. It's not maintained. It's hot, will you still keep your mask on? Of course, not PA18: It's hot outside, you're sweating and everything, and you have to wear mask on top of that, you can barely breathe. So, I think uh, me not breathing is the reason why I took my mask off.	5
	I only wore a mask when it was compulsory	PA13: The only time I wear mask was when I'm going to shop, like I am in a mall or maybe when there's a lot of gathering. Then I will wear masks. PA18: I only wear a mask when I get inside the store and I pull it down slowly when I'm inside	6
	Reminders to physical distance were helpful	PA14: Wherever there was a sticker where it says I should stand, I would stand there, make sure I keep my distance. PA17: when standing in lines because if you would respect that 1.5 and the people following you would be so close to each other. What's the deal? Can't you see there's a sticker here?	2

	At clubs and churches there was no physical distancing	PA1: when I go to church we don't do physical distance. I go to church and night clubs	1
	Reminders to sanitise were helpful	PA2: I was either reminded or I was in an environment that you know there's a lot of people. PA1: when someone reminds you, 'sorry sanitise' you don't even say no, you just sanitize.	2
	I sanitised when forced	PA13: And sanitizing, not mostly. I will only sanitise when I am asked to, or maybe when I feel like it. PA14: they sanitise because now you have to sanitise when you go in a shop. There is a lady or gentleman there to sanitize your hands. So you have to sanitise.	2
	Living in shared accommodation made compliance impossible	PA6: They were never meant to accommodate these types of rules that they have put in place. When you are building a residence, let's say, when you are building a floor. Let's say there are 20 students who can use that kitchen. And let's say on that floor where there are 20 students, there are maybe five stoves or maybe less. Those four plate stoves. So you cannot run away from it. PA9: And we share the same shower, he touches the handle, I touch it too. We are sharing a microwave; you know there are those same basic things that we are all going to use…. And if there is no sanitation of that	2
	I took COVID-19 seriously when someone close to me got infected	PA11: My other sister at the beginning of COVID, she contracted COVID-19. And that was just a wake-up call for all of us at home that this thing is real PA5: The second time I was with my family because my father had COVID, it did [make a difference], because you are more aware of the situation and the impact, it's actually has. PA9: I've lost some distant family members during the times of COVID……when you have never had a close encounter with something, you really don't get it. When you see something, or feel something that is near to you, then you start realizing, oh, something like this is real. And you start perhaps changing your behaviour.	7

	If someone close to me had become ill/died of COVID-19 I would have taken it more seriously	PA14: I think it would be someone in my family having [severe] COVID, someone close to me. Maybe for example my mum. I think if she had to be infected by the virus then I would have taken extreme measures.	1
	When I saw people dying, I took it seriously	PA13: It sunk in, in my mind when I saw that there are lot of people were dying especially in Italy. PA15: Because I understand what as much as I would see, I understand what COVID is responsible for. So, in my area I know of … there was many, many, many funerals, especially during, I think it was last year, around June. No, last year around two years, around June, July, those were the most terrible times. That's when you see the funeral tents all over. Day by day, a family is burying a person the reason for the cause of that would be COVID.	2
Social influences	I was less compliant when with friends/family	PA1: Once you're with your friends, you just forget about the rules and everything continue as normal. PA12: The fact you love your friends and family so much. You end up forgetting that you could be at risk. You just forget all about that when you are mixing with people that you're comfortable around, people that you love and adore. So, you just want to be close to them. PA16: Ah, no. I can't even lie about that. No, not around friends. If we're talking like immediate friends and family, then then no.	11
	Wearing a mask around friends or family is a signal that you don't trust them not to have COVID-19	PA16: Like if you're my close friend and I come over and I keep my mask on around you, you are a snob. You know? Like "I don't have COVID. Why are you doing that?' Like it comes off as impersonal. Like it, it's borderline insulting. PA5: At first I do wear mask but it just comes with a sense of that I don't trust them whether they have COVID or not, because some of them become too sceptical sometimes.	3
	My family influenced me to adopt the measures	PA2: My parents also played a big role in encouraging this behaviour because they're so careful and I suppose because you're in the same with your family. You adopt or adapt to what they do.	3

		PA7: I guess my family and upbringing has been influential factor on how I perceive this whole pandemic because my mom is the one that's always forcing us to take the upmost measures to ensure that our health is at best and our well-being is preserved.	
	Public figures influence people's behaviour	PA1: Because I think every young person has got someone popular who he or she is following on social media. It's either on Instagram or Twitter and when that person posts something they want to view it because they are they are mentor or role model. PA13: Even when the president was speaking, although we better make a mockery out of him when he, when put the mask on wrongly, I did this and I did listen. Even now, even now I sometimes wear mask.	3
	Seeing others follow the rules reminded me to follow them too	PA2: It's like seeing other people because some students in my class are also quite safe so when I see them sanitizing their hands that reminds me to sanitize mine.	1

5.5.3 Motivation to adopt the NPIs

In order to enact behaviour change, a person must be motivated to make the change (West *et al.* 2020b). The facilitators and barriers identified in this study that are associated with the motivation to perform the NPIs are summarised in Figure 5.4. The facilitating factors included fear of personal infection, infecting others as well as a fear of law enforcement, a desire to return to normality, and to protect oneself and others. Factors that acted as barriers to adoption included misguided in-group trust, pandemic fatigue and incorrect risk assessment. The belief statements coded to the domains under motivation, along with examples and frequency are presented in Table 5.5.

Figure 5.4 Facilitators and barriers associated with motivation to adopt the NPI

5.5.3.1 Domain: Emotions

The Emotions domain was the third most prominent domain with 86 coded statements from 17 participants. The two emotions most represented by participants were fear and trust. COVID-19 was feared in terms of both the individual participants and their family members getting sick, which motivated participants to adopt the

NPIs as a precautionary measure. Law enforcement was also feared in terms of potential physical harm, fines and other penalties. Participants described NPI complacency around loved ones as they trusted them not to have COVID-19 and as such not to infect them with the virus.

PA18 Like we did trust one another that 'OK, you won't give me COVID we are in the same family.'

Participants expressed a strong desire for a return to normality. When around loved ones, there was a return to normality with a reduction in almost all NPIs. While this was generally due to 'trusting' friends and family not to have nor transmit the virus, the irrationality of this belief was acknowledged by one participant:

PA12: So I forget that the virus doesn't only pick those I don't know. It could easily be that someone close to you, could be carrying the virus.

While a minority of participants trusted the government, others bemoaned the lack of transparency regarding the regulations and felt that officials in power were using the regulations to suit their own agenda. Here a participant in a leadership role expressed his frustration:

PA9: For example, we were approaching the elections just now and suddenly we went back to level one. And during this level one of theirs, the people who were coming out to campaign and all that. No social distancing was followed, no mask. In fact, they broke every protocol in the book. Even when they approached student residences, you could have seen that they're not really doing this and nobody was there to address them. No cops were there. No cops came to say 'No guys, we understand that you are doing a manifesto but can you just try and find a bigger venue or at least to at least follow the protocols, wear masks. It became it became as if there was no rule at all. But we are tracing back, before this whole election thing'.

Another participant raised concerns about corruption infiltrating the government response.

PA6: We have seen the corruption in our country, for instance when it comes to giving people tenders. The people who are connected to the president are the ones getting contracts, whether his son…So essentially they are cashing more money than ever before.

The COVID-19 pandemic also negatively impacted mental health. In the early stages of the pandemic, isolation was difficult to deal with and worsened underlying mental health conditions.

PA16: like everyone else being isolated was eating at my head.

As the pandemic progressed, participants described exhaustion and burnout after a prolonged period of being on high alert, which was expressed more by male participants. Other emotions expressed included guilt at potentially placing others at risk, anxiety about being in public and feeling good about their role in potentially saving lives.

PA17: By me playing a part, I am maybe saving 10 people's lives.

5.5.3.2 Domain: Beliefs about consequences

This domain was pronounced with 68 coded statements from 17 participants. As the participants were under the age of 25 years, personal risk of severe disease was, correctly, viewed as unlikely. Despite this, participants recognised that low personal risk did not absolve them of their responsibility to protect those at risk for severe disease.

PA9: I'm going to use a saying my teacher once said to me "You cannot just sink with the ship while you can swim". You can't, if there are precautions you should try and follow them and hope for the best in following them while there is still a proper cure that is being searched for and so on.

Funerals were identified as high risk for community transmission. Other risk factors were incorrectly gauged as multiple participants believed that they would more likely become infected by a stranger than someone they knew.

PA12: You are just more trusting because you know these people. But then in public, then it's a different situation because you don't know where these other people have been.

There was also a view that by mixing with only a few people, participants would not become infected.

PA15: Like maybe if it's only the five of us in this area. There's no need for us, like there's no need for us to be wearing mask and doing all these sort of things.

5.5.3.3 Domain: Intentions

This domain received 29 coded statements from 13 participants. The main intention expressed was to avoid getting COVID-19, and secondarily to avoid transmitting it to others.

PA7: the number one obvious rule is because I, of course, don't want to contract the virus nor do I want to spread the virus.

A third of the participants stated that they had elected to carry their own sanitiser with them. This meant that they could choose a fragrance and consistency of their liking. Over time compliance decreased across all NPIs but a lack of physical distancing by people in general was highlighted.

PA14: But now I just feel like as time goes by from 2020 to 2021 to now, I feel like people are just ignoring those marks as time goes by.

5.5.3.4 Domain: Reinforcement

This domain received 35 coded statements from 11 participants. Returning to 'normal' was seen as an incentive to comply with the NPIs, which was also used by one participant to encourage others to do the same. While the presence of the military in communities was not welcomed, it did help to emphasise the seriousness of the pandemic and participants stated that they complied with the regulated NPIs to avoid being arrested or fined.

PA2: I know when I walk out the house I have to have my mask on because of that rule that was influenced about the fine.

5.5.3.5 Domain: Social/professional role and identity

This domain only received 12 coded statements from five participants. A sense of duty to protect others was expressed, although the specific protection of loved ones and the vulnerable was more prominent. Familial duty was also expressed in the intention to adopt the NPIs as that was how they were raised.

Participants who were in student leadership positions felt that it was important to lead by example and demonstrate the adoption of behaviours to others, so that they might mirror those behaviours.

PA9: ‘Hey guys, I am wearing a mask, you should too.’ I believe that it is influential that we need to show that we need to follow the precautions.

5.5.3.6 Domain: Beliefs about capabilities

Nine statements from eight participants were coded to this domain. Only physical distancing was seen as not achievable in some circumstances as this relied on others to maintain their distance. One participant stated sometimes people crowded around him while another participant found staying at home so boring, that he was unable to achieve this for a single day.

PA1: I think for me I couldn't stay at home, I won't lie. It was boring like even when you need airtime it was boring, from day one I couldn't stay at home. Even from day one, I couldn’t.

5.5.3.7 Domain: Optimism

Optimism received the second least coded statements (six) from four participants. While many participants felt that masking was ineffective, some believed that masks alone would prevent transmission of SARS-CoV-2.

PA5: The mask will do all the protection, I think.

5.5.3.8 Domain: Goals

Goals was the least coded domain with just three coded statements from three participants. The main goal expressed by participants was to avoid getting COVID-19. By avoiding becoming infected one not only avoids serious disease for oneself but also prevents spreading the virus.

PA7: I of course don’t want to contract the virus nor do I want to spread the virus.

Table 5.5: Belief statements/sub themes of domains listed under motivation

Domain	Belief statement/Sub theme	Examples	Frequency
Emotions	I was scared of getting COVID	PA13: at the centre I was also scared. I was saying 'No, man. What if I get COVID? I would die' PA4: I will be because I don't like COVID. I'm scared of COVID. PA8: because I'm scared of getting sick of getting the disease.	6
	I was scared/worried for my family	PA2: I don't want to now lose another family member PA15: You have this fear that if this happens, they might survive or they might not survive. PA17: So that really worried me for my grandma and for the rest of the family.	4
	I was scared of law enforcement	PA4: I will be scared; you know how the police think. I will be really scared. I will face that situation when it comes but I would be really scared. PA5: At first I was scared. I was scared of the army	3
	I trust my family not to give me COVID	PA11: We just assume they don't have the virus PA13: I think the main reason why we didn't sanitize or do social distancing. For me, I feel like it was because, I had that belief. Like we did trust one another that 'OK, you won't give me COVID we are in the same family.' PA18: I'm not going to lie when I'm at home, I don't wear mask at all, cause I'm like. Really, I trust them.	4
	I trust my family to take precautions to avoid catching COVID	PA10: I do believe that my family members would take the proper precautions when they are outside PA14: So, I trusted in her that she took all the precautions that she needs to take as a nurse. So, I am safe.	3

	I trust my friends not to give me COVID	PA10: They don't live with me but at the same time I feel like I can still not wear my mask because they're very close. PA11: It's like, just like my family. I trust him. So, with friends is also that.	2
	I trusted the government	PA12: It's funny because I am trusting the people that the people are saying 'do not trust' and trusting that the government pages, PA17: Because I only relied on government, information like content because that I know that I can trust.	2
	I did not trust the government and their lack of transparency	PA4: Yes, I can say I do trust, but slightly. I don't trust it 100%. Because government be like, people are dying. Johannesburg reports, maybe 100 deaths today, tomorrow 23 deaths. I'm like, no man. Which hospitals? I've got a lot of questions. PA13: For me personally, to what I've seen in our government and in general, there wasn't much of, what can I say, there wasn't much of transparency.	7
	COVID-19 was used to benefit government the politically connected	PA9: Let's just say our government is using this COVID virus in their advantage. They are the only people who are just going to say 'Okay we are putting up this certain rule now, we are putting up this certain level now and we are going to say this certain thing now' and so on and so forth. PA6: We have seen the corruption in our country, for instance when it comes to giving people tenders. The people who are connected to the president are the ones getting contracts, whether his son…So essentially they are cashing more money than ever before	2
	The pandemic was exhausting	PA4: I am exhausted, you know, it changed everything. PA6: But now It's gotten to a point where I'm tired. PA10: I think everybody just has a point where they've had enough	5

	I need a break from COVID-19	PA10: It's more like a I need just a little bit, and then afterwards, I'll go back to wearing my mask and everything, PA6: It's like the only thing that is being spoken about is just COVID COVID COVID!	3
	During the pandemic I was on high alert	PA15: It does affect you, mentally because you don't know, you don't know what to expect. A little flu becomes a red alert. You don't know if it's COVID or it's just a normal flu. PA5: I think it's because during the day that's where everything on high alert. I think in our minds and there's so much of things going on there's work. There are school days everything so our minds are just basically working from morning up until noon.	2
	The pandemic was bad for my mental health	PA5: that was overwhelming because I was all alone PA8: it was so difficult at first because I was once diagnosed with depression. PA18: But when I'm in public, there are times where I just get so anxious	5
	I felt guilty	PA8: So, I was just feeling so guilty that I was irresponsible that day	1
	It felt good to play my part	PA17: So, I need to do my part for my own sanity, so I know that I did play a part. Even though people are still dying, I know I'm playing a part. By me playing a part, I am maybe saving 10 people's lives.	1
Beliefs about consequences	I am not a risk for serious disease	PA1: So even if I get infected now, I know exactly that I will heal and I will continue with my life. PA16: Whatever, I'm not going die, regardless of what the government is saying	4
	COVID has been exaggerated	PA3: I don't see the real urgency of COVID that maybe a lot of other people are seeing. I don't feel it's as bad as everybody thinks it might be, PA6: The way it has been exaggerated in my opinion it's like there's no other disease out there.	2

	I am more likely to get COVID from a stranger	PA10: Well in public, there's obviously more people that I definitely do not know whether how they've been or whether they have or they don't have symptoms PA12: You are just more trusting because you know these people. But then in public, then it's a different situation because you don't know where these other people have been	4
	I won't get COVID if I only mix with a few people	PA15: Like maybe if it's only the five of us in this area. There's no need for us, like there's no need for us to be wearing mask and doing all these sort of things PA10: Maybe like over 100 / 150. So, you need to take the proper precautions when it's like that.	4
	Funerals are high risk for COVID	PA15: I won't be attending funerals because I know the impact of COVID.	1
	Excess hand sanitiser can be dangerous	PA16: I know people who have had serious medical effects of using too much hand sanitizer.	1
Intentions	I keep sanitiser with me	PA2: I also have a hand sanitizer with me in my car and one in my bag. So, my school bag and in my handbag for on the go if I need to sanitize my hands after I've touched anything PA7: Always have a bottle of sanitizer in the car and would sanitize my hands and feet before entering the car PA9: If I go into a taxi I am going to bring my own sanitizer.	6
	As time went on my compliance decreased	PA3: But recently we've all kind of started to drop those things, especially with my family PA4: It has changed overtime because as time goes by, you see these things, this one is important, this one is less important you know. PA10: But as time went on, that's when I took it less seriously.	5

	People do not physical distance anymore	PA14: But now I just feel like as time goes by from 2020 to 2021 to now, I feel like people are just ignoring those marks as time goes by PA16: People just don't really practice that now.	3
	I try to physical distance	PA7: In terms of social distancing, I try my best to social distance. PA3: I try to stand away from other people.	2
Reinforcement	I complied to avoid being fined/arrested	PA3: Also when I'm in fear of police and getting arrested maybe that is the only thing that made me to stay at home PA13: I did not want to find in a state where ever I am arrested for not wearing a mask. So I will make sure whenever I go out, I would I will wear a mask PA2: I know when I walk out the house I have to have my mask on because of that rule that was influenced about the fine.	4
	Police/army presence emphasised the seriousness of the situation	PA3: At first it was more to kind of express how serious it was, like you have to wear a mask, otherwise you're going to get fined because it's quite a serious thing PA5: Even the military got involved. So from there, and the arrests started being made. So, from there people knew that this thing was serious and I took it seriously from there.	2
	I did not like the military presence	PA6: Let's say I working outside and I was not wearing a mask. I got a feeling of how it was during apartheid. So, for me, it wasn’t pleasant or made me happy PA4: The only thing that I hated the most is this soldier thing	2

	Getting back to normal was an incentive to follow the rules	PA10: Just following the rules knowing that the quicker the more people follow the rules the quicker we can get out of this. PA3: Try to go ahead with moving forward with everybody. I think that's the incentive	2
	I just want things to get back to normal	PA8: Now, like I wish it could end so that we could go back to a normal world, you know. PA2:We want life to go on to get back to normal	3
Beliefs about capabilities	Physical distancing is not always possible	PA1: I think for me I couldn't stay at home, I won't lie. It was boring like even when you need airtime it was boring, from day one I couldn't stay at home. Even from day 1, I couldn't. PA7: I went to the post office and people are literally cramped up behind me and they didn't want to social distance.	2
Social/professional role	I was careful to protect the vulnerable	PA7: Number 2 would be I don't want to bring the virus at home to my family members, especially my mom because she old, she's 51 PA12: I normally social distanced. I would sit on the other couch not close to her, especially after I had had visitors because I wouldn't know. Sometimes I even wear my mask in the house but eventually, with familiarity, I stopped wearing the mask inside the house. Especially after she got vaccinated.	4
	I wanted to protect others	PA3: Because already my behaviour towards other people is to keep them safe PA17: It was more, doing those things, so make sure that other people are not are not put at risk, you know? Other people don't lose their lives because of our reckless behaviour.	4
	I wanted to protect the people I love	PA10: Obviously if I went out and I came back, then I had to sanitise just to protect the people in there. PA9: We're kind of doing all of the all of those things to make sure that we are protecting the whole family.	5

	I lead by example	PA7: I practice it in a manner whereby I indirectly promote its practice. So, for example, if I am walking on the road and I have my mask on and the second person would adopt it and same as washing my hands small children will replicate that or family members will too follow these measures PA9: 'Hey guys, I am wearing a mask, you should too.' I believe that it is influential that we need to show that we need to follow the precautions.	2
	I followed my family rules	PA7: I guess my family and upbringing has been influential factor on how I perceive this whole pandemic because my mom is the one that's always forcing us to take the upmost measures to ensure that our health is at best and our well-being is preserved. PA9: At home, my mom is kind of a person who had lung issues and stuff like that so that is something that kind of led the family to follow all the rules and restrictions.	5
	I follow the law	PA2: I may not always agree with government, but I mean I do abide by laws. PA10: Because they told us to do it, that's why.	5
Optimism	Masks will protect me completely	PA11: I just felt like when you're wearing your mask, it's then it's OK. You are protected PA5: I'm sure if someone coughs, maybe like whether he or she is next to me, the mask will do all the protection, I think.	2
	I won't get COVID	PA13: I have that mind set whereby I won't get COVID. I will not, I will not contract COVID.	1
Goals	I avoid getting infected	PA2: And also I don't want to put myself at risk or put anyone at risk, so that's another reason why I sort of wear my mask PA7: I of course don't want to contract the virus nor do I want to spread the virus	3

5.6 INDUCTIVE ANALYSIS

Four major themes emerged from the inductive analysis: 1) Autonomy; 2) Social media; 3) Social connection and 4) The youth voice.

The themes and belief statements (or subthemes in this case), along with examples and frequencies are presented in Table 5.5.

5.6.1 Theme 1: Autonomy

Participants sought information, critically evaluating the value of the interventions. Individual scenarios were assessed according to perceived risk and behaviours deemed to be appropriate were adopted.

PA12: That infrared forehead thermometer thing, so I checked their temperature and stuff like that. Then I would take off my mask.

Two participants did not adopt the behaviours unless they felt that they had no choice in the matter, for example, masking to enter a shopping centre. Both expressed doubt about the existence of COVID-19. There was a strong sense that people can and should be educated regarding COVID-19 risk and the NPIs in an open and honest fashion but that individuals should then make their own decisions about their own behaviour.

PA6: Give them honest information from all sides. Let them make the decisions.

PA8: We mustn't just be told.

5.3.2 Theme 2: Social Media

Social media was viewed as an important tool when communicating information with young people. This information was rapidly distributed and allowed viewers to read comments by others thus taking in their views on different topics. There was concern about the accuracy of information available online as participants had seen conspiracy theories circulated. While participants did not necessarily believe the conspiracy theories themselves, this resulted in a general sense of uncertainty as to what information was true.

PA17: When you go to Facebook, WhatsApp, Twitter like there's just so much fake news, you just don't know which one is real, which one is not.

Approval signifiers such as ‘likes’ and repetition of the same information, from different sources were seen to add to the credibility of content, as was content that was by verified accounts.

PA1: I follow and I see how many people ‘like’, I look at the number, like voting. So if things appear again and again, I get to pay more attention to it.

Social media use was noted as highly prevalent in the youth with a notable ability to influence. Participants viewed social media influencers (SMIs) as important players on social media and followed SMIs that they could relate to or with whom they shared common interests. While SMIs were viewed as influential in other aspects of life (e.g., beauty and fashion) this was not the case for COVID-19 specific information, unless the SMI’s brand was medically based. This was seen as outside of their scope or brand and suggested the possibility of paid content.

PA8: No, I wouldn't. I wouldn't trust them because you know, now you think that maybe they've been paid to promote this kind of thing, you know, so I wouldn't trust them.

The potential for general health influence was however noted.

PA15: One of the celebrities, I think it's Casper Nyovest [a South African rapper] … posting mostly about physical fitness and everything, I think that followers of him will get a lot of influence from him and learn that it is important to also stay healthy.

5.6.3 Theme 3: Social Connection

There was a common sense of resentment that COVID-19 had negatively impacted the participants’ university experience. University was seen as a time of independence, away from the family home where students could make new friends and be exposed to new opportunities.

PA18: Because us, who started varsity [in] 2020. We never really had the full experience of what it's like being about this.

The period of extreme physical distancing was regarded as particularly challenging. It was during this time that some students disregarded the regulations to see their friends.

PA12: I did follow the rules by staying at home. But I didn’t follow the rules by not having friends over. My friends would come visit me.

5.6.4 Theme 4: The Youth Voice

Participants felt that the interventions did not take the youth into account and doubted that young people had been consulted in their design.

PA17: When they're making decisions about doing this campaign, I'm sure they don't go and talk to young people.

There was a call for young people to be meaningfully included when finding solutions to issues that impact that demographic.

PA 13: You know there's a need to listen to us which they are not doing. They're not willing to take what we the youth are saying. If the government can say 'OK, we agree we are giving out a platform to youth submit your plan, submit your agenda, submit your thoughts'.

The age gap between the decision makers and young people was noted and the difficulty in communication across the age divide was highlighted.

PA1: We get irritated with the way they think, I remember one day we shared a post on our Twitter that reveals most people that are in Parliament, especially the ANC. All of them they were all above 60s.

PA17: And that's very important, because a fish talking to a fish, so there is that understanding that connection.

Table 5.6: Themes with belief statements/Sub themes

Theme	Belief statement/Sub theme	Examples	Frequency
Autonomy	People must make their own decision	PA6: Give them honest information from all sides. Let them make the decisions. PA17: I don't know because at the end of the day, you can do everything that you can do, but it's still a person's decision like to make that choice.	6
	Loss of autonomy	PA3: I feel like were a bit bullied into it PA11: Not wanting to be controlled.	3
	I looked at the evidence and drew my own conclusions	PA1: I take whatever that is on social media, I interpret it, I come to conclusion. PA13: So, what I do is. whenever I watch the news, I will listen, I will listen clearly because personally I have that mind and that a little bit of wisdom in me says 'No. This, I will not. I will not take this. Like, I'll keep this, I will follow this'	4
	I am more likely to adopt interventions that make sense to me	PA1: I think that one, it's very nice and its hygienic and it makes sense to me. And it makes sense to most people, why we need to sanitise our hands PA8: it needs to makes sense to me.	2
	I assessed the risk for my circumstances and acted accordingly	PA10: If I did feel any symptoms, then I was like no. You guys aren't allowed to come to me for like the next week or two. PA12: That infrared forehead thermometer thing, so I checked their temperature and stuff like that. Then I would take off my mask.	8
	I did my own research	PA5: I am comfortable because I did my research, my own research about COVID PA15: So, I think that having to research that information and having to learn from that experience to do my own research in everything that is happening, it really has impacted my life.	8

		PA18: So, in 2020 I did a lot of research I think, because every time I had a question, I will go on the Internet.	
Social Media	Social media influences young people	PA1: I think the only thing that can control me and young people in our days. I think its social media, that's where everyone of us spend time. When there's a leak on social media, the first people that know is young people. PA11: I think that the best actually, because we most of the times we look up to them and what they're doing, what they into at that time. You know what topics interest them and they interest us also. You know trying to get along with the vibes that they you know, so yeah influencers play a really big role in what I believe when it comes to social media and everything. PA12: Young people just all about social media these days, so that's, I think one of the main ways to reach out to them. Because that's one thing that they read and focus on PA13: Yes, yes, yes, yes. Social media also influences what I think about COVID.	6
	Social media is a quick way of receiving information/catch things easily	PA1: Twitter is fast, even their comments. It's a platform where people show their views, they raised their views, they raise their concerns, they raise how they feel. PA12: Like youngsters and emails, they don't really focus on them. We easily catch things on Twitter that just pop up on our feeds or so on and so forth. PA17: And that is like evidence of what's being said on social media, not that I saw it on social media, but its people telling me what's being said on social media.	4
	Social media spreads false information and conspiracy theories	PA10: I feel like it's honestly stupid. I've never believed in not a single one of any information given on social media literally. PA12: It influenced me in the sense that it took me longer than I would have to get vaccinated because of all these theories that they actually trying to kill us with the vaccine PA17: In other platforms, especially Facebook, never. There's just so much and then especially because people start to import their opinions on what's happening and they combine that with the actual truth. They just add on information and you end up being misled.	7

	I use social media to see how others feel	PA6: To go to through social media and just to see well how other people are feeling about COVID-19. PA1: They raise how they see things and you get to understand everything even your way of thinking before commenting. Like maybe this person is right. Maybe this person right, like when they discuss, that's where you get to understand more things.	2
	The more often something is repeated, the more I believe it to be true	PA1: I see how many people like, I look at the number, like voting. So, if things appear again and again, I get to pay more attention to it. PA11: I see it once, and, I'll be like uh uh. [no] But if I see like in different sites or something, okay, maybe it's the truth. PA11: because sometimes I can't tell. Like sometime, this thing, it doesn't seem, you know, real. Like I have to, like, see things maybe more than five times.	4
	I don't know what to believe on social media	PA17: When you go to Facebook, WhatsApp, Twitter like there's just so much fake news, you just don't know which one is real, which one is not. PA8: I would see on Twitter that somebody passed away, I wouldn't know how true that is PA12: Things that come from other people that are just random, you know posts, those are the ones that I flag in my mind. I'm like, 'Okay, this could just be made up or this could just be a theory but it hasn't been proven'.	7
	I trust verified accounts or known brands	PA1: I follow people who protect their names and they won't post something if it's not true. PA11: I just trust Twitter because most of the things, even like. I trust when someone who's verified. I check if the person is verified. And I just assume someone like that won't write false information you know. PA12: Trusting that the government pages, the health pages, because those are verified accounts. So I know what they're saying, I believe, it has been studied.	3
	Social media influencers influence me	PA3: I would probably say it's based on your personal views and who you relate most to you. PA11: I think that the best actually, because we most of the times we look up to them and what they're doing, what they into at that time. You know what topics interest them and they interest us also. You	4

		know trying to get along with the vibes that they you know, so yeah influencers play a really big role in what I believe when it comes to social media and everything. PA13: Yeah, because I believe because I know for the youth to hear and listen, mostly you have to bring someone who's more of a musician and actor, someone who they know. PA14: To be quite honest, influencers do influence me.	
	Influencers are paid to promote views and should not be trusted	PA8: No, I wouldn't. I wouldn't trust them because you know, now you think that maybe they've been paid to promote this kind of thing, you know, so I wouldn't trust them. Because I don't really think that they are honest, so I think that maybe somebody paid them to do something. PA15: On Instagram, it's not that serious with conspiracy because people there, they just want for themselves. People are just promoting their personal lives or personal businesses or everything. PA13: I believe that is a part of (a) marketing strategy because marketing strategy, they always use someone who is an influencer in in order to promote something.	6
	Influencers share their opinion not facts	PA17: As long as I know it's coming from, an influencer saying it doesn't make it difference like because they can say something that's misleading or they can say something that's actually true but I was never influenced by other people's opinions or other people's views on the subject. PA9: Some people you saw, they were just saying something, expressing their thoughts but being influential in a way to people who were already following them.	2
Social connection	COVID has taken away my university experience	PA11: I feel like I'm missing out on the real university experience. Like going to campus, meeting up with my classmates, you know, engaging in lectures. PA18: Because us, who started varsity (in) 2020. We never really had the full experience of what it's like being about this.	3
	Isolation was difficult	PA16: Like everyone else being isolated was eating at my head. PA14: And it's really difficult. Very difficult, this isolation thing.	2

	I broke the rules to see my friends	PA12: I did follow the rules by staying at home. But I didn't follow the rules by not having friends over. My friends would come visit me. PA14: The sad thing was that I got had to have my birthday during that heavy lockdown. So, the only time I went out was to spend my birthday with my friends.	
	When I am with my friends and family I let my guard down and slip into normality	PA5: When I'm with friends and family, I don't think I do that or observed that much. That's where usually my guard is down and I'm sure that I can do anything. PA10: I let my guard down around my friends.	5
	I missed my friends	PA11: I miss people engaging with friends PA10: Because with my friends I obviously want to see them	7
	Friendships have been lost	PA15: You have relationships that you are going lose because of COVID. There will be less of campus life knowledge. Uh, we've missed greatly on that. I would say, we missed a lot of that PA14: I lost many friends not like they died. But I lost them, you know.	2
	Sometimes you just need a hug	PA2: Some days I just want a hug from a friend. So, on campus sometimes, I do. PA12: You miss that physical touch, the hugs so in that moment you just forget that they could be carrying the virus and you might never know.	3
The youth voice	The youth are not included in the conversation	PA8: I feel like for a lot of things they are just not giving us a chance to speak or not giving us a chance to say our part. PA17: When they're making decisions about doing this campaign, I'm sure they don't go and talk to young people.	5
	Older decision makers do not understand young people	PA17: When they come to us, they just talking from the high place is telling us one, two and three. Not really understanding, our views and just how we feel about the whole situation. And that's very important, because a fish talking to a fish, so there is that understanding that connection	2

5.7 SUMMARY OF THE CHAPTER

This chapter presented the key findings and presented them as demographics, behaviours, domains and themes with specific belief statements or subthemes that emerged in the study.

In the next chapter, these results are interpreted and discussed by the researcher.

CHAPTER 6:

DISCUSSION OF FINDINGS

6.1 INTRODUCTION

Adolescence is a time of significant physiological and psychosocial change, often associated with an increase in risk taking behaviour (Andrews, Foulkes and Blakemore 2020). It is also a stage of life where behaviour change intervention programmes have shown limited success, in general (Yeager, Dahl and Dweck 2018a) and also locally in South Africa (Harrison *et al.* 2010; National Department of Health 2012). Despite the need to improve such programmes with custom messaging, there has been little exploration of how and why adolescents adopt positive behaviours. The COVID-19 pandemic provided a lens for such an exploration of the adoption of the COVID-19 personal non-pharmaceutical intervention (NPI) measures. The previous chapter reported the findings of the exploration of adoption of NPIs by adolescents at a University of Technology (UOT). This chapter will provide in depth analysis of these findings.

6.2 OVERVIEW OF THE RESEARCH STUDY DISCUSSION

Chapter three gave a detailed explanation of the Theoretical Domains Framework (TDF) and the Behaviour Change Wheel (BCW), the two interarticulating theoretical frameworks used to guide this study. Figure 6.1 maps the frameworks together, both centred around the Capability, Opportunity, Motivation, Behaviour (COM-B) model.

This study used the TDF to analyse the adoption of the COVID-19 NPIs by adolescents at a UOT. Participant statements were coded to the appropriate TDF domain (yellow) and presented in Chapter five, clustered under the corresponding COM-B model source of behaviour (green). Statements relevant to the aims and objectives of the study that did not align with the TDF domains were inductively analysed and presented as themes.

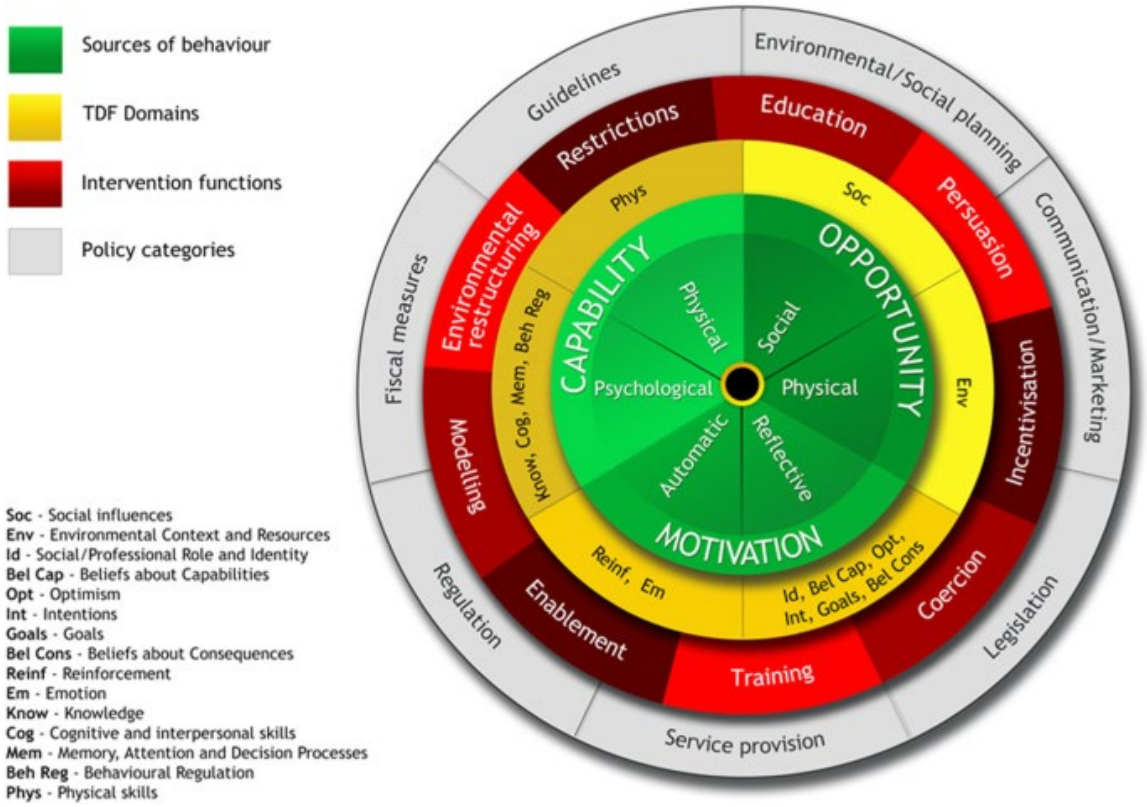

Figure 6.1 Mapping of the TDF, BCW and COM-B model of behaviour (Westland et al. 2017)

The discussion in this chapter is presented in four sections.

- Firstly, the adoption of the specific NPIs is described and discussed.
- Secondly, the barriers and facilitators to NPI adoption are identified and discussed under their sources of behaviour: *Physiological capability, physical capability, physical opportunity, social opportunity, automatic motivation and finally, reflective motivation*.
- Thirdly, the findings as themes elicited via inductive analysis are discussed as follows: 1) Autonomy; 2) Social Media; 3) Social Connection and 4) The Youth Voice.
- Fourthly, the means through which the adoption of the NPIs was achieved is reviewed.

Throughout the discussion, the findings are triangulated via comparison to other relevant studies.

6.3 THE ADOPTION OF THE SPECIFIC NPI

The adoption of NPIs was not uniform, with participants adopting different behaviours in various settings, dependent on the relative perceived value of the intervention in context and emotional motivating factors.

This study found that knowledge of COVID-19 improved NPI uptake in most settings. Participants were reasonably well informed about the NPIs and recognised the value of masking and sanitising when appropriate. Hand hygiene was seen as common sense and something that should be done in general, outside of the COVID-19 pandemic, to prevent the spread of pathogens. Frustration was however expressed about the unnecessary frequency of sanitising hands at every shop or campus entrance and at times, participants faked sanitising their hands as a performative gesture. The World Health Organisation (2020b) highlighted closed, crowded spaces or those that involve close contact (the three 'C's) as high risk for COVID-19 transmission. Participants in this study wore masks indoors and in crowded or public spaces but were unlikely to wear them outdoors, when it was hot and when exercising, despite regulations requiring them to do so. This behaviour aligns with not only the WHO recommendations of risk management but also the current literature of mask efficacy (Andrejko *et al.* 2022), suggesting the participants were well informed of the benefits of masks at reducing COVID-19 transmission, and that they were prepared to wear a mask when it was considered reasonable to do so.

During the early stages of the COVID-19 pandemic, the South African government regulations included 'stay-at-home' orders for all non-essential activity. This became known as the 'lockdown'. At this time, most of the participants complied with the extreme physical distancing. However, over time, as the restrictions decreased, social mixing was once again permitted, but masking and physical distancing was required. Social connection is vital in adolescence and participants viewed reconnecting with friends as a time to relax and escape the constant threat of the pandemic. Unfortunately, this emotional connection was accompanied by a false sense of safety and trust that these loved ones would not give them COVID-19. This in turn decreased NPI compliance.

6.4 THE FACTORS INFLUENCING THE ADOPTION OF THE NPIS VIA COM-B BEHAVIOUR SOURCE

As described in Chapter two, the COM-B model of behaviour was chosen to underpin this study. This model states that for an individual to enact a behaviour, they must be both physically and psychologically able to do so. They must also have the physical and social/environmental opportunity to enact the behaviour. Both the capability and opportunity will influence motivation for behaviour change. This motivation may include cognitive processes and active choice as well as emotional aspects or habits.

(Michie, van Stralen and West 2011).

6.4.1 Psychological capability to adopt the NPIs

Psychological capability requires an understanding of what behaviour is required, when it is required, as well as why it is required (Michie, van Stralen and West 2011). The TDF domains classified under psychological capacity are: 'Knowledge'; 'Memory, attention and decision processes' and 'Behavioural regulation'.

The main facilitators for psychological capability identified in this study were trust in international health organisations, the scientific community and health care workers, the ability to discern reliable sources of information and an understanding of behavioural efficacy. The main barriers identified were a lack of trust in government sources, misinformation, changing guidance, regulations that did not align with the scientific literature and forgetfulness.

A global pandemic due to a novel virus requires the rapid dissemination of accurate information. In terms of the COVID-19 pandemic, this included information about how the disease was transmitted, signs of infection and intervention measures to prevent the spread of disease (World Health Organisation 2020b). As such it is not surprising that 'Knowledge' was by far the most pronounced domain, both in this category and the study itself. Despite the novel nature of SARS-CoV-2, with little known about the virus at the beginning of the COVID-19 pandemic, knowledge at the time of this study was found to be high. Where there was confusion, it was in areas where the research had evolved over time (e.g., asymptomatic spread) or where scientific consensus was not reached (e.g., the efficacy of cloth masks). However, high levels of knowledge do not necessarily translate to better attitudes and practice in context (Nwagbara *et al.* 2021; Siddiquea *et al.* 2021). This was evident in the current study where, despite a clear

understanding of the principles of transmission of COVID-19, NPI practice around friends and family was in many cases reduced or absent.

The African Centres for Disease Control and Prevention (2020) highlights the importance of reliable and consistent evidence from trusted sources. Although most participants stated that they had 'done their own research', a phrase that has become associated with conspiracy theorists and social media sources, the study population were university students and chose reputable sources. The main sources of information were identified as the internet, international organisations like the WHO, government broadcasts and notices, as well as health care workers which was comparable to other studies (Hager *et al.* 2020; Isah *et al.* 2021). This likely contributed to the high level of accurate knowledge. Participants were most likely to adopt behaviours that were viewed as effective and made sense to them. In alignment with the prevailing literature (Sharma, Mishra and Mudgal 2020), cloth masks were seen as inferior to medical grade masks with their value limited to crowded public or indoor spaces. Behavioural adherence is improved when the interventions are communicated with a clear rationale (Postill *et al.* 2022), the more effective the perceived intervention, the more likely the adoption (Lee, Kang and You 2021; Woodland *et al.* 2022). As evidenced in this study, where this rationale was weak or absent, adoption was poor. In addition, the changing guidance for masking eroded the confidence in not only the perceived efficacy of the intervention itself, but also competence of authorities (Laurent-Simpson 2023). Misconceptions were uncommon, but as with Isah *et al.* (2021), centred around asymptomatic COVID-19 and its spread. While most participants were exposed to false information at some point, few took it at face value. If it had an impact at all, it was to lower the confidence in the official information channels, indicating that the spread of false information has negative effects, even when it is not believed.

Knowledge is not the only cognitive process that regulates behaviour. The novel nature of the NPIs was both a facilitator and barrier to adoption for many young people (Postill *et al.* 2022). Of all the NPIs, handwashing, albeit far less regularly, was the only one that participants practiced prior to the COVID-19 pandemic. As such, it is understandable that despite good intentions, all the NPIs were forgotten by participants at times. These were, however, reinforced over time with visual cues like floor stickers and signs, or witnessing others practicing the behaviours and effectively enabled adoption.

6.4.2 Physical capability to adopt the NPIs

The physical capability to enact a behaviour requires both an able body and the required skills (Michie, van Stralen and West 2011). The only TDF domain classified under physical capability is 'Physical skills'. When learning new skills, Seale *et al.* (2020) suggest the use of resources that practically demonstrate the required behaviour.

The main facilitator to physical capability in this study was the exposure to practical information with the simplification of concepts and demonstration of skills like handwashing by health care workers and the correct way to wear a mask by the state president. Minimal barriers were identified except others encroaching within a 1.5 metre radius.

6.4.3 Physical opportunity to adopt the NPIs

The physical opportunity to enact a behaviour is usually determined by external or environmental factors that are outside of the individual's control (Michie, van Stralen and West 2011). This also includes the concept of a critical incident or salient event which stands out to the individual, making a significant impression that may be related to a threat or anticipated regret (Cane, O'Connor and Michie 2012). In a review of factors influencing engagement with NPIs, Seale *et al.* (2020) reported that the most important factor in NPI adoption is the creation of an environment that encourages adoption.

'Environmental context and resources', the only domain listed under physical opportunity, was the second most pronounced domain in this study. Environmental facilitators identified in this study were the provision of sanitisers at entrances and a salient event. Salient events included a participant personally contracting COVID-19, a loved one contracting COVID-19, knowing someone who was severely ill with or had died from COVID-19 or another event highlighting the reality of COVID-19 deaths. Restrictions like the stay-at-home orders and closure of businesses did facilitate physical distancing, albeit at times reluctantly. Environmental barriers were related to the challenges of social distancing on public transport or high density living in student accommodation.

Living in high density or in overcrowded environments as well as a lack of basic provisions like indoor water supply provide structural barriers to NPI adoption in lower to middle income groups (Coetzee and Kagee 2020). This was evident in this study with participants who lived in university student accommodation reporting low levels of NPI compliance due to environmental challenges. Hand sanitising was abandoned due to impracticality as one would constantly have

to sanitise after every surface one touched and physical distancing in high density living viewed as impossible. By contrast the provision of sanitiser in other contexts, such as at the entrances to shops and campuses, was broadly considered to be useful.

Most participants complied with the stay–at-home orders during the 'lockdown'. This was partially due to the closure of places of gathering such as churches, restaurants and bars. While such restrictions did increase short term compliance via a lack of physical opportunity, Postill *et al.* (2022) argue that they should be used with restraint as their value dilutes over time. Illegal attendance could be viewed as a type of fix or rebellion; a response that might be exaggerated during adolescence. As regulations were adjusted and social mixing was permitted, physical distancing was dependant on mutual co-operation (Leather *et al.* 2022) and while participants in this study generally practised physical distancing in public areas, frustration was expressed about others standing too close. In these cases, the markings on the floor were noted as useful reminders or at times something that could be used to highlight the lack of distance between themselves and others.

Masking was the NPI most influenced by the climatic environment. The eThekwini municipality has a humid subtropical climate with summer temperatures of more than 30°C and humidity exceeding 80% (Weather and Climate 2023). Almost a third of participants took off their masks in very hot weather as they found them excessively uncomfortable and wearing one made it difficult to breath. To increase compliance, Seale *et al.* (2020) recommended rational and targeted use of face masks in high-risk scenarios whereby people would be more likely to tolerate discomfort. In this study, although most participants were willing to wear a mask when they believed it to be effective (when indoors or in crowded spaces), a third only wore a mask when compulsory, for example when entering a shopping centre. While this could be considered a positive influence, in some cases, once inside the centre, the mask was pulled down, showing limited value.

A personal experience with a disease can alter one's perception of the risk of infection and the potential consequences. In this study, a personal experience of COVID-19 positively influenced NPI adoption by making the disease a reality. Moreover, participants with no personal experience of COVID-19 believed that they would probably have taken it 'more seriously' if someone close to them had become ill. In addition, participants recounted that seeing people dying in the overcrowded hospitals in Italy and the marked increase in funerals within their community had also helped to make the threat of COVID-19 real rather than a theoretical

concept. Experiential knowledge of disease mortality has been shown to improve behaviour change in Africa (Macintyre, Brown and Sosler 2001). While interventions cannot manufacture a meaningful personal experience, the vicarious experience of disease via the use of patient stories to humanise health communication is not a new concept and can produce a similar, emotive response (Seale *et al.* 2020). This is relevant to adolescence where an 'it won't happen to me' optimism bias is notably relevant.

6.4.4 Social opportunity to adopt the NPIs

The social opportunity to enact behaviour is determined by one's social environment, and how this influences the way in which one thinks about things, often due to the approval or disapproval of others (Michie, van Stralen and West 2011). In this study, the facilitators identified were family members who complied with the NPIs and the adoption of NPIs by influential people. The barriers identified were friends or family members who did not adopt the NPIs or social disapproval from others for adopting the NPIs.

The only domain included under social opportunity is 'social influences' which was the third most referenced domain in the study. Social opportunity was an influential factor in non-adoption with almost two thirds of participants lowering compliance around friends and family. While this was generally related to lowered risk perception, coupled with a false sense of security, social disapproval was a contributing factor. Social norms are widely accepted to have a significant influence on human behaviour, especially when one considers injunctive norms or 'norms of ought' where there is peer pressure to uphold the group's moral standards (Schumpe *et al.* 2022). Group norms have however been shown to influence NPI adoption both positively and negatively. The findings of this study support this in terms of familial influence on participants, which was more pronounced in those who lived within the family home. Some participants described their family facilitating NPI adoption as part of respect shown towards family members or the household rules. Other participants described households where there was no masking or physical distancing, as well as households in which the NPIs were adopted to varying degrees, largely determined by those present. Human beings subconsciously interpret physical cues and facial expressions and the acts of physically distancing from others and masking can feel antisocial or rude. As such, at times certain participants elected not to wear a mask around specific family members to avoid a potentially, unpleasant or controversial conversation. Others adopted a flexible approach and would gauge if others were 'COVID conscious' or not and adjust their behaviour accordingly. The targeting of parents to increase

parental responsibility for their children's well-being is a factor that should be considered for health campaigns. This is not limited to adolescents living with their parents as, although not present in this study, maternal influence on behaviour can extend to adolescents living outside of the family home (Aksoy 2022).

Social factors have a strong influence on behaviour at all ages but given the need for peer approval and social connection associated with adolescence, social influence is key to behaviour in young people (Blakemore and Choudhury 2006). Despite a common perception that social media influencers (SMIs) provide an opportunity to communicate the risk of negative health behaviours (Andrews, Foulkes and Blakemore 2020), in this study SMIs were seen as untrustworthy in terms of providing information about COVID-19 and likely to either promote their own personal (and not scientific) view or promote someone else's view for financial gain. A minority of participants did however feel that SMIs could be a positive influence in terms of NPI adoption if they were viewed as mentors or trustworthy with an established and appropriate brand. Authority figures have also been successful in the promotion of NPI adoption (Woodland *et al.* 2022). In terms of authority figures outside of the home, individual health care workers, lecturers and the current South African President Ramaphosa were noted to be influential, with specific mention of the latter's humility when demonstrating the correct way to wear and remove a mask. This influence was by virtue of respect for the authority figure. It should be noted that the converse was also true. Where political figures or parties disregarding the required NPIs participants felt disrespected and second guessed the effectiveness of the NPIs.

6.4.5 Automatic motivation to adopt the NPIs

While capability and opportunity are important in the adoption of any positive health behaviours, adolescents should be motivated to feel that they need to do it rather than that they have been told to do so (West *et al.* 2020b). Motivation via automatic processes includes emotions, habits and personal temperament (Michie, van Stralen and West 2011), and comprises the domains 'Emotion' and 'Reinforcement'. 'Reinforcement' as a domain includes both incentives and consequences, and punishment or sanction. In this study the facilitators identified included fear for not only one's own safety, but also that of one's loved ones. Fear extended to law enforcement and sanctions for not complying with the regulations. The concept of a return to normality or 'getting back to normal' was both a facilitator and a barrier, depending on the individual's viewpoint. The most notable barriers were both trust and distrust. Trust that loved

ones would not infect them with COVID-19 resulted in low levels of NPI adoption around friends and family, while distrust of government intentions eroded the value of the NPIs.

The three dominant emotions expressed in this study were trust, distrust and fear although anxiety and burn out were also evident. Despite evidence that most COVID-19 transmission occurred in households (Madewell *et al.* 2020), more so when complacent around loved ones (Qian *et al.* 2020), participants in this study dramatically reduced NPI compliance around friends and family. This was not surprising. The COVID-19 pandemic was a time of fear, isolation and uncertainty about the future, and adolescents are more likely to enact risky behaviours in an emotional setting (Pringle *et al.* 2018). Human beings are, by nature, social creatures, willing to minimise perceived personal risk or harm for the comfort of contact with others (Cruwys *et al.* 2021). Studies have shown that NPI adoption was strongly influenced by in-group trust where people trust other group members more than people outside of the group (Cruwys *et al.* 2021) while viewing strangers as a far greater threat (Jetten *et al.* 2020). While there are certain benefits to ingroup trust in times of crisis from a solidarity perspective, high levels of interpersonal trust have been associated with less protective behaviour (Jorgensen, Bor and Petersen 2021), which dramatically increases transmission of infectious diseases. Cruwys *et al.* (2021) suggest that the risk of infection from loved ones should be highlighted when designing interventions for infectious diseases. However, as the need for contact with loved ones might outweigh the associated risk, messaging needs to emphasise preventative actions that can be taken to allow such contact. The findings of this study support this but in addition propose that when targeting adolescents, the risk of infection should be supplemented with accurate data to allow for empowerment via informed decision making. For example, as the risk of transmission in informal gatherings varies with different combinations of NPIs this could be represented using infographics with links to reference materials. An example of such an infographic was created by the researcher using images of the NPIs from the official Twitter account of the Gauteng Provincial Government (Gaunteng Provincal Gov 2021).

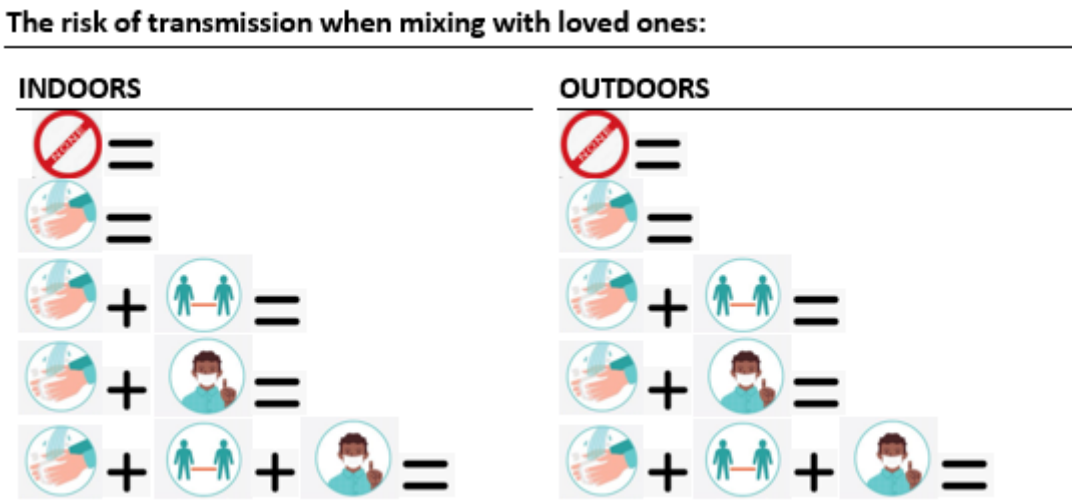

Figure 6.2: Proposed informed risk reduction infographic

Distrust in governments played a major role in the non-adoption of COVID-19 NPI worldwide (Lang *et al.* 2021; Siddiquea *et al.* 2021; Hengartner, Waller and Wyl 2022). While few participants of this study placed great trust in the South African government, many participants lamented the lack of transparency from government and suggested that some of the government decisions were made to financially benefit those close to the president rather than to save citizen's lives. This was not surprising, as despite the assurance from President Ramphosa (2020) that no COVID-19 relief funds would be stolen, contracts worth billions of rand were flagged for corruption (Winning 2022). In addition, the national Minister of Health was forced to resign after being implicated in a scandal involving kickbacks, from the outsourced communications agency hired as part of the COVID-19 pandemic response. Due to distrust in government, most participants in this study did not accept information provided to them by national government at face value. Instead, participants 'did their own research' by consulting what they viewed as credible sources. In this study the participants were university students who have, presumably, been exposed to sound research practice. As a result, the resources cited were mostly credible and included published literature and international organisations such as the World Health Organisation, however this might not be true of other South African adolescents. Trust in leadership also increases behavioural compliance in young people (Postill *et al.* 2022), the converse is also true. In this study participants with the lowest levels of NPI compliance described high levels of government distrust, so much so that they doubted the very existence of COVID-19.

Fear and the perception of threat are well established predictors of the adoption of preventative behaviours in times of a pandemic (Jorgensen, Bor and Petersen 2021). These are, however, likely to dissipate over time and are unlikely to provide sufficient motivation to those with a low personal risk (Hyde 2021). Fear was highlighted by almost every participant in this study. Not only the fear of personally contracting COVID-19 but for their family, especially those considered to be at risk of severe disease. However, in emotional settings, humans perform risk analysis using affect, feelings and instinct (Slovic *et al.* 2004) and over time, NPI adoption was reduced around loved ones, including those at risk of severe disease, indicating that fear was not a reliable nor long-term motivator for behaviour change. As would be expected, after a prolonged period of high stress and anxiety, with the need to be on high alert, participants were eventually exhausted and craved a return to normality. For some this was an incentive to follow the regulations, for others it was a reason to flout them. This natural reaction of complacency and loss of motivation in response to a prolonged public health crisis is called 'pandemic fatigue' (World Health Organisation. Regional Office for Europe 2020). While there are many aspects to this reaction, it is likely that over time people are driven to regain their freedom and autonomy as the long -term consequences of restrictions outweigh the perceived threat of disease. This requires further strategic management to increase motivation via other avenues including strengthening of self-efficacy and inclusion of community groups to improve solidarity (World Health Organisation. Regional Office for Europe 2020).

While such fears of death and disease during a global pandemic were likely universal, in South Africa and other African countries, law enforcement created additional anxiety with numerous accounts of abuse of authority and violence by deployed officers and troops (Solomon *et al.* 2022). In the first two months of the South African lockdown, nearly a quarter of a million people had been arrested for violating COVID-19 regulations with 11 lockdown related civilian deaths (Haffajee 2020). South Africa is a country mired by a violent past where law enforcement disregarded the human rights of people of colour (Friedman 2021). In this study it was noted that the military presence was reminiscent of Apartheid, where Black Africans over the age of 16 years were forced to carry a much hated 'dompas' (passbook) to move between specific areas. Failure to produce this documentation would result in arrest or even police brutality (Maluleke 2023). This presence was however also a facilitator in terms of highlighting the seriousness of the situation as well as a reluctant facilitator for compliance in public areas for those who complied to avoid being fined or arrested. In those cases, fear of law enforcement did not influence adoption in private spaces and increased overall government mistrust.

The COVID-19 pandemic was associated with negative mental health effects in terms of loneliness, anxiety and depression (European Centre for Disease Prevention and Control 2020), this was evident in this study as participants grappled with fear and loss while isolated from their peers. While electronic means were used to keep in contact with friends and family, this was 'not the same'. The clinical onset of most mental illness peaks around adolescence. Many of these illnesses will continue throughout the remainder of life, at great cost to the individual and public health (Lee *et al.* 2014). It is therefore important that any future guidance to improve NPI adoption is cognisant of the effect of health communication and motivational factors on mental health. As previously stated, although fear is a motivator for behavioural change, it is not effective in terms of longevity (World Health Organisation. Regional Office for Europe 2020). In an exploration of motivations for social distancing and mental health associations, Oosterhoff *et al.* (2020) found adolescents who were motivated to physical distance by self-protection or to avoid social judgement experienced increased anxiety and found physical distancing more burdensome. Conversely physical distancing because of government or parental rules did not show negative mental health associations. In fact, those who distanced because of parental rules actually felt a sense of belongingness, possibly attributed to the perception of concern for their well-being. This suggests that health messaging to promote positive behaviour change as an expected act of solidarity, with the confidence that the required change will make a difference and save lives, is not only likely an important facilitator but will also protect against negative mental health impacts.

6.4.6 Reflective motivation to adopt the NPIs

Bandura (1982) defines self-efficacy as 'a belief in the self's personal ability to engage in behaviour that protects them from a given threat' and a major motivator of longevity of compliance with protective behaviours during a pandemic, possibly more important than the risk of threat. Jorgensen, Bor and Petersen (2021) found that while risk perception varied across the population, this was insignificant in terms of NPI compliance when self-efficacy was high. In this study, risk was accurately assessed in certain ways (crowded, public places as high risk for transmission and elderly and diabetic as high risk for severe disease) but not others (small groups and gatherings with loved ones considered low risk for transmission) which resulted in variance in NPI adoption.

While some participants were concerned for their own health, others accurately considered themselves to be at low risk for severe disease. A major concern was however the

consequences of infecting someone else, who was high risk for severe disease, with COVID-19. Young people are more likely to adhere to NPIs when they feel a sense of responsibility to protect others (Coroiu *et al.* 2020; Oosterhoff *et al.* 2020; Postill *et al.* 2022). A sense of duty to one's family was evident in this study, with participants from strict households more likely to adopt the behaviours in an unquestioning manner. Similarly, Ding *et al.* (2020) found Chinese students were more concerned for higher risk family members than themselves, the participants were generally aware of the factors that determined the risk of severe COVID-19 and were more likely to adopt the NPI when around high risk family members. The Academy of Science South Africa (2020) highlighted that the South African response to the COVID-19 pandemic was dominated by medical scientists from a Western viewpoint with little focus on the humanities and social sciences. Although advanced age was considered to be the greatest risk factor for severe disease, in a country where respect for the elderly is culturally entrenched, messages regarding the cultural influence on the adoption of the NPIs was minimal. Chigangaidze, Matanga and Katsuro (2021) have suggested the use of Ubuntu, an African philosophy of societal responsibility, underpinned by values such as compassion, empathy and sharing (Mupedziswa, Rankopo and Mwansa 2019), as a theoretical framework for COVID-19 as well as other future pandemics in Africa, rather than a Western or Eurocentric approach to balance the socio-cultural diversity of the continent.

6.5 THE EMERGENT THEMES FROM THE INDUCTIVE ANALYSIS

Analysis of the qualitative data also included inductive analysis, whereby the data was analysed without preconceived categories. This allowed for the exploration of concepts that have not been included in the Theoretical Domains Framework but are relevant to the study aim. The following themes emerged: Autonomy, Social Media, Social Connection and the Youth Voice.

6.5.1 Theme 1: Autonomy

Participants stressed the importance of being empowered to make their own decisions about their own health behaviours. Adolescence ends when a person assumes their role as an adult in society. As such, this period is associated with a struggle for personal autonomy or self-determination (Blakemore and Choudhury 2006). During this time autonomous motivation is a stronger predictor of prosocial behaviour as it is seen as a choice that the adolescent can make, rather than a rule that they are expected to follow (Hardy *et al.* 2015). In this study participants were more likely to adopt behaviours that seemed both reasonable and efficacious. It was

suggested that government could facilitate this by providing unbiased, accurate information. While Reyna *et al.* (2011) found that adolescents preferred a summarised version of the information rather than details, the participants in this study wanted a detailed understanding of the novel disease and took active steps to educate themselves by 'doing their own research' via reputable sources. This should be considered when designing future campaigns, with information pitched at an appropriate level so that adolescents do not feel that are being spoken down to or treated like children. The information should be easily fact checked, via links to credible sources, with a strong emphasis of the value and reasoning behind each recommendation to increase self-efficacy (Downs *et al.* 2004). As young people are more likely to exercise caution when mixing with loved ones by making manageable changes to behaviour rather than overall compliance (Postill *et al.* 2022), a risk reduction approach should be included. For example, if masking is not seen as a viable option around friends, socialising outdoors is a viable alternative.

6.5.2 Theme 2: Social Media

Social media is recognised as an important medium for health communication (Salmon and Atkin 2003). The COVID-19 pandemic was the first time in history where social media has been used to rapidly disseminate pandemic information around the globe, unfortunately it was not without its challenges (World Health Organisation 2020a). The participants in this study recognised the value of social media as a fast and efficient tool to share not only accurate information but also misinformation. This misinformation, whilst not necessarily believed, resulted in confusion and distrust about what information was credible. Social media was noted as a particularly powerful influence on young people, an influence extended beyond the direct users with one participant explaining that social media permeates young people's lives to such a degree that she was aware of what was being shared online, despite not using social media herself.

Peer endorsement is important during adolescence (Andrews, Foulkes and Blakemore 2020). Online discussion in largely unmoderated comment sections gave participants the opportunity to see differing viewpoints that could be considered when forming their own personal attitudes and beliefs. Repetition of information by different users and signs of agreement by popularity indicators (such as 'likes' and 'retweets') added credibility to content via groupthink. Social media platforms manipulate user engagement in a variety of ways. Misinformation is generally designed to invoke strong reactions of shock or anger which increase user activity. Posts that

show increased user activity are then boosted by complex algorithms further amplifying the misinformation, while drowning out accurate content (Walther and Jang 2012).

Although managing this 'infodemic' was seen as critical by the World Health Organisation (2020a) in terms of the global COVID-19 response, efforts to counteract the spread of misinformation with the dissemination of accurate information were unsuccessful. This is a challenge that will need to be addressed in future, with collaboration of all stakeholders, including the social media platforms themselves, to prevent the spread of misinformation while protecting freedom of expression.

Social media influencers (SMIs) are highly influential digital content creators that are defined by 'their substantial following, distinctive brand persona, and patterned relationship with their commercial sponsors' (Duffy 2020). SMIs provide their followers with advice and inspiration, often integrating endorsements into their content to generate revenue. The rise in popularity of SMIs with their follower reach creates the potential for new forms of strategic health communication (Enke and Borchers 2019). Andrews, Foulkes and Blakemore (2020) suggested incentivising SMIs to communicate risk during the COVID-19 pandemic. In this study, SMIs were seen as influential in general terms but few participants trusted them as a source of COVID-19 information as this was not viewed as their niche area. As such the authenticity of the content was questioned as the SMIs might be acting for financial benefit.

As the title suggests, social media influence is one of normative social influence through a, para-social, almost peer like relationship where the influencer and followers form part of an online community (Enke and Borchers 2019). Typically, this relationship is formed over time with the influencer incorporating aspects of their personal life into stories about their area of interest and creating curated content for their followers. Research has shown that this influence is in the form of emotional persuasion, rather than as an authority on the actual content presented (Pöyry, Reinikainen and Luoma-Aho 2022). As part of the COVID-19 pandemic response, the Finish government included the use SMIs to help to distribute 'Corona Facts' campaign materials (Pöyry, Reinikainen and Luoma-Aho 2022). However, the success of the influencer relationship is dependent on the authenticity that has developed through the persona, style and brand of that influencer, not merely the sharing of outside content (Pöyry *et al.* 2019). As such, influencers adapted the campaign content according to the reactions of their followers and to accommodate their 'brand'. This resulted in the presentation of general guidelines rather than the specific campaign material. While this did not add to the educational campaign, the

influencers were successful in influencing social norms and encouraging their followers how to behave (Pöyry, Reinikainen and Luoma-Aho 2022).

As has been noted, in this study the participants were highly capable in terms of enacting the NPI. The most notable barrier to adoption was due to an emotional lack of motivation around loved ones. In future campaigns, trusted SMIs could be utilised to drive emotional persuasion of prosocial behaviours via online communities rather than specific health communication. In this way the influencers would retain their individual qualities, like brand and persona, which enabled them to become influential while positively impacting public health.

6.5.3 Theme 3: Social Connection

Adolescence is a time of heightened social connection and peer influence, where risks might be taken to avoid social exclusion (Andrews, Foulkes and Blakemore 2020). In this study, participants found the social isolation difficult and COVID-19 regulations were broken, by otherwise compliant individuals, to socialise with friends. For sustained behavioural change to occur, the behaviour must be viewed as effective and reasonably convenient (Michie and West 2021). Overtime certain behaviours may seem more convenient as they become habit or a way of life (e.g. masking) whereas others, like physical isolation, tend to be seen as more inconvenient as time passes and perceived risk declines (World Health Organisation. Regional Office for Europe 2020). Ravenhurst *et al.* (2023) found that university undergraduates were prepared to negotiate a reduction in risk behaviour by reducing the number of physical contacts in their social circle and the use of electronic communication, thus maintaining a social connection with their peers. Severe limitation of social interaction was simply not viewed a reasonable option. The participants in this study responded in a similar fashion by connecting with a small number of close contacts. During the earlier stages of the pandemic this socialising did include the use of masking and physical distancing, but over time this waned as the comfort of familiarity set in.

Adolescence is also a time when one finds one's identity within the group in preparation to navigate adulthood (Wallander, Fradkin and Scott 2013; Yeager, Dahl and Dweck 2018b). Participants lamented their lack of a 'university experience', explaining that they had expected their time at university to be one of newly acquired independence, where they would establish themselves as young adults with new friends and colleagues, laying the foundation for the rest of their lives. Mental health concerns were voiced, and sadness was expressed as they grieved the loss of this experience, old relationships and how much they missed their friends. Social

connectedness has many implications for student mental health, not only does isolation increase fear and anxiety, it decreases the ability to cope with additional stressors (Humphrey *et al.* 2022). This has implications for higher education in South Africa where students from previously disadvantaged backgrounds already struggle to cope with the expectations of university and should be considered in terms of additional support.

6.5.4 Theme 4: The Youth Voice

To improve behavioural compliance during a pandemic, disruptions to life should be both reasonable and manageable, but never arbitrary (Michie and West 2021). While participants were generally prepared to adopt the NPIs when viewed as necessary and effective, the 'lockdown' in South Africa was one of the most stringent globally, with restrictions such as bans on the sale of hot food, cigarettes and alcohol that were not imposed in many other countries (Greyling, Rossouw and Adhikari 2021). These were communicated in an authoritative manner with limited rationale, resulting in a public backlash with lowered trust in government and loss of public goodwill (Egbe *et al.* 2022). Almost a third of the participants voiced frustration about the lack of inclusion of young people in the behavioural response to the COVID-19 pandemic. The South African government's response was via a centralised National Coronavirus Command Council (NCCC), where members had an average age of 60 (Schreiber 2019) and there was no evidence of consultation with community or youth representative groups (Friedman 2021). Participants highlighted this generational gap with the decision makers viewed as old, out of touch 'pensioners' who could not understand the priorities and challenges of young people today. This resulted in what were viewed as poorly designed initiatives which were destined to fail. Seale *et al.* (2020) stress the importance of the targeted community in both intervention design and messaging. By mid-adolescence, most people have similar cognition skills to those of an adult (Fischhoff 2008) and could contribute meaningfully to fit for purpose intervention campaigns by adding insight and an understanding of their peer circumstance that older adults do not have. This is especially important in the design of digital interventions, where the generational gap is emphasised (Strommer 2020).

This study found that NPI adoption among students evolved over time, closely aligned to the available published literature regarding NPI efficacy and WHO recommendations, but not necessarily aligned to or in compliance with government regulations. A notable exception was the reduced compliance when interacting with loved ones. In these circumstances, despite high levels of both the psychological and physical capability to perform the protective behaviours,

the participants lacked the social opportunity and emotional motivation to do so. Notable factors that facilitated NPI adoption included trust in international health organisations, personal experience of COVID-19 and an altruistic desire to protect others. Notable factors that acted as barriers to NPI adoption included in-group trust, government distrust and social disapproval for adoption. The major themes that emerged included the need for autonomy in adolescent health decision making, the importance of social connection, the influence of social media, and the need to include young people in the development of targeted behaviour change interventions (BCIs).

6.6 REVIEW OF MEANS THROUGH WHICH NPI ADOPTION WAS ACHIEVED

The BCW behaviour change intervention design process consists of three stages. Stage one focuses on understanding the behaviour, stage two involves the identification of intervention options while stage three identifies content and implementation options. To best understand barriers and facilitators to performing the target behaviour, the TDF is used to perform a COM-B analysis or diagnosis (Michie, Atkins and West 2014). The COM-B analysis of the NPIs has been discussed in detail in this chapter. In the case of the current study, it is also prudent to review how interventions influenced NPI adoption by university students in this study.

Michie, Atkins and West (2014) recommend the use of nine intervention functions: education; persuasion; incentivisation; coercion; training; restriction; environmental restructuring, modelling and enablement. A definition of each intervention function by Michie, van Stralen and West (2011) is included in Chapter three, these are however repeated in this section for ease of reference.

Education is defined as ‘increasing knowledge or comprehension’ and is generally used to target psychological capability and reflective motivation in the form of beliefs about capabilities and consequences. The behaviour change techniques (BCTs) most frequently used to educate include the provision of information regarding social, environmental and health consequences of negative behaviours (Michie, Atkins and West 2014). As would be expected during a pandemic caused by a novel virus, education was a very important intervention. One that would, however, be complicated by widespread misinformation. Education as an intervention function in this study was broadly effective as participants were knowledgeable about COVID-19 transmission and the benefits of the adoption of positive behaviours and whilst there was evidence of COVID-19 misinformation exposure, most participants were aware of its falsehood.

Knowledge was however found to be lacking, in terms of household transmission and transmission in small informal gatherings. This was compounded by the emotional clouding of judgement in such circumstances. When considering education as an intervention function, it must be remembered that education driven BCIs that target adolescents show poor outcomes, often due to the manner in which the knowledge is communicated (Andrews, Foulkes and Blakemore 2020). In this study participants noted that most of the health communication came from the older generation and described a disconnect between the different generations. This again highlights the importance of the inclusion of young people in the health communication of BCIs.

West *et al.* (2020b) warned that while education was likely to be critical for NPI adoption, persuasion and modelling would be necessary to provide additional motivation. Persuasion, incentivisation and coercion all target both reflective and automatic motivation (Cane, O'Connor and Michie 2012). Persuasion is defined as 'the use of communication to induce positive or negative feeling or action'. BCTs commonly used to persuade include the provision of information about the consequences of negative behaviours as well as the use of a 'credible source' to reinforce the message. Where persuasion was noted as influential in this study, it was regarding visuals that highlighted death, such as the imagery of overcrowded hospitals in Lombardy, Italy from March 2020. This helped to highlight the reality and gravity of the COVID-19 pandemic. Persuasion in the form of feeling like one was 'doing their part' or contributing to the greater good and 'saving lives' by adopting the NPIs was also noted. Participants stressed the importance of personal autonomy and felt that they should be persuaded to make responsible decisions with the provision of accurate, unbiased information, rather than ordered to comply with authoritative demands. Incentivisation is defined as 'creating an expectation of a reward' which did not feature as an influential intervention function. The main incentive noted in the study was the concept of following the regulations so that things could 'get back to normal'. This however was not something that the government had promised.

Coercion, defined as 'creating an expectation of penalty', however featured prominently. BCTs associated with coercion include feedback and monitoring of behaviour. The use of law enforcement was influential in some respects as at times, some participants did adopt NPIs in public, only because they feared being fined or arrested. This did not help to reduce transmission in private spaces. West *et al.* (2020b) emphasised that coercion should be used in a manner that is equitable and accepted by the community. In South Africa and other developing countries, law enforcement was associated with an abuse of power with violence

and infringement of human rights. This is not acceptable at any time and law enforcement officials should be trained for appropriate conduct in times of disaster and disciplined when necessary.

Training is defined as 'developing skills' and targets both psychological and physical capability, physical opportunity and automatic motivation (Michie, Atkins and West 2014). BCTs associated with training include the instruction and demonstration of behaviour and should be as practical as possible with the inclusion of common mistakes and how to avoid them (West *et al.* 2020b). Training was noted as empowering and influential with HCWs demonstrating handwashing techniques, participants practising to master the skill and recalling memory tricks like washing hands being a 'twenty second shuffle'. In addition, President Ramaphosa addressed the nation and demonstrated how to correctly wear a mask on live television. Despite a somewhat clumsy attempt, this was fondly remembered and achieved its goal.

Restriction is defined as a 'reduction in the opportunity to enact the competing behaviours' by limiting physical and social opportunity. As BCTs focus on the individual's views and reactions rather, there are no BCTs associated with this intervention function. This was noted to be influential by some participants but not all. It was impossible for every citizen to be always policed and some visited friends during the stay-at-home orders. Those living in rural areas were also able to move around with relative freedom.

Environmental restructuring is defined as 'altering the physical or social context' in order to increase physical or social opportunity and automatic motivation, mostly in the form of habit (Michie, Atkins and West 2014). Sanitisers at entrances and floor markings were the notable successes in terms of environmental restructuring. Participants also noted that where this restructuring had been absent, for example in student residences, it acted as a barrier to adoption of NPIs. Social restructuring was successful to a degree in terms of large gatherings and strangers, but not around loved ones where non-adoption was most likely.

Modelling is defined as 'providing a positive example to emulate' targeting social opportunity, automatic motivation via an emotive response. The most common BCT used for modelling is the demonstration of the desired behaviour. The state president, HCWs and specific celebrities were identified as role models. Participants expressed frustration when political figures or parties were seen to flout the regulations when the regulations were seen as inconvenient, this added to a sense of mistrust of government and reduced confidence in the NPIs. Although SMIs were expected to play a role in the modelling of positive behaviours (Andrews, Foulkes and

Blakemore 2020), this was not the case in this study. The findings of the study do, however, suggest a potential role for SMIs in influencing prosocial norms.

Enablement is defined as 'facilitating behaviour by increasing capability or opportunity or reducing barriers' that goes beyond training or environmental restricting. West *et al.* (2020b) suggested that 'enablement could encompass a variety of interventions to improve capability such as mental health support. Participants found isolation challenging and mental health difficulties were noted but no support services were mentioned. The lack of university experience was also noted where participants highlighted that despite efforts from lecturers to engage via online lessons, it was not the equivalent of face-to-face interaction.

It should be noted that different behaviours require different combinations of intervention functions that should be contextualised to the target group as well as the emotional, social and physical setting. As a general principle, intervention functions should aim to promote and reward positive behaviours rather than sanction negative behaviour. When sanction is however necessary, it should be perceived as rational and fair and focused on the behaviour rather than the person.

6.7 REFLECTIONS ON PERSONAL REFLEXIVITY

The importance of reflexivity in qualitative research was discussed in Chapter four. This included four questions that a researcher answers to examine any potential personal biases or assumptions (Austin and Sutton 2014). These are answered below to add extra context to this study via the inclusion of the researcher's world view.

Why am I interested in this topic?

COVID-19 was a central part of our lives for more than three years, where most citizens experienced losing various degrees of rights and freedom, it became something that we could not escape. I am also passionate about health promotion of individual and public health. South Africa has an expanding population which will increase the burden on an already strained public health system. I also do not believe that young people should be written off and that risky behaviour should automatically be expected. For all these reasons, I feel it is vital that we gain an understanding of adolescent behaviour change.

What do I really think the answer is?

I do not exactly know. I could speak to my personal adoption of the non-pharmaceutical intervention (NPI) measures, which did change throughout the pandemic. My personal

adoption would be considered highly compliant and in accordance with the available literature, although around loved ones I adopted a risk reduction. It would also be a misstep not to acknowledge the socioeconomic divide regarding the impact of COVID-19 as well as the differing resources available to people of different socioeconomic status that enable NPI adoption. I come from a middle-income background and was fortunate enough to be able to work from home for a large part of the pandemic. My immediate family and I did contract COVID-19 during the delta wave, but fortunately no one developed serious disease. I contracted COVID-19 from a family member that would be considered a non-adopter of the NPI. I believe myself to be acutely aware of social media misinformation campaigns and how to spot them. My preconceived notions would include the significant influence of social media and influencers on young people. In my personal experience I saw COVID-19 politicised and expected to find this in the study.

What am I getting out of this?

I am completing my qualification and hopefully contributing something meaningful to the behaviour change body of work.

What will my professional community think of this work and me?

I would hope that the professional community would find this work useful and that it provides some insight into designing targeted adolescent behaviour change interventions (BCIs).

6.8 SUMMARY OF THE CHAPTER

This chapter discussed the results presented in Chapter five. Participants in this study were broadly knowledgeable about COVID-19 and the NPIs to reduce transmission. Despite this, negative social influences and emotional motivators like in-group trust resulted in low levels of adoption when mixing with loved ones. While fear was evident, over time pandemic fatigue set in whereby the desire for normality outweighed the threat of disease. Notable themes associated with adolescents emerged, which provided further insight into the effective use of social media influencers and importance of adolescent involvement in the design and communication of future targeted interventions. The next chapter will review the behavioural considerations for the improvement of adolescent targeted BCI via each COM-B source of

behaviour and make recommendations for the design of BCI to target South African adolescents.

CHAPTER 7:

GUIDELINES FOR THE DESIGN OF ADOLESCENT TARGETED BEHAVIOUR CHANGE INTERVENTIONS

7.1 INTRODUCTION

In Chapter six, the findings of this study were discussed and triangulated with other related studies in the field. Some of the findings reinforced those of international authors, others gave specific insight into the low levels of adoption of personal nonpharmaceutical intervention (NPI) measures around loved ones in this study, the influence of health misinformation and the potential role of South African social media influencers (SMIs) in future health promotion campaigns. This chapter presents the final objective of this study, which was to develop guidelines for the design of targeted behaviour change intervention (BCI) strategies for promoting positive health behaviours among South African youth. This guidance is for use with the Behaviour Change Wheel (BCW) for all service providers, organisation and behaviour change practitioners working within public health in South Africa. It is however particularly aimed at those who design, implement and evaluate behaviour change interventions. The guidance may also be of interest to policy makers and researchers in the field of public health and behavioural science.

7.2 RATIONALE FOR BEHAVIOUR CHANGE DESIGN GUIDELINES FOR SOUTH AFRICAN ADOLESCENTS

The National Strategic Plan for the Prevention and Control of Non-Communicable Diseases 2022-2027 sets out the South African government's plan to reduce the future burden of non-communicable disease on the already strained public health care system as well as to prepare for future pandemics via five strategic goals (National Department of Health (South Africa) 2022b). Strategic Goal two aims to 'Promote and enable health and wellness across the life course' through targeted health promotion and disease prevention activities. The National Insitute for Health and Care Excellence (2014) recommend the use of high quality, acceptable, effective, practical and sustainable behavioural interventions that take local needs and context into account. The approach for the design of such interventions is, however limited to six broad

stages such as performing a needs assessment and developing practical ways of delivering behavioural change techniques (BCTs).

Adolescence is a critical time in terms of health promotion as it is during this phase of life that many long term health behaviours, both positive and negative, are established (Fuhrmann, Knoll and Blakemore 2015). While prevention programmes remain the most efficient and economical health promotion option, universal prevention programmes targeting this group have shown little success globally (Wallander, Fradkin and Scott 2013; Yeager, Dahl and Dweck 2018a). South Africa is no different. Due to the persistent challenges of HIV/AIDS, teenage pregnancy, substance abuse and violence, adolescence remains a key demographic to target for effective behaviour change (National Department of Health 2012; Khuzwayo, Taylor and Connolly 2020). In response, the National Department of Health (2017) developed the Adolescent and Youth Policy (AYHP) to promote the health and well-being of young South Africans via a pro-active, preventative focus on health promotion and management. This has however centered around the Adolescent and Youth Friendly Service (AYFS) approach, which has produced sub-optimal results (Geary *et al.* 2015; James *et al.* 2018). While the AYHP does advocate for the use of evidence-based, innovative youth-oriented programmes to affect behaviour change, little guidance is provided in the design of such interventions. This guidance is much needed as many of the behaviour change interventions (BCI) targeting this group have shown limited success, at least in part, due to poor design with misaligned theoretical focus and a lack of sociocultural context (Mwale and Muula 2017).

Public Health England (PHE) have based their national guidance for achieving behaviour change on the BCW (West *et al.* 2020a) and although the African Centre for Disease Prevention and Control (Africa CDC) does not provide specific guidance, they have partnered with PHE regarding behavioural science and intervention strategies in the past. While the BCW is a comprehensive framework for the design of BCI, it lacks specificity in terms of targeting adolescents. This guidance adds value in complementing the AYHP to improve BCI design to meet its primary objectives.

7.3 PROCESS OF DEVELOPING GUIDELINES

These guidelines were developed following the WHO fundamental steps for guideline development (World Health Organisation 2019a). These five steps consisted of two conceptual considerations: scoping of guidelines and formulating questions (chapters one and two) and

methodological considerations: synthesising the evidence; grading of the evidence and finally formulating recommendations. Evidence was synthesised through qualitative evidence synthesis via both COM-B model (framework synthesis) and thematic analysis and discussed in relation to the prevailing literature regarding adolescent behaviour influence and intervention (Flemming *et al.* 2019). Further consideration of evidence is included in relation to the COM-B model of behaviour in this chapter. Finally, the WHO-INTEGRATE evidence-to-decision framework was considered to include sociocultural acceptability, health equity; equality and non-discrimination; societal implications; sustainability and feasibility (Rehfuess *et al.* 2019). Recommendations were then formulated using the three stages of the BCW and are intended to supplement the BCW when designing interventions to target South African adolescents.

7.4 APPLICATION OF THE CAPABILITY, OPPORTUNITY, MOTIVATION, BEHAVIOUR (COM-B) MODEL TO THE DEVELOPED GUIDELINES

Guidance to improve adolescent adoption of positive behaviours is first discussed under each source of behaviour: capability, opportunity and motivation. The recommendations are included thereafter.

7.4.1 Guidance to improve adolescent capability to adopt positive behaviours

The desire for personal and bodily autonomy was a key finding in this study. Adolescence is the final stage in the progression of childhood to adulthood, a time where the cognitive capacity for rational decision making is comparable to adults (Yeager, Dahl and Dweck 2018a). Adolescent health promotion should acknowledge this and seek to empower young people to make better health decisions rather than ‘tell them what to do’. Abstinence or ‘just say no’ campaigns tend to show poor results as they involve an all or nothing approach. Most adolescents are likely to engage in some kind of risky behaviour, as such education should include strategies to reduce risk (limitation of the risk of disease) and reduce harm (limitation of the damage caused by a disease or activity) (Einstein 2007). Adolescents should be provided with accurate, evidence-based information, delivered by trusted, relatable individuals like health care workers, teachers, parents or peers (Viner and Macfarlane 2005). The value of social media for health communication should not be underestimated and further research is needed to develop a framework for designing and implementing a strategic social media programme for health communication delivery (Fayoyin 2016). Social media use is particularly prevalent in adolescence and allows for the rapid dissemination of health communication, targeted

interaction and engagement analysis. To maximise social media utility, young people should be included in digital interventions from the outset as older adults are likely to be out of touch with technological developments (Sherman *et al.* 2016). This information should focus on the individual's ability to protect themselves from disease and help them build the skills to do so. This could include physical demonstrations like handwashing or putting on a condom or emotional skills which are discussed in the next section.

7.4.2 Guidance to improve adolescent opportunity to adopt positive behaviours

Not only does social media allow for rapid and effective distribution of health information, it provides a space to influence social norms via sociocultural learning. Adolescence is a time where peer influence is heightened. On social media adolescents can gauge what others think when forming their own opinion on a topic. This can be via comments or the approval or disapproval of other users by quantitative indicators such as 'likes' (Sherman *et al.* 2016). As such, it is essential that any large- scale adolescent BCI includes a sophisticated social media campaign. In addition, SMIs offer the potential for normative influence on their followers via a parasocial relationship (Pöyry, Reinikainen and Luoma-Aho 2022). This should focus on positive health attitudes rather than medical information which could be considered as 'off brand' and potentially financially motivated. While peer influence dominates adolescence, parental influence should also be considered. Certain BCIs may benefit by targeting parents in their parental responsibility to promote healthy behaviours in their children (National Academies of Sciences Engineering and Medicine. 2020). In South Africa this can be expanded to include a broader audience via the African view of family which includes relationships other than the traditional Western familial structure.

BCI are more likely to be successful when it is easier to perform the behaviour than it is not to do so, not only in social opportunity, but also physical opportunity. Extreme poverty reduces the opportunity for adolescents to adopt healthy behaviours and should be considered when designing BCI. Where socioeconomic interventions are not possible, practitioners can address (rather than change) social factors to potentially improve understanding of and attitudes towards these factors (Harrison *et al.* 2010).

7.4.3 Guidance to improve adolescent motivation to adopt positive behaviours

The purpose of health communication is not only to educate, it also includes an element of persuasion (Williams *et al.* 2023). Adolescents need to be respectfully motivated to want to adopt healthy behaviours rather than be told to do so (Nagata 2020). However, due to

significant growth of the limbic system, adolescents may struggle to regulate their emotions. As such, adolescents are more likely to perform risky behaviours in an emotional context (Pringle *et al.* 2018). While these situations cannot be prevented, adolescents can be prepared ahead of time and upskilled to manage their emotions more effectively. This study highlighted misplaced in-group increased risky behaviour whereas the experience of a salient event was likely to result in extra caution. A personal experience may not however necessarily be an available or appropriate option. In such cases the vicarious experience of a relatable individual is a potential alternative. It is important to note that adolescents are not a homogenous group and that motivations differ during the different stages. For example, in early adolescence, short term motivation with immediate reward is common, whereas by late adolescence long term motivation becomes more evident (Viner and Macfarlane 2005).

7.5 RECOMMENDED GUIDELINES FOR THE DESIGN OF BCIS TO TARGET SOUTH AFRICAN ADOLESCENTS

Recommendation 1: Ensure the target audience is correctly identified.

Not all intervention strategies will be most effective by targeting adolescents themselves. Evidence shows that parental influence, especially maternal influence, can have a strong positive or negative affect on the adoption of healthy behaviours. BCIs should also be targeted to the correct stage of adolescence. For example, HIV prevention programmes need to be initiated by mid-adolescence as by late adolescence, much of the targeted population would have already engaged in risky behaviours.

Recommendation 2: Gain an understanding of the target audience.

The stage of adolescence should also be considered in the design of BCI. Adolescents are not a homogenous group; it is important to gain insight from adolescents within the target group when designing any BCI. During early adolescence complex thought has not been realised and peer influence is increasingly important whereas by late adolescence a strong sense of personal identity and social autonomy is evident with greater consideration to long term consequences.

Recommendation 3: Choose least inconvenient action for maximum benefit.

BCIs should target the specific actions that are most likely to change. Any efforts to perform these actions should be seen as both reasonable and manageable.

Recommendation 4: Create an environment where it is easier to perform the behaviour than not.

This includes both the physical environment and social environment. South Africa is one of the most unequal societies in the world with very high levels of youth unemployment. As extreme poverty is a negative factor in adoption of healthy behaviours, for large scale meaningful adolescent BCI success, economic interventions are needed. While BCI practitioners may be unable to change these factors, interventions should address them and aim to influence adolescent understanding and attitudes towards those factors.

Recommendation 5: Deliver accurate information from trusted sources.

In the age of the internet, information is readily available. Health promotion information presented to adolescents should include links to reputable sources for easy fact checking. Low levels of trust in the South African government can be combatted by including international health organisations like the World Health Organisation and the African Centre for Disease Prevention and Control.

Recommendation 6: Communicate with respect to drive responsible decision making. Communication should place an adolescent as someone about to enter adulthood and treat them with the appropriate level of respect. This should target the adolescent as capable of responsible decision making, while empowering them with the tools to do so. This includes an understanding that this decision making is likely to be challenging in emotional circumstances and preparation for this. As abstinence only interventions often fail, BCIs should consider risk and harm reduction strategies.

Recommendation 7: Humanise disease outcomes with real life experiences and outcomes.

Adolescents may struggle to correctly identify personal risk and believe ‘it won’t happen to me’. Humanising negative health outcomes by presenting cases by peers or older youths can help to highlight the potential consequences of risky behaviour. Emotional drivers, while powerful, can also be unpredictable and should be piloted to prevent unforeseen, adverse effects.

Recommendation 8: Ensure effective use of social media.

Most adolescent targeted BCIs should include an effective social media strategy. Social media is a primary form of communication among young people, one where older adults are often out of touch. This strategy should be developed in consultation with members of the target group. SMIs become successful by developing a parasocial relationship with their followers. This

relationship presents an opportunity to drive change via social norms if the norms align with the SMI's brand. If not, specific medical education should be avoided as this can be viewed as a personal or purchased opinion. In addition, measures to mitigate social media misinformation should be undertaken. These could include studying effective communication strategies, interventions to promote critical thinking skills, approaches to counteract false or misleading claims on social media and driving internet literacy skills.

Recommendation 9: Consider adolescent mental health when designing BCI.

Adolescence is associated with an increased risk for mental health illnesses like anxiety and depression. Fear or threat-based motivations for behaviour change negatively influence these illnesses. BCIs should rather promote self-efficacy of interventions, highlighting the individual's ability to take control of their own health.

Recommendation 10: Youth involvement in BCI development.

Adolescents have specialised knowledge of their peer group and should be included in targeted health promotion activities from conception to evaluation. This will not only produce BCIs that are better suited to the target audience, it will also foster a sense of ownership and empowerment and positively influence community acceptability. Youth participation is however, not without its challenges. Organisers need to be transparent and ensure that all parties are committed to the process and willing to make necessary adjustments along the way. Adolescents may not have the necessary understanding of policy, legal and financial constraints and feel side-lined during the process. To combat such challenges organisers will need to carefully select appropriate participants with the insight and ability to meaningfully contribute to the intervention. Clear expectations should be established from the outset to prevent the breakdown of the working relationship.

7.6 DISSEMINATION OF THE DEVELOPED GUIDELINES

It is envisaged that developed guidelines will be disseminated via presentation at national conferences as well as published in peer reviewed, accredited journals. In addition, this thesis will be available in both hard and soft copy via the DUT library and online repository respectively.

7.7 SUMMARY OF THE CHAPTER

This chapter presented recommended guidance for the design of BCIs to target South African adolescents. This guidance developed using the COM-B model of behaviour by integrating insights gained from this study and other published literature. Chapter eight will conclude the thesis with future research recommendations and limitations of this study.

CHAPTER 8:

CONCLUSIONS, RESEARCH RECOMMENDATIONS AND LIMITATIONS OF THE STUDY

8.1 INTRODUCTION

The previous chapter presented the developed guidelines for designing targeted behaviour change intervention strategies for promoting positive health behaviours among South African adolescents. This chapter completes the dissertation with the conclusion, research recommendations and limitations of the study.

8.2 RECOMMENDATIONS FOR FUTURE RESEARCH

Firstly, this study only included university students as participants. Future studies to explore the barriers and facilitators to the adoption of healthy behaviours by adolescents should include late -stage adolescents with varying levels of education as this could provide different insight in terms of educational content and delivery as well as participants from early and middle adolescence.

Secondly, this study focused on the COVID-19 NPIs as targeted behaviours. It would be beneficial to use the BCW to guide future studies on adolescent risky behaviours like smoking, alcohol abuse etc.

Thirdly, social media influence and misinformation featured strongly in this research and is recognised as a significant barrier to health communication. Future research should be conducted into strategies to combat the effect of this misinformation.

8.3 CONTRIBUTION OF THE RESEARCH STUDY TO THE BODY OF KNOWLEDGE

Despite the need to gain an in depth understanding of youth behaviour in context, there is a paucity of literature regarding how and why South African adolescents adopt positive behaviours. This study helps to close that gap regarding the factors influencing of the adoption of the COVID-19 NPIs.

In addition, although the National Department of Health (2017) developed the Adolescent and Youth Health Policy (AYHP) with a goal of adolescent health promotion, at this time no guidelines for the design of targeted BCIs could be found. The researcher contends that this is the first South African study to develop such guidelines. This adds to the existing body of behavioural science knowledge and helps to inform evidence based public health practice.

8.4 LIMITATIONS OF THE STUDY

Several limitations of this study that should be acknowledged.

Firstly, as the study was qualitative, with participants from a single UOT in one South African province, the findings cannot be regarded as generalizable.

Secondly, it is arguably impossible to eliminate some degree of researcher subjectivity in qualitative studies. Reflexivity was however practiced as documented in Chapter four.

Thirdly, the study population was limited to university students, therefore certain aspects of the findings may not be representative of students who do not enter tertiary education. This is particularly likely in terms of the psychological capability source of behaviour and discernment of credible information sources.

Fourthly, while the COVID-19 pandemic was declared in March 2020, data collection only commenced in November 2021. As a result, there may be errors in participant recall.

8.5 CONCLUSION OF THE STUDY

When designing targeted behaviour change interventions, it is important to understand not only the behaviour in context, but also the potential influences on behaviour within that target group. Adolescence is the stage of development immediately preceding adulthood and is associated with a struggle for autonomy. As such it is important that adolescents are empowered with the tools for responsible decision making. In addition to access to accurate health education, this requires changes in social norms and the development of skills to make these decisions in emotionally charged environments. This study further supports the inclusion of the youth voice in all stages of adolescent targeted behaviour change interventions.

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Appendix A:

Screening questions

Title: An exploration of the adoption of personal non-pharmaceutical interventions by students at a university of technology in response to the COVID-19 outbreak

Name of prospective participant:

Faculty:

Date: …… Time: ……

Question	Anticipated answer	Answer
Would you mind answering a few questions to determine if you are eligible for my study?	Yes	
How old are you?	18-24	
Have you been a student registered at DUT since 2020?	Yes	
Did you believe that you have mostly complied with the required behaviour change of hand hygiene, mask wearing or physical distancing in response to the COVID-19 pandemic?	Either yes or no	

Researcher signature: ……

Appendix B: Interview guide and checklist grid with extra prompts

Introduction:

Thank you for taking the time to participate in this research. After reading the letter of information do you have any questions before we begin? Please be as open and honest as possible, your identity will be kept confidential.

Demographic details:

Age:

Gender:

Faculty:

Year of study:

Type of residence:

Overarching question:

During the COVID-19 pandemic, please describe your experience in adopting the following non-pharmaceutical protection measures: hand washing, mask wearing and physical distancing?

- Hand washing/sanitising: Prompts:
    - Describe your understanding of the importance of handwashing and good hand hygiene
    - Do you feel confident about how to wash your hands appropriately?
    - Were there times where you were more or less likely to maintain good hand hygiene? (Include hand shaking, greetings etc. as follow up prompts.)
    - What factors do you believe encouraged/positively influenced you to wash or sanitise your hands regularly?
    - What factors do you believe discouraged/negatively influenced you from washing or sanitising your hands regularly?

- Mask wearing: Prompts:
    - Describe your understanding of the importance of mask wearing
    - Do you feel confident about how to wear and care for a mask?
    - Were there times when you were more or less likely to wear a mask?
    - What factors do you believe encouraged/positively influenced you to wear a mask?
    - What factors do you believe discouraged/negatively you from wearing a mask?

- Physical distancing: Prompts:
    - Describe your understanding of the importance of physical distancing
    - Do you feel confident about how to safely maintain a physical distance?
    - Were there times where you were more or less likely to maintain physical distance?
    - What factors do you believe encouraged/positively influenced you remain physically distanced from other?
    - What factors do you believe discouraged/negatively influenced you from physical distancing?

- Did your adoption of these measures change during the course of the pandemic? If so how and why?
- During the course of the pandemic, did you or anyone that you know test positive for COVID-19 (rank in order)
    1. Themselves
    2. Close friend or family member
    3. Others in their class or residence
    4. Others

End interview with: Is there anything else that you can think of that could have positively influenced you to adopt any of these measures?

Matrix for specific additional TDF domain prompts to ensure that all domains of the framework are explored

COM-B	TDF Domain	Hands	Masks	Physical distancing
Capability – psychological	Knowledge	Are you aware of the hand washing guidelines?	Are you aware of the mask wearing guidelines?	Are you aware of the physical guidelines?
Capability - psychological	Beliefs about capabilities (self-efficacy)	How confident are you that you wash your hands correctly?	How confident are you that you wear a mask correctly?	How confident are you keep your physical correctly?
Capability - psychological	Memory, attention and decision processes	Are there times where you forgot to wash your hands or chose not to?	Are there times where you forgot to wear a mask or chose not to?	Are there times where you forgot to keep your physical distance or chose not to?
Capability - psychological	Behavioural regulation	Is there anything that helped/prompted you to wash your hands?	Is there anything that helped/prompted you to wear a mask?	Is there anything that helped/prompted you to keep an appropriate physical distance?
Capability – physical	Skills	Have you been shown how to wash your hands correctly?	Have you been shown how to wear a mask correctly?	Have you been shown how to keep an appropriate physical distance?
Opportunity - physical	Environmental context and resources (environmental constraints)	Describe resources that helped or hindered you washing your hands	Describe resources that helped or hindered you to wear a mask	Describe resources that helped or hindered you to keep an appropriate physical distance
Opportunity - social	Social influences	What people/scenarios influenced you washing your hands?	What people/scenarios influenced you to wear or not wear a mask?	What people/scenarios influenced you to keep an appropriate distance?
Motivation – automatic	Emotion	How do you feel about washing your hands and how does this influence what you do?	How do you feel about wearing a mask and how does this influence what you do?	How do you feel about physical distancing and how does this influence what you do?
Motivation - reflective	Intention	Do you want/intend to wash your hands?	Do you want/intend to wear a mask?	Do you want/intend to physical distance?
Motivation - reflective	Goals	Is washing your hands a goal or priority for you?	Is wearing a mask a goal or priority for you?	Is physical distancing a goal or priority for you?

Motivation - reflective	Social/professional role and identity (self-standards)	Is washing your hands something you see as part of your role in society	Is wearing a mask something you see as part of your role in society	Is physical distancing something you see as part of your role in society
Motivation - reflective	Beliefs about consequences (anticipated outcomes/attitudes)	What do you think might happen if you do or don't wash your hands?	What do you think might happen if you do or don't wear a mask?	What do you think might happen if you do or don't physical distance?
Motivation - reflective	Reinforcement	Have you had a positive/negative experience washing your hands? Are there incentives?	Have you had a positive/negative experience wearing a mask? Are there incentives?	Have you had a positive/negative experience physical distancing? Are there incentives?
Motivation - reflective	Optimism	To what degree do you believe washing your hands protects you from the virus?	To what degree do you believe wearing a mask protects you from the virus?	To what degree do you believe physical distancing protects you from the virus?

Appendix C:

Would you like to share your experience of adopting wearing a mask, hand washing/sanitising & physical distancing?

Source: Twitter Emoji project

Are you between ages 18-24 & were a student at DUT in 2020?

Research is currently being conducted at the Durban University of Technology into the behaviour change of students in response to the COVID-19 pandemic.

To see if you qualify for the study please email Dr Colette Kell on colettek@dut.ac.za.

Interviews will be conducted via Microsoft Teams & **confidentiality will be maintained at all times**.

Participants will be compensated with a data bundle of a value between R80-R99 (network

Appendix D

LETTER OF INFORMATION

Title of the Research Study: An exploration of the adoption of personal non-pharmaceutical interventions by students at a university of technology in response to the COVID-19 outbreak.

Principal Investigator/s/researcher: Dr Colette Kell

Co-Investigator/s/supervisor/s: Prof C Jinabhai, PhD and Prof F Haffejee, PhD

Brief Introduction and Purpose of the Study:

Good Day,

I am a DUT staff member conducting research for my PhD in Health Sciences and would like to invite you to participate in the following study:

In 2020 the world faced the most dramatic, acute global pandemic in a century; COVID-19. In the absence of a vaccine or cure governments and the medical community turned to personal non-pharmaceutical interventions (NPIs) to decrease the rate of transmission and 'flatten the curve'. These NPIs centered around handwashing, mask wearing and physical distancing, all of which require a change in existing practice for most people as both individuals and a collective. In South Africa, as in other countries these measures were adopted with varied success, with particularly poor results in the youth. A potential reason for this is the lack of targeted interventions that take the group circumstances into account.

Outline of the Procedures:

Aim of the study: To understand influences on behaviour related to the implementation of NPIs in the DUT student context. Insight into these factors will be used to develop guidelines to inform interventions to promote positive behaviour change.

Should you agree to participate in the study you would be interviewed and asked about your adoption of these behaviours and any factors that influenced this adoption. This interview will last approximately one hour via Microsoft Teams. Please feel free to ask as many questions as you wish because it is important that you fully understand the study. You are entitled to discuss the study with family and friends and are under no obligation to commit at this stage. For this purpose, a copy of the Letter of Information document is available for you to take home.

Risks or Discomforts to the Participant: There are no foreseeable risks or discomforts to participants.

Reasons why the participants may withdraw from the Study: Should you wish to, you are free to withdraw from the study at any stage and for any reason.

Benefits: There are no direct benefits to the participants. You may benefit indirectly in the form of future targeted positive behaviour change interventions.

Remuneration: You will receive data to a value of between R80-R99 (participant network dependent) as compensation for data used by participating in this study.

Costs of the Study: You will not be expected to cover any costs towards the study.

Confidentiality: Confidentiality will be maintained by coding each participant with a specific pseudonym/reference code. The record of which will be stored with the informed consent documents and kept separate from the data gathered. All data will be kept in a locked office and where electronic in a password protected folder.

Results: The results will be available in the form of the final thesis and any subsequent publications.

Research-related Injury: There are no foreseeable research related injuries.

Storage of all electronic and hard copies including tape recordings will be kept in the researcher's locked office. Electronic data will be password protected. This information will be kept for 5 years and then destroyed in accordance with DUT policy. Only the researcher, study supervisors and any research assistants will have access during this time.

Persons to contact in the Event of Any Problems or Queries: Please contact the researcher, Colette Kell on 031 3732393, my supervisor, Prof Jinabhai on champaklalj@dut.ac.za, my co-supervisor Prof Haffejee on firozah@dut.ac.za or the Institutional Research Ethics Administrator on 031 373 2375. Complaints can be reported to the Director: Research and Postgraduate Support Dr L Linganiso on 031 373 2577 or researchdirector@dut.ac.za.

CONSENT

Full Title of the Study: An exploration of the adoption of personal non-pharmaceutical interventions by students at a university of technology in response to the COVID-19 outbreak

Names of Researcher/s: Dr Colette Kell

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, Colette Kell, about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: 176/21 ,
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

Full Name of Participant	**Date**	**Time**	**Signature / Right Thumbprint**

I, Colette Kell herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Full Name of Researcher	**Date**	**Signature**
Full Name of Witness (If applicable)	**Date**	**Signature**
Full Name of Legal Guardian (If applicable)	**Date**	**Signature**

Appendix E:

LETTER OF INFORMATION – PRETESTING

Title of the Research Study: An exploration of the adoption of personal non-pharmaceutical interventions by students at a university of technology in response to the COVID-19 outbreak.

Principal Investigator/s/researcher: Dr Colette Kell

Co-Investigator/s/supervisor/s: Prof C Jinabhai, PhD and Prof F Haffejee, PhD

Brief Introduction and Purpose of the Study:

Good Day,

I am a DUT student conducting research for my PhD in Health Sciences and would like to invite you to participate in the pretesting section of the following study:

In 2020 the world faced the most dramatic, acute global pandemic in a century; COVID-19. In the absence of a vaccine or cure governments and the medical community turned to personal non-pharmaceutical interventions (NPIs) to decrease the rate of transmission and 'flatten the curve'. These NPIs centered around handwashing, mask wearing and physical distancing, all of which require a change in existing practice for most people as both individuals and a collective. In South Africa, as in other countries these measures were adopted with varied success, with particularly poor results in the youth. A potential reason for this is the lack of targeted interventions that take the group circumstances into account.

Outline of the Procedures:

Aim of the study: To understand influences on behaviour related to the implementation of NPIs in the DUT student context. Insight into these factors will be used to develop guidelines to inform interventions to promote positive behaviour change.

Should you agree to participate in the pretesting section of the above study you would be asked to read the interview guide (Appendix D) and participate in a discussion regarding the real world applicability of the guide itself. This interview will last approximately one hour via Microsoft Teams. Please feel free to ask as many questions as you wish because it is important that you fully understand the study. For this purpose, a copy of the Letter of Information document is available for you to take home.

Risks or Discomforts to the Participant: There are no foreseeable risks or discomforts to participants.

Reasons why the participants may withdraw from the Study: Should you wish to, you are free to withdraw from the study at any stage and for any reason.

Benefits: There are no direct benefits to the participants. You may benefit indirectly in the form of future targeted positive behaviour change interventions.

Remuneration: Should you require data in order to participate in the focus group, you will receive data to a value of between R80-R99 (preferred network dependent).

Costs of the Study: You will not be expected to cover any costs towards the study.

Confidentiality: Confidentiality will be maintained and no data will be collected during the pretesting. All data will be kept in a locked office and where electronic in a password protected folder.

Results: The results will be available in the form of the final thesis (as the post-testing interview guide).

Research-related Injury: There are no foreseeable research related injuries.

Storage of all electronic and hard copies including tape recordings will be kept in the researcher's locked office. Electronic data will be password protected. This information will be kept for 5 years and then destroyed in accordance with DUT policy. Only the researcher, study supervisors and any research assistants will have access during this time.

Persons to contact in the Event of Any Problems or Queries: Please contact the researcher, Colette Kell on 031 3732393, my supervisor, Prof Jinabhai on champaklalj@dut.ac.za, my co-supervisor Prof Haffejee on firozah@dut.ac.za or the Institutional Research Ethics Administrator on 031 373 2375. Complaints can be reported to the Director: Research and Postgraduate Support Dr L Linganiso on 031 373 2577 or researchdirector@dut.ac.za.

CONSENT – PRETESTING

Full Title of the Study: An exploration of the adoption of personal non-pharmaceutical interventions by students at a university of technology in response to the COVID-19 outbreak

Names of Researcher/s: Dr Colette Kell

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, Colette Kell, about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: 176/21_____,
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

_____	_____	_____	_____
Full Name of Participant	**Date**	**Time**	**Signature / Right Thumbprint**

I, Colette Kell here with confirm that the above participant has been fully informed about the nature, conduct and risks of the above study

_____	_____	_____
Full Name of Researcher	**Date**	**Signature**
_____	_____	_____
Full Name of Witness (If applicable)	**Date**	**Signature**
_____	_____	_____
Full Name of Legal Guardian (If applicable)	**Date**	**Signature**

Confidentiality agreement – Focus group

IMPORTANT NOTICE: This form is to be read and filled in by every member participating in the pretesting group, before the focus group meeting convenes.

CONFIDENTIALITY STATEMENT AND CODE OF CONDUCT: Pretesting group

1. All information contained in the research documents and any information discussed during the focus group meeting must be kept private and confidential.

2. The information from this focus group will be made public in terms of a dissertation/thesis and/or journal publication, which will in no way identify any of the participants involved in this focus group.

3. The focus group may be either voice or video recorded, as a transcript of the proceedings will need to be made. The data will be stored securely under password protection for a period of 5 years and thereafter destroyed.

Once this form has been read and agreed to, please fill in the appropriate information below and sign to acknowledge agreement.

Please print in block letters:

Focus Group Member: _____ Signature: _____

Witness Name: _____ Signature: _____

Researcher's Name: _____ Signature: _____

Supervisor's Name: _____ Signature: _____

Appendix F:

Coding guidelines as per interview schedule:

Question	Likely Domains
Describe your understanding of the importance of (NPI)	Knowledge Motivation – reflective (self-standards, attitudes, optimism)
Do you feel confident about how to (NPI)	Skills Beliefs about capabilities
Were there times when you were more or less likely to (NPI)	Memory Social influences Behavioural regulation
What factors do you believe encouraged/positively influenced you to (NPI)	Knowledge Social/professional role Beliefs about consequences Intentions Goals Reinforcement Environmental context and resources Social influences Emotion
What factors do you believe discouraged/negatively influenced you to (NPI)	Knowledge Optimism Beliefs about consequences Intentions Memory, attention and decision processes Environmental context and resources Social influences Emotion Optimism
Did you adoption change during the pandemic, if so how and why?	Knowledge Social influences Emotion Reinforcement
Did you know anyone who tested positive?	Beliefs about consequences Environmental context and resources (salient event) Emotions

Appendix G:

Institutional Research Ethics Committee
Research and Postgraduate Support Directorate
2nd Floor, Berwyn Court
Gate 1, Steve Biko Campus
Durban University of Technology

P O Box 1334, Durban, South Africa, 4001

Tel: 031 373 2375
Email: lawlahad@dut.ac.za
http://www.dut.ac.za/research/institutional_research_ethics

www.dut.ac.za

27 October 2021

Dr C M Kell
Department of Basic Medical Sciences
Health Sciences
Durban University of Technology

Dear Dr Kell

An exploration of the adoption of personal non-pharmaceutical interventions by students at a university of technology in response to the COVID-19 outbreak
Ethical Clearance number 176/21

The Institutional Research Ethics Committee acknowledges receipt of your gatekeeper permission letter.

Please note that FULL APPROVAL is granted to your research proposal. You may proceed with data collection.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the IREC according to the IREC Standard Operating Procedures (SOP's).

Please note that any deviations from the approved proposal require the approval of the IREC as outlined in the IREC SOP's.

Yours Sincerely

Prof J K Adam
Chairperson: IREC

Appendix H:

20 October 2021

Dr. Linda Zikhona Linganiso
Directorate for Research and Postgraduate Support
Durban University of Technology
Tromso Annexe, Steve Biko Campus
P.O. Box 1334, Durban 4000

Request for Permission to Conduct Research at DUT

Dear Dr. Linganiso

My name is Colette Kell, a student at the Durban University of Technology. The research I wish to conduct is for my Doctoral thesis titled: An exploration of the adoption of personal non-pharmaceutical interventions by students at a university of technology in response to the COVID-19 outbreak.

I am hereby seeking your consent to interview a minimum of twelve DUT students, but to continue until data saturation, regarding their adoption of personal non-pharmaceutical interventions during the COVID-19 pandemic. The interviews for this qualitative study will take approximately one hour via Microsoft Teams and participants will receive a compensatory data bundle of a value between R80-R99, dependent on the participant's chosen network provider.

I have provided you with a copy of my proposal which includes copies of the data collection tools and consent forms to be used in the research process, as well as a copy of the approval letter which I received from the Institutional Research Ethics Committee (IREC).

If you require any further information, please do not hesitate to contact me on 031 3732393 or colettek@dut.ac.za. Thank you for your time and consideration in this matter.

Yours sincerely,

Dr Colette Kell

Durban University of Technology

031-3732393/0730199799

Directorate for Research and Postgraduate Support
Durban University of Technology
Tromso Annexe, Steve Biko Campus
P.O. Box 1334, Durban 4000
Tel.: 031-3732576/7
Fax: 031-3732946

25th October 2021
Dr Colette M Kell
c/o Independent Research
Faculty of Health Sciences
Durban University of Technology

Dear Dr Kell

PERMISSION TO CONDUCT RESEARCH AT THE DUT

Your email correspondence in respect of the above refers. I am pleased to inform you that the Institutional Research and Innovation Committee (IRIC) has granted **Gatekeeper Permission** for you to conduct your research "An exploration of the adoption of personal non-pharmaceutical interventions by students at a university of technology in response to the COVID-19 outbreak" at the Durban University of Technology. **Kindly note that this letter must be issued to the IREC for approval before you commence data collection**.

The DUT may impose any other condition it deems appropriate in the circumstances having regard to nature and extent of access to and use of information requested.

We would be grateful if a summary of your key research findings would be submitted to the IRIC on completion of your studies.

Kindest regards.
Yours sincerely

_____
DR LINDA ZIKHONA LINGANISO
DIRECTOR: RESEARCH AND POSTGRADUATE SUPPORT DIRECTORATE

Appendix I:

Angela Bryan & Associates

6 Martin Crescent
Westville

Date: 23 November 2023

To whom it may concern

This is to certify that the Doctoral Thesis: An Exploration of the Adoption of Personal Non-Pharmaceutical Intervention Measures by Students at a University of Technology in Response to the COVID-19 Pandemic written by Colette Mellisa Kell has been edited by me for language.

Please contact me should you require any further information.

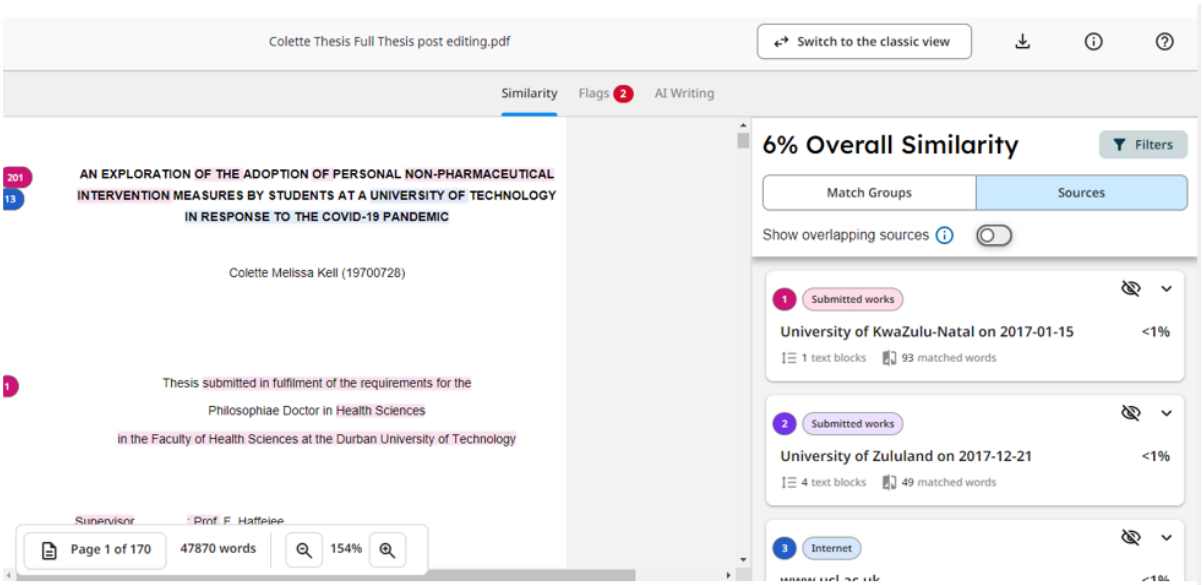
Kind Regards

Angela Bryan

angelakirbybryan@gmail.com

0832983312

Appendix J: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Colette Melissa Kell (19700728)
Thesis submitted in fulfilment of the requirements for the
Philosophiae Doctor in Health Sciences
in the Faculty of Health Sciences at the Durban University of Technology
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