IMPLICIT AND EXPLICIT ATTITUDES: AN EXAMINATION OF THE EFFICACY OF ANTI-SUGAR PUBLIC HEALTH CAMPAIGNS

by

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ABSTRACT

The current obesity epidemic is prevalent, and its potential growth is concerning. Moreover, obesity-inducing food products have become more accessible to consumers, with increases in sugar-sweetened beverage (SSB) consumption necessitating SSB-related taxation. The purpose of this study is to examine whether social-marketing efforts, in the form of an anti-sugar public health campaign (PHC), influence consumer attitudes toward SSBs. In this context, one's self-reported attitude (ie, conscious, explicit attitude) may not accurately reflect one's 'true' attitude (ie, subconscious, implicit attitude). Therefore, the focus of this study concerns consumers' explicit and implicit attitudes toward SSBs. There are three core objectives of this study: to determine whether anti-sugar PHCs influence consumers' (1) explicit and (2) implicit attitudes toward SSBs, and (3) to determine whether changes in explicit attitudes mediate changes in implicit attitudes, and vice-versa.

To examine the efficacy of an anti-sugar PHC, this quantitative and causal research adopts a pre- and post-test control group design. Prior to, and following exposure to an anti-sugar PHC, young adult consumers' explicit attitudes were assessed through self-report surveys, and their implicit attitudes assessed using neuromarketing-based evaluative priming tasks (EPTs). Data were analysed using a combination of paired sample *t*-tests and structural equation modelling (SEM).

This study provides evidence that anti-sugar PHCs influence consumers' explicit and implicit attitudes toward SSBs, and that changes in explicit attitudes mediate changes in implicit attitudes, and vice-versa. Specifically, following exposure to the anti-sugar PHC, less favourable explicit and implicit attitudes toward SSBs demonstrates the usefulness of considering explicit and implicit attitudes when designing and implementing PHCs.

The study contributes to the Associative-Propositional Evaluation (APE) model, through the lens of dual-process theory (DPT), by bridging the gap between PHC research and implicit consumer cognition. This study contributes to practice by advocating for marketers' application of neuromarketing techniques in evaluating campaign effectiveness, such as implicit attitudinal measures. Further, this study contributes to policymaker practices by highlighting the effectiveness of anti-sugar PHCs as a supplementary or complementary tool in addressing the obesity epidemic and enhancing societal wellbeing and health.

Keywords: *Obesity, social marketing, public health campaigns (PHCs), Associative-Propositional Evaluation (APE) Model, dual-process theory (DPT), implicit cognition*

DEDICATION

To my late maternal grandfather, Mervin Segal, my maternal grandmother, Leone Segal, and my paternal grandparents, Monty and Sybil Kaplan, who have instilled in me the values of perseverance, integrity, and work ethic, without which I would not have completed this dissertation.

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TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION 1

1.1. INTRODUCTION 1

1.2. BACKGROUND TO THE RESEARCH 2

1.2.2. Social Marketing: Public Health Campaigns 3

1.2.3. Cognition: Implicit and Explicit Attitudes 5

1.2.4. Obesity and Sugar-Sweetened Beverages 6

1.3. RESEARCH QUESTION AND OBJECTIVES 7

1.4. METHODOLOGY 8

1.5. JUSTIFICATION OF THE RESEARCH 9

1.5.1. Theoretical Contributions 9

1.5.2. Managerial Implications 10

1.6. DEMARCATION OF THE STUDY 11

1.7. CONCLUSION 12

CHAPTER 2: EXPLORING SOCIAL MARKETING AND ITS ROLE IN PUBLIC-HEALTH CAMPAIGNS 14

2.1. INTRODUCTION 14

2.2. SOCIAL MARKETING 14

2.2.1. Definition of Social Marketing 15

2.2.2. Foundations of Social Marketing 18

2.2.3. Importance of Social Marketing 23

2.3. PUBLIC HEALTH CAMPAIGNS 24

2.3.1. Definition of Public Health Campaigns 24

2.3.2. Overview of Public Health Campaigns 24

2.3.3. Importance of Public-Health Campaigns 27

2.3.4. Evidence of Public Health Campaign Effectiveness 28

2.3.4.1. Anti-alcohol Public-Health Campaigns 28

2.3.4.2. Anti-smoking Public-Health Campaigns 29

2.4. OBESITY 30

2.5. ANTI-SUGAR PUBLIC-HEALTH CAMPAIGNS 31

2.6. CONCLUSION 32

CHAPTER 3: COGNITION, IMPLICIT AND EXPLICIT ATTITUDES, AND NEUROMARKETING 34

3.1. INTRODUCTION 34

3.2. COGNITION 34

3.2.1. Overview of Cognition 34

3.2.2. Memory 36

3.2.3. Knowledge Accessibility 38

3.2.4. Motivation 40

3.2.5. Dual Process Theory 41

3.3. ATTITUDES 43

3.3.1. The Implicit-Explicit Distinction 44

3.3.2. Associative-Propositional Evaluation Model 46

3.4. NEUROMARKETING 49

3.5. CONCLUSION 50

CHAPTER 4: METHODOLOGY 51

4.1. INTRODUCTION 51

4.2. THE RESEARCH PARADIGM 51

4.3. RESEARCH DESIGN AND METHOD 52

4.3.1. Research Design 52

4.3.2. Research Method 58

4.4. SAMPLING 59

4.4.1. Target Population 59

4.4.2. Sampling Frame 61

4.4.3. Sampling Technique 62

4.4.4. Sample Size 63

4.5. MEASUREMENT 64

4.5.1. Explicit Attitudinal Measurement 64

4.5.1.1. Measurement Instrument 65

4.5.1.2. Questionnaire Design Considerations 66
4.5.1.3. Questionnaire Layout 67
4.5.1.4. Measurement Scales 67
4.5.2. Implicit Attitudinal Measurement 69
4.5.2.1. Measurement Instrument 70
4.5.2.2. Evaluative Priming Task Design Considerations 71
4.5.3. Treatment Variable 71
4.6. DATA COLLECTION 72
4.7. DATA ANALYSIS 73
4.7.1. Sample Descriptive Statistics 73
4.7.2. Scale Descriptive Statistics 74
4.7.3. Normality Tests 74
4.7.4. Measurement Invariance Testing 75
4.7.5. Inferential Statistical Analyses 76
4.7.5.1. Hypotheses One and Two 76
4.7.5.2. Hypotheses Three and Four 76
4.7.5.3. Hypotheses Five 77
4.8. CONCLUSION 78
CHAPTER 5: RESULTS 79
5.1. INTRODUCTION 79
5.2. SUMMARY OF RESEARCH QUESTION AND HYPOTHESES 79
5.3. SAMPLE SIZE 80
5.4. DESCRIPTIVE STATISTICS 82
5.4.1. Sample Descriptive Statistics 82
5.4.2. Scale Descriptive Statistics 83
5.4.2.2. Explicit Scales 84
5.4.2.3. Implicit Scales 86
5.4.3. Reliability and Validity 87
5.4.3.1. Scale Reliability 88
5.4.3.2. Construct Validity 89
5.4.4. Data Normality 90
5.4.5. Measurement Invariance 94

5.5. INFERENTIAL STATISTICS 94
5.5.1. Hypothesis One 96
5.5.2. Hypothesis Two 96
5.5.3. Hypothesis Three 97
5.5.4. Hypothesis Four 99
5.5.5. Hypothesis Five 101
5.6. CONCLUSION 105
CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS 106
6.1. INTRODUCTION 106
6.2. DISCUSSION AND CONCLUSIONS 108
6.2.2. Conclusions of the Primary Objectives 110
6.2.2.1. Hypothesis One 110
6.2.2.2. Hypothesis Two 113
6.2.2.3. Hypothesis Five 115
6.2.3. Conclusions of Secondary Objectives 117
6.2.3.1. Hypothesis Three 117
6.2.3.2. Hypothesis Four 119
6.3. THEORETICAL CONTRIBUTIONS 121
6.3.1. Social Marketing 121
6.3.2. Public Health Campaigns 122
6.3.3. Obesity and Sugar-Sweetened Beverages 123
6.3.4. Cognition 124
6.3.5. Attitudes 125
6.4. MANAGERIAL IMPLICATIONS 126
6.4.1. Individual Wellbeing and Societal Welfare 126
6.4.2. Overcoming Obesity through Public Health Campaigns 127
6.5. LIMITATIONS OF THE STUDY 129
6.6. RECOMMENDATIONS FOR FUTURE RESEARCH 130
6.7. CONCLUSION 131
LIST OF REFERENCES 133

LIST OF APPENDICES

Appendix A: Questionnaire Items 177
Appendix B: Evaluative Priming Tasks [Prime] 184
Appendix C: Evaluative Priming Tasks [Targets] 186
Appendix D: Evaluative Priming Tasks [Instructions] 190
Appendix E: Ethics Approval 2019 197
Appendix F: Director of Student Affairs Approval 2019 199
Appendix G: Ethics Approval 2020 201
Appendix H: Director of Student Affairs Approval 2020 203
Appendix I: Normality Statistics 205
Appendix J: Measurement Invariance Models 207
Appendix K: PP-LGM Measurement Model 211
Appendix L: Best-Fitting SO-MG-LCM Measurement Models 213
Appendix M: SO-MG-LCM Models 215

LIST OF TABLES

Table 1.1: Demarcation of this Study 12
Table 2.1: Definitions of Social Marketing 16
Table 2.2: Conceptualisation of the Social-Marketing Mix 21
Table 3.1: Hierarchy of Memory 38
Table 3.2: Change Patterns of Implicit and Explicit Attitudes 48
Table 4.1: Pre- and Post-test Control Group Design 57
Table 5.1: Sample Descriptive Statistics 82
Table 5.2: Measurement Scale Descriptive Statistics 84
Table 5.3: Cronbach Alpha Values for Composite Scales 89
Table 5.4: Tests for Control Group Equivalence 92
Table 5.5: Tests for Experimental Group Equivalence 93
Table 5.6: Model Estimation Summaries 102
Table 6.1: Summary of Hypothesis Tests 109

LIST OF FIGURES

Figure 1.1: The Intersection of this Study's Key Tenets 3
Figure 3.1: Schematic of Processes in Attitude Formation 47
Figure 4.1: Official School Ages by Level of Education 60

Figure 4.2: Non-Comparative Rating Scales 68
Figure 5.1: PP-LGM for Mediation by Implicit Attitudes 98
Figure 5.2: PP-LGM for Mediation by Explicit Attitudes 100
Figure 5.3: Best-Fitting SO-MG-LCM Estimation 103
Figure 5.4: Trajectories of Attitudes in the Best-Fitting Model 104
Figure 6.1: Trajectories of Explicit Attitudes 112
Figure 6.2: Trajectories of Implicit Attitudes 115

LIST OF ACRONYMS

APE	:	Associative-Propositional Evaluation
DPT	:	Dual Process Theory
EPT	:	Evaluative Priming Task
PHC	:	Public Health Campaign
SSB	:	Sugar-Sweetened Beverage

CHAPTER 1: INTRODUCTION

1.1. INTRODUCTION

Marketing has typically been used to drive sales and increase profits (Smith, 2018; Adams, 2021). However, Wiebe's 1951 *Merchandising Commodities and Citizenship on Television* represented the first call for the use of marketing to address social issues (Wiebe, 1951). Through advertising, consumer goods are purchased by consumers (Stead, Hastings & McDermott, 2007a; Adams, 2021). Thus, the use of marketing for societal benefit (ie, social marketing) is a "powerful" tool with which social wellbeing can be achieved (Andreasen, 2003:294). With the ability to influence the behaviour of consumers, marketing and communication have become important considerations for health-related research (French & Gordon, 2020; Kearns & Andrews, 2021). It was only in India in 1964 that the concept of social marketing began to obtain interest from marketers, with contraceptive-product promotion (Harvey, 1999). Therefore, social marketing offers policymakers the means to promote health-related changes in consumer behaviour (Hornik, 2018; Kranzler & Hornik, 2019). It is therefore no surprise that social marketing initiatives have been implemented to address a variety of health-related concerns (for example, alcohol abuse, smoking, and drug use), across continents (Kite, 2018; Stead *et al.*, 2019; Adams, 2021).

Within the context of health-related behaviour, changes can be affected through disseminating information to consumers and educating society to better inform their consumption of products (Stead & Hastings, 2018; Marent & Henwood, 2021). This highlights the benefits of healthy behaviours, and potential consequences of unhealthy behaviours, with Smith (2018) noting that simply informing society of vaccines' benefits, increases the adoption of immunisation. To lessen the prevalence of alcoholism, smoking, and obesity, policy enforcement is deemed to supplement the efficacy of the associated information which consumers are exposed to (Hoek & Jones, 2011; Adams, 2021). Fiscal policy tools are likely to enhance the effectiveness of social-marketing campaigns (Thow *et al.*, 2018), though the focus has also been brought to creating effectively designed public health campaigns (PHCs; Andreasen, 2018; Hornik, 2018). The urgent requirement for effective PHCs has been exacerbated by complex health challenges (Chin & Mansori, 2018), particularly within the South African context (Delobelle, Sanders, Puoane & Freudenberg, 2016).

The prevalence of non-communicable diseases (NCDs; for example, obesity, heart disease, and diabetes; World Health Organization; WHO, 2016) conveys the need to assess and implement effective PHCs, with the goal of effecting changes in consumer knowledge, attitudes, and beliefs (Kite, 2018; Stead *et al.*, 2019). Given that global obesity has almost tripled in prevalence since 1975 (WHO, 2020), the need for PHCs to address the obesity problem has been highlighted (Redondo, Hernández-Aguado & Lumbreras, 2018; Abdool Karim, Kruger & Hofman, 2020). As unhealthy consumer behavior escalates (Snuggs, Houston-Price and Harvey, 2019), the efficacy of PHCs

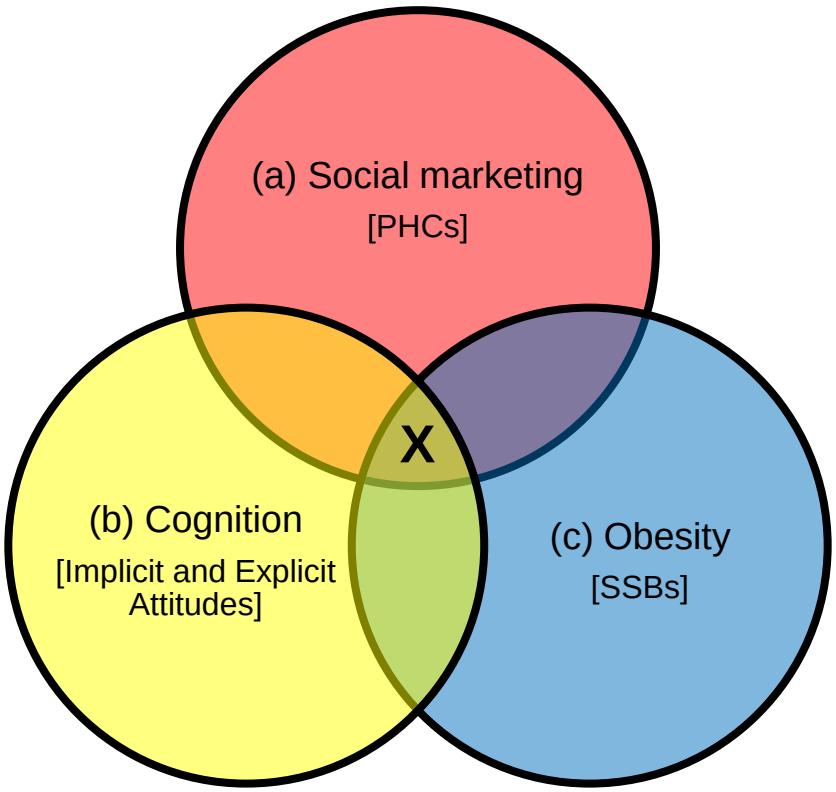
needs attention (Farley *et al*., 2017; Kibler *et al*., 2018). This is particularly important in the case of the obesity epidemic, where PHCs can be used to educate society about healthier food choices (Smith, 2018; Adams, 2021; Marent & Henwood, 2021). One such food choice that is prevalent in driving obesity is sugar-sweetened beverages (SSBs; Murukutla *et al*., 2020). SSBs are defined as beverages with artificially added sugar content, which are suggested by Demaio and Jones (2018) to be a significant source of sugar, conveying the need for action on the part of policymakers. Murukutla *et al.* (2020:2) further note that SSBs pose a "major" problem to the obesity epidemic. With an estimated average daily intake of approximately 200 millilitres of SSBs, the prevalence of obesity will continue to grow, thereby posing a threat to the South African healthcare sector, its economy, and its consumers (Tugendhaft *et al.*, 2016; Delobelle, 2019). The academic literature and popular press report widely on the consequences of obesity (Preston, Vierboom & Stokes, 2018; Thaiss, 2018). During a post-match press conference at the 2020 European Championships, Portugal's Cristiano Ronaldo pushed aside two bottles of Coca-Cola, exclaiming "Água, no Coca-Cola" as he held up a bottle of water. Ronaldo's gesture led to a $4-billion drop in Coca-Cola's market value, demonstrating that better informing consumers' food choices can influence their attitudes (Villegas, 2021). Therefore, this study uses SSBs as the context in which to investigate PHCs.

This chapter provides a background to this study by looking at what social marketing is, how PHCs can be implemented to address health issues, the consequences of excessive SSB consumption on obesity prevalence, and implicit and explicit attitudes as an important aspect to consider in cognition and consumer-behaviour research. This background serves to illuminate the study's research question and objectives.

1.2. BACKGROUND TO THE RESEARCH

To provide the theoretical foundation for better understanding the influence of anti-sugar PHCs on consumers' implicit and explicit attitudes toward SSBs, Chapters 2 and 3 offer an in-depth discussion and dissection of the relevant literature. This section, however, provides a brief overview of this study's key tenets: (a) PHCs and their role in social marketing; (b) implicit and explicit attitudes and their role in cognition; and (c) the effects of excessive SSB consumption on obesity prevalence. These concepts are depicted in Figure 1.1.

Figure 1.1: The Intersection of this Study's Key Tenets



In Figure 1.1, X indicates where these concepts intersect. This intersection represents the core aim of this study: to assess the efficacy of anti-sugar PHCs on consumers' implicit and explicit attitudes toward SSBs, thereby offering insight into how the obesity prevalence can be addressed. The forthcoming sub-sections provide an overview of each of these concepts, where their relevance to this study is discussed.

1.2.2. Social Marketing: Public Health Campaigns

Social marketing is a multidisciplinary field, where principles and theories are shared among health and communication marketing practitioners (French & Russell-Bennett, 2015; Akbar, French & Lawson, 2019). Given the broad scope for its application (Gordon, Russell-Bennett & Lefebvre, 2016; Basil, 2019), social marketing campaigns offer marketers the tools with which the drivers of various health-related consumer behaviours can be better understood (Smith, 2018). Similarly, Akbar *et al.* (2019), and French and Gordon (2020) highlight the importance of consumer research to identify the factors which enable and reinforce the behaviours of interest.

Owing to the debates surrounding exactly what social marketing is (Gordon *et al.*, 2016; Basil, 2019), an international consensus definition of social marketing was developed by the International Social Marketing Association (iSMA), European Social Marketing Association (ESMA) and Australian Association of Social Marketing (AASM) (2013:1):

> Social marketing seeks to develop and integrate marketing concepts with other approaches to influence behaviours that benefit individuals and communities for the greater social good. Social Marketing practice is guided by ethical principles. It seeks to integrate research, best practice, theory, audience and partnership insight, to inform the delivery of competition sensitive and segmented social change programmes that are effective, efficient, equitable and sustainable.

The definition of social marketing applied to this study is that of the iSMA, ESMA and AASM (2013), as it has been endorsed by all social marketing organizations (Evans & French, 2019; Kubacki, Szablewska & Kennedy, 2019). Considering this definition and to better understand the relevance of social marketing in this study, it should be noted that social change programmes comprise PHCs (Andreasen, 2018; Hornik, 2018) and policy development (Roy, Kelly, Rangan & Allman-Farinelli, 2015; Thow *et al.*, 2018). Multi-faceted intervention strategies are deemed to play a role in the success of social-marketing campaigns (Andreasen, 2018; Hornik, 2018), thereby emphasizing the importance of implementing effective PHCs. Additionally, PHCs offer marketers a tool with which health-related information and knowledge can be communicated to consumers (Dunstone *et al.*, 2017; Bristow *et al.*, 2020), often on a national level (Wakefield, Loken & Hornik, 2010; Kite *et al.*, 2018; Mozaffarian, 2018)

Defined as the strategic dissemination of persuasive information to a predefined target population to engage in healthy behaviours and refrain from unhealthy behaviours (Kreps, 2002b; Springston, 2013), PHCs should be researched further to establish the most effective approaches to effecting social change (Kumanyika *et al.*, 2008; Farley *et al.*, 2017). Moreover, while previous research has varied significantly through its focus and findings, further research is required on the influence that PHCs have on the knowledge, attitudes, and behaviour of consumers (Kite *et al.*, 2018; Morley *et al.*, 2018), and within different health-related contexts (Mayén *et al.*, 2016; Bala, Strzeszynski & Topor-Madry, 2017). Therefore, the proliferation of unhealthy behaviours among society (Mozaffarian, 2016; Snuggs, Houston-Price & Harvey, 2019) conveys the need for research to assess PHC effectiveness (Farley *et al.*, 2017; Kibler, Ma, Hrzich & Roas, 2018). PHCs' communications are interpreted in a unique way by consumers, subsequently effecting how consumers behave (Jansson-Boyd & Marlow, 2017; Spiteri-Cornish, 2017). Thus, the following section addresses the second concept of this study, which is cognition, with the roles of implicit and explicit attitudes in consumer behaviour highlighted.

1.2.3. Cognition: Implicit and Explicit Attitudes

Neural processes become operational and lead to context-relevant interpretations when consumers are exposed to new information (Wyer, 2017; Prestwich, Kenworthy & Conner, 2018). Therefore, in considering how best to implement effective PHCs to effect changes in behaviour, understanding consumer cognition is important for researchers (Jansson-Boyd & Zawisza, 2017; Jansson-Boyd, 2019), particularly within a health-behaviour context (Conner & Norman, 2015). Specifically, Graf and Schacter (1985) note the various factors that determine how information is processed by consumers: (1) the initial interpretation thereof; (2) how it is stored in memory; (3) the likelihood that the information will be reconsidered in future; and (4) how relevant the information is to decisions. This study conceptualizes cognition as the mental representations of objects, places, and people (see Smith & Queller, 2001).

The efficacy of a PHC depends largely on how persuasively the information is conveyed (Schwarzer & Luszczynska, 2015), as sufficient motivation to improve one's health and wellbeing can encourage one to change their behaviour (Bagozzi & Edwards, 2000; Sheeran, Gollwitzer & Bargh, 2013; Conner & Norman, 2017; Gollwitzer, Bieleke & Sheeran, 2017). For example, Bagozzi and Edwards (2000) note that one's goal of reaching a healthy weight might be achieved through motivating oneself to exercise more often, or notably, by changing one's food and drink consumption behaviour. Therefore, PHCs can be effectively implemented by ensuring that cognitive responses are invoked to the extent that consumers become motivated to change their behaviour (Dunstone *et al.*, 2017; Durkin, Schoenaker, Brennan, Bayly & Wakefield, 2020). Invoking cognitive responses requires that information be interpreted by consumers at both conscious and subconscious levels. Conscious interpretation concerns deliberately considering the information within context, whereas subconscious interpretation can be invoked through subliminal persuasion (ie, presenting subtle brand-related cues; Grimes, 2010; Moorman, 2010). Therefore, to better understand how information is interpreted by consumers, controlled (ie, conscious) and automatic (ie, subconscious) modes of processing are to be considered (Grayot, 2020). This study operationalizes the distinction between conscious and subconscious processes by distinguishing between controlled and automatic processing. Dual process theory (DPT; Kahneman, 2011) assumes that each form of processing is distinct, yet possible of interaction with the other, in the face of decisions (see Schneider, 2009; Packer, Kesek & Cunningham, 2011; Bargh, Schwader, Hailey, Dyer & Boothby, 2012).

The stronger the motivation of communication on one's subconscious processing, the more difficult it is for one to overcome this motivation at the conscious level (Kakoschke, Kemps & Tiggemann, 2017; Payne, Vuletich & Lundberg, 2017). In line with this, one's attitudes towards an object or behaviour are powerful as attitudes facilitate the association of said object or behaviour with an emotion or series of thoughts in one's mind, which is subsequently captured in one's memory (Wänke,

Plessner, Gartner & Friese, 2002; Friese & Hofmann, 2009). Therefore, attitudes can shape one's disposition toward objects and behaviours (Albarracín, Wang, Li & Noguchi, 2008). Given that over 90% of the information one is exposed to is processed subconsciously (Zurawicki, 2010), it is worth noting that explicit (ie, controlled, deliberate) and implicit (ie, automatic, subconscious) attitudes may not accurately represent one another (Peters & Gawronski, 2011; De Houwer, Van Dessel & Moran, 2020). Research suggests that although explicit attitudes correlate with behaviours of interest, a gap in knowledge exists between what consumers intend to do and their subsequent behaviour (cf. Herring *et al*. Greenwald & Banaji, 2017; Maison & Gregg, 2017; Kurdi *et al.*, 2019). Therefore, it is important for researchers to better understand how explicit and implicit attitudes can affect consumer behaviour (Hofmann & Schmitt, 2008; Greenwald *et al.*, 2020).

Marketers should consider measuring consumers' explicit and implicit attitudes, such that the interplay between the distinct manifestations of attitudes can be better understood (Greenwald & Banaji, 2017; Gawronski & Bodenhausen, 2018), and be used to guide the development of future PHCs and marketing communications. Therefore, to establish how changes in explicit and/or implicit attitudes can be affected (Petty & Briñol, 2006; Van Osselaer, 2008; Gawronski & Bodenhausen, 2018), this study adopted the Associative-Propositional Evaluation (APE) model (Gawronski & Bodenhausen, 2006, 2011). The adoption of the APE model was geared towards highlighting how motivational forms of communication can be used to affect changes in consumers' implicit and explicit attitudes. Specifically, this intervention was designated as anti-sugar PHCs, whereas consumers' attitudes toward SSBs were of interest, with each of these owing to the growing problem that is obesity (Redondo *et al.*, 2018; Abdool Karim *et al.*, 2020). Therefore, obesity and the contribution of excessive SSB consumption to the prevalence thereof is discussed next.

1.2.4. Obesity and Sugar-Sweetened Beverages

Posing a serious threat to society, given its prevalence (Orehek & Vazeou-Nieuwenhuis, 2016; Kaltenbrun, Du Plessis & Drimie, 2020), obesity has been exacerbated by poor dietary intake by consumers (McGill *et al.*, 2015). The aggressive commercial advertising of (unhealthy) foods and beverages has led to markets experiencing resistance to obesity-related PHCs (Casswell, 2019; Reeve & Gostin, 2019). Specifically, interference by the food industries has rendered obesity-related legislation and taxation wholly ineffective (Delobelle *et al.*, 2016; Stacey *et al.*, 2019), with obesity contributing to the prevalence of NCDs in South Africa (Kaltenbrun *et al.*, 2020; Wrottesley, Stacey, Mukoma, Hofman & Norris, 2020). Therefore, this study aims to assist policymakers in addressing the obesity prevalence in South Africa, with a focus on reducing the consumption of SSBs by consumers.

Despite the imposition of a Health Promotion Levy (HPL) on SSBs in 2018, in addition to evidence suggesting that this SSB tax has seen a reduction in the consumption of SSBs (Bosire *et al.*, 2020; Stacey *et al.*, 2021), Daniel (2021) notes that under 0.5% of the R7.9 billion in tax collections has been spent on SSB-related health promotion in the country. Therefore, to supplement the efficacy of the HPL in South Africa, this study sought to assess whether anti-sugar PHCs influence consumers' implicit and explicit attitudes toward SSBs. Accordingly, the research question and research objectives of this study are presented in the next section.

1.3. RESEARCH QUESTION AND OBJECTIVES

The aim of this study was to establish the influence of anti-sugar PHCs on consumers' explicit and implicit attitudes toward SSBs, and to guide the implementation of a social-marketing campaign to improve societal welfare and health. To clarify the purpose of this study, the research question guiding this study is as follows:

> *Do anti-sugar PHCs influence consumers' explicit and/or implicit attitudes toward SSBs, and do these attitudinal changes mediate changes in the other attitudinal manifestation?*

Considering the above research question, the following primary research objectives were developed:

> *To determine whether anti-sugar PHCs influence consumers' explicit attitudes toward SSBs;*
>
> *To determine whether anti-sugar PHCs influence consumers' implicit attitudes toward SSBs;*
>
> *To determine the extent to which anti-sugar PHCs influence consumers' explicit and implicit attitudes toward SSBs.*

To address the possibility that mediation occurs between the distinct manifestations of attitudes, the following secondary research objectives were developed:

> *To determine whether changes in consumers' explicit attitudes are mediated by changes in their implicit attitudes toward SSBs;*
>
> *To determine whether changes in consumers' implicit attitudes are mediated by changes in their explicit attitudes toward SSBs.*

Given these objectives, Chapter 3 provides a detailed discussion of the hypotheses used to achieve each research objective. Prior to hypothesis testing, however, data were required that necessitated the adoption of a true-experimental design. The methodological approach to this study is now discussed.

1.4. METHODOLOGY

This study follows a conclusive, causal, true-experimental research design: pre- and post-test control group, with quantitative methods of conducting the research, with prior studies having adopted this type of causal approach (cf. Morley *et al.*, 2018; Van Kleef, Rongen, Vingerhoeds, Dijkstra & Seidell, 2020; Jensen *et al.*, 2021). Quantitative research allows one to infer cause-and-effect relationships between variables by providing evidence for such relationships (Bryman, Bell, Du Toit & Hirschsohn, 2016; Schindler, 2021). Owing to the focus of this study on both explicit and implicit attitudes, two measurement instruments were required. Self-report online surveys were used for explicit attitudinal measurement, whereas evaluative priming tasks (EPTs) were conducted to measure implicit attitudes. Both instruments comprised questions requiring participants to indicate how they associate 14 SSBs on three scales, based on their evaluations thereof. All scale items were scored from 0 to 200, where zero meant that respondents evaluated the SSB unfavourably (ie, associating it with *anxious*, *sad*, and *unhealthy* evaluations), whereas scores of 200 indicated that respondents evaluated the SSB favourably (ie, associating it with *content*, *happy*, and *healthy* evaluations). A caveat was that, owing to the potential testing effects of completing the explicit measures prior to the implicit measures and vice versa (see Nosek & Smyth, 2007), two experimental groups and two control groups were created. That is, one group from each condition completed the explicit measures prior to the implicit measures, while the remaining two groups completed the measurements in the opposite order.

The target population comprised young adults (ie, aged 18 to 24 years) in South Africa, with similar studies having adopted this population (cf. Pelletier & Laska, 2013; Glock, Klapproth & Müller, 2015; Sato, Sawada, Kubota, Toichi & Fushiki, 2016; Genschow, Demanet, Hersche & Brass, 2017; Sato, Sawada, Kubota, Toichi & Fushiki, 2017). To increase representativeness, a non-probability, quota sampling technique was used to sample participants from the target population (see Section 4.4.3). Following registration for their participation, respondents were directed to either the Qualtrics (ie, explicit attitudes) or Sentient Prime Implicit Research Technology (ie, implicit attitudes) platforms. Respondents randomly allocated to either experimental group were directed to the 30-second anti-sugar PHC (ie, treatment variable) thereafter. Following the recommended delay of 24-72 hours between pre- and post-test measurements (Carter, Onyeador & Lewis, 2020; Gonzalez, 2021), respondents were required to complete each measure again. Data were statistically analysed using IBM SPSS Statistics 27 and Ωnyx, to generate the results (see Chapter 5) and subsequent findings (see Chapter 6) of this study. On this note, the following section outlines the contributions of this study.

1.5. JUSTIFICATION OF THE RESEARCH

To better inform marketing campaign development and implementation, better understanding the attitudes underlying targeted behaviours is important for marketers (St. Quinton & Brunton, 2017; French & Gordon, 2020). For example, motivational and/or persuasive communications have been shown to be successful in effecting social change (cf. Rahman, Saleem, Akhtar, Ali & Khan, 2014; Andreasen, 2018). Thus, this study addresses the uncertainty surrounding the influence of anti-sugar PHCs on consumers' implicit and explicit attitudes toward SSBs. In addressing this uncertainty, the following sections explain the theoretical and managerial implications offered by this study to the current understanding of social-marketing practice, anti-sugar PHC efficacy, and implicit and explicit attitude research, with the theoretical contributions outlined next.

1.5.1. Theoretical Contributions

This study contributes theoretically by bridging the gap between what is known and what is needed to be known, in the following ways.

The present research contributes to the emerging stream of research on anti-sugar social-marketing efforts. Obesity research in marketing focuses on the impact of advertising and social marketing campaigns on consumer food consumption (Manika, Gregory-Smith & Antonelli, 2017). However, consumer consumption is not only fuelled by physical hunger, but additional cues such as PHCs and implicit memory. Although research has primarily studied explicit measures through self-report methods, these responses tend to be inaccurate and/or biased (Telpaz, Webb & Levy, 2015). However, the application of implicit attitudinal measures is limited (Yun & Berry, 2018). A better understanding of how both implicit and explicit attitudes affect consumer behavior is needed (Greenwald & Banaji, 2017; Kurdi *et al*., 2019). Explicit attitudes alone may not always predict behavioural change (Asbridge *et al*., 2021) and do not accurately reflect consumers' implicit attitudes toward a campaign (Maison *et al*., 2004). Therefore, the present study bridges the gap between anti-sugar PHC research and explicit and implicit attitudes. It shows that anti-sugar PHCs affect both implicit and explicit attitudes. As far as can be ascertained, this is the first empirical examination of anti-sugar PHCs' impact on implicit and explicit attitudes toward SSBs.

Further, the findings contribute to the APE model (Gawronski & Bodenhausen, 2006) through the lens of the DPT (Kahneman, 2011). In turn, this study demonstrates that anti-sugar PHCs affect both implicit and explicit consumer attitudes toward SSBs, with mutual mediation between changes. Therefore, in the anti-sugar context, the APE model is supported as anti-sugar PHCs influence both explicit and implicit consumer attitudes towards SSBs. As this study uses the APE model through the lens of DPT to investigate PHC efficacy on both explicit and implicit consumer attitudes, it offers a foundation for public policy literature. As far as can be ascertained, it is the first

empirical study that brings the APE model through the DPT lens into the realm of anti-sugar PHCs. The study's model advances the literature by offering insights on how anti-sugar PHCs influence implicit and explicit attitudes toward SSBs.

The study examined the mediating impact of changes in implicit attitudes on changes in explicit attitudes, and vice-versa. Research on the interplay between these distinct attitudinal manifestations gained traction in the past decade through the development of sequential priming (Neely, 1977) and response interference tasks (Kornblum *et al*., 1990). These are used as the basis for attitudinal measurement in 21st century experimental paradigms (see Fazio and Olson, 2003; Greenwald and Banaji, 2017; Petty *et al*., 2015). Therefore, this understanding enables a movement towards conceptualizing implicit and explicit attitudes whilst considering the potential interplay between the two. Moreover, this study contributes theoretically by elucidating the importance of measuring both implicit and explicit consumer attitudes to better understand consumer behaviour within an obesity and SSB context.

With this study's theoretical contributions addressed, below are potential avenues for marketers to put the findings of this study into practice.

1.5.2. Managerial Implications

This section provides an understanding of how to improve marketing practice and implement effective PHCs.

Despite not facilitating the formal exchange of goods and services for a fee, social marketing typically offers consumers improved states of health and general wellbeing in exchange for their changing behaviour (Grier & Bryant, 2005; Kotler, 2017; Andreasen, 2018). Further, it has been suggested that the determinants of unhealthy behaviours are influenced by effective PHC implementation (Basil, 2019; French & Gordon, 2020). In evaluating the efficacy of anti-sugar PHCs, this study addresses whether such social-marketing efforts are successful in encouraging consumers to adopt healthier lifestyles. By understanding this, social marketers could better understand the efficacy of PHCs within the obesity context. Therefore, by not overlooking the benefits offered by social-marketing practices, this study's findings could inform the design and implementation of future PHCs. Although the direct influence of marketing campaigns on behavioural outcomes might be difficult to demonstrate (Hornik, 2009/2002; French & Gordon, 2020), changes in consumers' awareness of and attitudes toward health-related consumption represent the first steps in influencing their behaviour. Walls, Peeters, Proietto and McNeil (2011) suggest that this can be achieved by clearly communicating information to consumers through PHCs, which can reinforce consumers' understanding of the risks of unhealthy consumption behaviour. It is widely understood that implicit attitudes are better indicators of behaviour change than explicit attitudes (Asbridge *et al*., 2021; Brunel *et al*., 2004; Hollands, Prestwich & Marteau, 2011). Implicit attitudes are valid predictors

of eating behaviour such as overeating and obesity (Gallucci *et al*., 2021). However, decision makers continue to assess through self-report. Therefore, it is pertinent that decision makers examine both implicit and explicit attitudes towards SSB's when developing PHCs. Thus, by evaluating the extent to which anti-sugar PHCs influence consumers' implicit and explicit attitudes toward SSBs, this study could assist marketers by deepening the understanding of how campaigns can successfully influence consumers' awareness of and attitudes toward health-related consumption behaviours.

To enhance the efficacy of PHCs and marketing campaigns in general, understanding the motivations and attitudes underlying consumer behaviour is an important consideration for practitioners (Rahman *et al.*, 2014; Smith, 2018). Further, identifying pertinent attitudinal associations can be used to better inform the development and implementation of these campaigns, such that the influence thereof on consumers' implicit and explicit attitudes are better understood (St. Quinton & Brunton, 2017; French & Gordon, 2020). Understanding what works in a PHC and effectively replicating these mechanisms means understanding both the implicit and explicit attitudes. In turn, PHC implementation and policy development can be more effective. Therefore, this study may provide marketers with new avenues for campaign development and targeting. In overcoming the complexities of obesity, PHCs have been put forward as a potentially effective tool for marketers (Ha, Akamavi, Kitchen & Janda, 2014; Mayén *et al.*, 2016). This study, therefore, could provide policymakers with guidance on how best to address the global obesity epidemic, by informing the effective implementation of anti-sugar PHCs.

The above managerial implications are based on this study's findings, which were conceptualised based on prior literature. In addition, the methods used to collect data, and the conclusions drawn, are all part of this study. Therefore, the layout of this study is presented in the following section.

1.6. DEMARCATION OF THE STUDY

There are five chapters hereafter, addressing the theoretical foundations of the study, the methodology, the results, and the conclusions. Table 1.1 illustrates how each of these elements is laid out.

Table 1.1: Demarcation of this Study

Chapter 1	**Introduction**
Chapter 2	**Literature Review** *Social Marketing: Public Health Campaigns* *Obesity and Sugar-Sweetened Beverages*
Chapter 3	**Literature Review** *Cognition: Implicit and Explicit Attitudes* *Associative-Propositional Evaluation Model and Hypotheses*
Chapter 4	**Methodology**
Chapter 5	**Results**
Chapter 6	**Conclusions and Recommendations**

Six chapters make up this study: Chapter 1, the current chapter, provides an overview of this study. Chapters 2 and 3 provide the theoretical foundations of the study: first, by exploring the role of social marketing in PHCs; second, by exploring the role of cognition in consumer behaviour, how implicit and explicit attitudes are distinguished from one another and introduces the APE model that was adopted by this study. To test the hypotheses associated with the APE model, Chapter 4 details the methodology used. Chapter 5 presents the results obtained by conducting this methodology. Finally, Chapter 6 highlights the conclusions drawn from the study, the theoretical contributions and managerial implications, the study's limitations, and the recommendations for future research.

1.7. CONCLUSION

This first chapter serves as the start of this study. Figure 1.1 demonstrates that the intersection between social marketing and PHCs, cognition and implicit and explicit attitudes, and obesity and SSBs is the focus of this study: to determine whether anti-sugar PHCs influence consumers' explicit and/or implicit attitudes toward SSBs. The research question and objectives sought to address this study's core aim. To attend to the research question and objectives, a true-experimental, pre- and post-test control group research design is applied. This study contributes to theory, whilst providing marketers, policymakers, and others with insights into how the influence of anti-sugar PHCs on consumers' implicit and explicit attitudes toward SSBs could be used to address the global obesity epidemic. Of the five forthcoming chapters, two attend to providing the theoretical foundation for this study, with further chapters explaining this

study’s methodology, the results and findings, and the conclusions and recommendations. Chapter 2, which now follows, provides a context into social marketing by exploring its role in addressing health-related challenges, focusing on how PHCs can influence behaviour.

CHAPTER 2: EXPLORING SOCIAL MARKETING AND ITS ROLE IN PUBLIC-HEALTH CAMPAIGNS

2.1. INTRODUCTION

The previous chapter outlined the current research, introducing and providing background to the key tenets of this study. This chapter attends to reviewing the extant literature to better understand this study and its key tenets. This literature review begins with a brief overview of social marketing, which is followed by a discussion of PHCs. Thereafter, the obesity prevalence is highlighted, leading onto the link between social marketing and obesity.

2.2. SOCIAL MARKETING

While previous marketing literature has focused on assessing the efficacy of stimuli in relation to increasing sales and profit (Noble & Basil, 2011; Smith, 2018), a developing field of research seeks to better understand how the wellbeing of consumers can be enhanced (Brychkov & Domegan, 2017; Pirouz, 2017). The field of social marketing focuses on influencing consumers' decisions (Rahman *et al.*, 2014; Andreasen, 2018) to encourage a greater sense of wellbeing among individuals and society (Basil, 2019; French & Gordon, 2020). The first use of marketing to address social problems was suggested in Wiebe's *Merchandising Commodities and Citizenship on Television*, produced in 1951 (Wiebe, 1951). The suggested adaptation of marketing to meet social objectives was based on the concern that, if commodities (ie, consumer goods) could be advertised on radio and television with great success, why could marketing not be adapted to address social inadequacies (Wiebe, 1951; Stead *et al.*, 2007a)? The emphasis on marketing adaptability led to the following question being posed by Wiebe (1951:679):

> Why can't you sell brotherhood and rational thinking like you sell soap?

The notion of 'selling rational thinking like soap' failed to obtain interest from marketers until the introduction of contraceptive-product promotion in India in 1964 (Harvey, 1999). This effort emphasised the role of marketers in addressing social objectives, with Unilever assisting in the distribution of these products in India (Andreasen, 2003). Following this venture, social-marketing efforts were made in the promotion of a wide range of products in a variety of countries (Kite, 2018; Stead *et al.*, 2019). Further, these efforts were deemed to be of value, with the social-marketing movement being recognised as a "powerful social force" (Andreasen, 2003:294). Competing perspectives offer conceptualisations of social marketing (see Kotler & Levy, 1969; Kotler & Zaltman, 1971; Lazer & Kelley, 1973; Andreasen, 1994, 1995). Kotler and Levy (1969) argued that marketers' focus was too narrow, asserting that marketing is a societal activity with scope beyond the mere selling of soap. In response to this, Luck (1969:54) suggested that marketing was limited in its scope to "buy-and-sell"

transactions, as the fascination with marketing is its diverse and ubiquitous nature. Luck (1969) further argued that marketing was not to concern societal activities, which did not involve a clear exchange of goods or services between parties (Diaz-Meneses & Basil, 2019). Kotler and Levy (1969) responded that marketing was not merely about market transactions, but all transactions between consumers and firms. In their counterargument, Kotler and Levy (1969) clarified that marketing involved activities carried out both by businesses and other (ie, non-business) organisations. Ultimately, Kotler and Zaltman (1971) suggested a new subfield of marketing, encapsulating the application of marketing to societal problems. Appropriately, this new subfield was given the name 'social marketing' (Basil, 2019).

Kotler and Zaltman (1971) were the first to formally define social marketing (see Section 2.2.1.), though its growth in research has led to emergent debates surrounding the boundaries of the field (Basil, 2019; Diaz-Meneses & Basil, 2019). Moorman, Van Heerde, Moreau and Palmatier (2019) note the fundamental changes to marketing research and practice caused by recent developments in technology and societal issues. French and Gordon (2020) highlight the importance of understanding the nature of social marketing, to enhance its application to societal challenges. Kotler and Zaltman's (1971) definition referred to above is one of many definitions of social marketing. Thus, given the competing perspectives (Kotler & Levy, 1969; Kotler & Zaltman, 1971; Lazer & Kelley, 1973; Andreasen, 1994, 1995) and emergent debates surrounding the social-marketing concept (Stead, Gordon, Angus & McDermott, 2007b; Basil, 2019), the following section looks at the various definitions of social marketing, as encountered in prior literature.

2.2.1. Definition of Social Marketing

Defining terms is necessary to ensure that marketing practices are applied to programme objectives in a clear and consistent manner, particularly in the case of social marketing (Diaz-Meneses & Basil, 2019; French & Gordon, 2020). French and Gordon (2020) highlight that social marketing is built upon guiding principles that underpin its conceptual nature, rather than being an outright theory.

Despite its application to diverse issues (Saunders, Barrington & Sridharan, 2015; Andreasen, 2018), social marketing can be viewed as a framework used to understand how to influence behaviour (Stead *et al.*, 2007b; French & Gordon, 2020). Nonetheless, it is worth noting that the definition of social marketing has evolved since the birth of the field in the 1960s (Saunders *et al.*, 2015; Gordon *et al.*, 2016). Each of these definitions has been brought on by developments in behaviours, such as lifestyle changes and modern technological advancements (Diaz-Meneses & Basil, 2019; French & Gordon, 2020).

Thus, to guide the formulation and application of social-marketing programmes and better understand how it can be applied effectively, it is necessary to define social

marketing (Basil, 2019; French & Gordon, 2020). As such, Table 2.1 provides definitions of social marketing found in prior literature.

Table 2.1: Definitions of Social Marketing

Author(s) and Year		Definition
Kotler and Zaltman	1971:5	"The design, implementation, and control of programs calculated to influence the acceptability of social ideas and involving considerations of product planning, pricing, communication, distribution, and marketing research."
Lazer and Kelley	1973:ix	"Social marketing is concerned with the application of marketing knowledge, concepts and techniques to enhance social as well as economic ends. It is also concerned with analysis of the social consequence of marketing policies, decisions and activities."
Andreasen	1995:7	"The application of commercial marketing technologies to the analysis, planning, execution and evaluation of programs designed to influence the voluntary behaviour of target audiences in order to improve their personal welfare and that of their society."
International Social Marketing Association (iSMA), European Social Marketing Association (ESMA) and Australian Association of Social Marketing (AASM)	2013:1	"Social marketing seeks to develop and integrate marketing concepts with other approaches to influence behaviours that benefit individuals and communities for the greater social good. Social Marketing practice is guided by ethical principles. It seeks to integrate research, best practice, theory, audience and partnership insight, to inform the delivery of competition sensitive and segmented social change programmes that are effective, efficient, equitable and sustainable."

Social marketing was first defined by Kotler and Zaltman (1971) as a practice implemented to achieve the broad acceptability of social ideologies, while considering the overall nature and positioning of the 'product'. However, since then this definition has caused confusion among marketers and academics alike in two ways (Diaz-Meneses & Basil, 2019). First, practitioners familiar with topics such as non-profit marketing and socially responsible marketing were unsure of the distinction between these subfields and social marketing (Basil, 2019; French & Gordon, 2020). Second, the proposed definition required further clarity to distinguish social marketing from fields including public relations and education (Basil, 2019; Diaz-Meneses & Basil, 2019).

Further, health communication and promotion practitioners struggled to understand how their existing concerns were in any way distinct from those associated with social marketing (Hastings & Haywood, 1994; Andreasen, 2018). As a result, marketers

sought to apply policies which would allow for the influence of consumer attitudes and encourage ethical practices by businesses (Gordon *et al.*, 2016; Basil, 2019).

To clarify the confusion surrounding the field, Lazer and Kelley (1973) subsequently defined social marketing as the application of marketing tools and expertise to achieve social and economic enhancement, whilst considering the social consequences of marketing practice. In contrast to the definition of Kotler and Zaltman (1971), Lazer and Kelley (1973) emphasised that social marketing concerned the enhancement of both society and the economy and not merely effecting attitudinal change among consumers. Furthermore, Lazer and Kelley (1973) suggested social marketing not only be used for societal enhancement but for monitoring or assessing the consequences of businesses' activities on society. However, this definition of social marketing lacked clarity and direction (Andreasen, 2018): it failed to encapsulate how social and economic enhancement should be achieved (Basil, 2019). Appropriately, Kotler and Roberto (1989) clarified that social marketing referred to a social-change technology. The clarification provided by Kotler and Roberto (1989) led to Andreasen (1995) defining social marketing as the means through which marketers could influence and change voluntary behaviour. Specifically, Andreasen (1995) defined social marketing as the use of traditional marketing strategies in programmes implemented to achieve voluntary changes in targeted subpopulations, thereby enhancing individual and societal welfare (Basil, 2019; Diaz-Meneses & Basil, 2019).

The subsequent focus of marketers on the application of marketing for societal benefit helped distinguish social marketing from its disciplinary competitors (ie, public relations, human resources; Brychkov & Domegan, 2017; Basil, 2019; French & Gordon, 2020). Moreover, the shift in focus from achieving social and economic enhancement to voluntary behavioural change, as demonstrated in Andreasen's (2003) definition, made the criteria of effective social marketing clearer. Specifically, it suggested that social marketing be used to influence voluntary behaviour and thereby attempt to improve personal and societal welfare (Goldberg, Fishbein & Middlestadt, 2018; Diaz-Meneses & Basil, 2019). Despite this, direct influences on behaviour are difficult to detect and cannot be attributed to specific causes with certainty (French & Gordon, 2020). Such has been the extensive debate surrounding what social marketing is (Gordon *et al.*, 2016; Basil, 2019) that an international consensus definition was developed by the iSMA, ESMA and AASM (2013). This definition advanced the conceptualisation of social marketing in the contemporary world and provided enhanced focus and clarity regarding the objectives of its use (Saunders *et al.*, 2015; Gordon *et al.*, 2016).

Specifically, explicit reference was made to the use of other approaches (ie, beyond traditional marketing approaches; Basil, 2019). This broadened the scope of social marketing to challenges in previously ignored fields (Saunders *et al.*, 2015), such as climate change and disaster response (Gordon *et al.*, 2016). Additionally, the inclusion of theory and research in programmes emphasised their respective importance in

implementing social marketing effectively (Saunders *et al.*, 2015; Basil, 2019). Finally, this definition posits that social marketing should be practised ethically (Basil, 2019). Specifically, it required that social marketing be practised in alignment with what is moral and rightful, both for individuals and society (iSMA, ESMA and AASM, 2013). Furthermore, Gordon *et al.* (2016) highlight the importance of social marketers considering the potential of inadvertently harming one consumer group in enhancing the wellbeing of another. For example, although anti-smoking programmes might result in improved health in society, groups of smokers may feel stigmatised and deem that their basic human right to free choice has been infringed upon (Gordon *et al.*, 2016).

Social marketing is in no way about enforcing policies or coercing consumer behaviour, but rooted in the idea of reinforcement (Key & Czaplewski, 2017; French & Gordon, 2020). For example, offering incentives to encourage certain behaviours and reinforcing the consequences of others (Kotler, 2017; Andreasen, 2018). In context, reinforcing the benefits of healthy food and drink consumption (ie, health promotion messages) does not provide a direct reward (Basil, 2019; French & Gordon, 2020). The resultant knowledge may, however, be of value in the long-term behaviour of consumers (Gordon, 2012; Smith, 2018). Furthermore, social marketing not only encourages consumers to practice healthy behaviours but can discourage consumers from practising unhealthy, dangerous, and undesirable behaviours (Goldberg *et al.*, 2018; French & Gordon, 2020). Evans and French (2019) suggest that social marketers should adopt the core principles that underpin the iMSA et al. (2013) definition, given that this definition was endorsed by all social-marketing organisations (Kubacki *et al.*, 2019). As such, it should be noted that, in examining the differences between the various definitions of social marketing, the iMSA, ESMA and AASM (2013) international consensus definition of social marketing was adopted by this study. In response to the above suggestion of Evans and French (2019), the following section explores the core principles of social marketing, which, as noted by French and Russell-Bennett (2015) and Akbar *et al.* (2019), serve as the cornerstone of this field and describe the nature of its application.

2.2.2. Foundations of Social Marketing

In the same manner that the definition of social marketing has been debated and developed, several authors have attempted to delineate the foundations of social marketing (Weinreich, 2010; Lee & Kotler, 2011; French & Russell-Bennett, 2015). As such, the much-debated nature and identity of social marketing has continued to evolve since its birth in the 1960s (French & Russell-Bennett, 2015; French & Gordon, 2020). Accordingly, this section provides an outline of social marketing's core principles, to establish how best to approach the implementation of an intervention (Akbar *et al.*, 2019; Evans & French, 2019).

Emanating from marketing theory, the foundations of social marketing are shared with other related sub-fields of marketing, such as health marketing and marketing communications (French & Russell-Bennett, 2015; Akbar *et al.*, 2019). However, social marketing can be distinguished from such sub-fields based on the systematic integration of these elements by social marketers (Noble & Basil, 2011; Schuster, 2015). Importantly, as French and Gordon (2020) point out, these principles do not need to be applied collectively in a mechanical sense, but rather treated as guidelines to follow in approaching an intervention (Lefebvre, 2011; Kubacki *et al.*, 2019). The primary aim of social marketing is to induce change in consumer behaviour, which has characterised the social marketing movement since the early 2000s (Andreasen, 2018). Andreasen (2002) maintains that the power of social marketing is manifested only once a campaign moves beyond advertising and results in behavioural change.

Many consumers accept marketing-campaign messages at face value, not necessarily questioning and contemplating their own behaviours, which may be in their best interests (Mickey, 2003). Although often misconstrued, mass media campaigns with the goal of influencing consumers' knowledge and beliefs alone do not constitute a social-marketing campaign (Andreasen, 2018; Smith, 2018). However, effecting the beliefs in, awareness of and attitudes towards a concept are believed to catalyse behavioural change among the individuals by whom they are held (Ha *et al.*, 2014). For example, Walls *et al.* (2011) posit that, to affect behavioural change, the benefits of healthy foods should be clearly communicated, thereby ensuring that the associated awareness, attitudes and beliefs are reinforced in a psychological manner. Understanding the roles played by attitudes in behavioural change has implications important for interventions and the design thereof; by identifying which attitudes or associations are central to affecting a behaviour by an individual, avenues for targeting are created for the intervention (St. Quinton & Brunton, 2017). Through the better understanding of the patterns and motivation behind consumer behaviour, social-marketing interventions can be implemented to the extent that behaviour is initiated or ceased (Rahman *et al.*, 2014; Smith, 2018). Understanding consumers is therefore of interest to marketers (Akbar *et al.*, 2019; French & Gordon, 2020) and thus this study sought to evaluate whether a social-marketing intervention effected the consumers' attitudes, to establish a better understanding of the nature of consumers and their behaviour.

The need for social marketers to focus on customers, as commercial marketers have done (Leo, 2013), has been highlighted in prior literature (Akbar *et al.*, 2019; Evans & French, 2019). Customer orientation is a central principle of social marketing (Lefebvre, 2011; Stead & Hastings, 2018), with social marketers encouraged to treat customers as partners in the pursuit of mutually beneficial outcomes (French & Russell-Bennett, 2015; French & Gordon, 2020). However, social marketers have traditionally focused on behavioural change as the 'product' that is exchanged with consumers, as opposed to a 'service' (Leo, 2013; Andreasen, 2018). It is suggested that all social-marketing planning decisions are to emanate from an understanding of

customers' needs and wants (Andreasen, 1995). Thus, social marketers' customer orientation allows for the satisfaction of both individual and societal welfare needs (Leo, 2013). However, this is contingent on research being conducted to better understand consumers and their needs and wants (Evans & French, 2019; French & Gordon, 2020). As consumers have the right to free choice (Maibach, 2003), social marketers carefully consider consumers within their target populations to better understand their behaviour and the influences thereon (Andreasen, 2002; Saunders *et al.*, 2015).

In context, this study sought to examine whether an anti-sugar social-marketing campaign influenced consumers' implicit and explicit attitudes toward SSBs, to better understand the nature of consumers' needs and wants (see Chapter 3). In understanding consumers, the use of theory assists in both explaining and predicting findings (Royne, 2016). Therefore, the use of theory in social marketing is outlined next. The use of theory in a social context is conceptualised as "a systematic way of understanding events or situations" (Glanz & Rimer, 2005:4). The effectiveness of social marketing can be enhanced by using relevant theory (David & Rundle-Thiele, 2018), thus resulting in research useful and interesting to practitioners (Royne, 2012).

Further, Glanz and Rimer (2005) maintain that the use of theory provides a framework upon which interventions can be successfully implemented. Social marketing relies on the use and appropriate application of theory to facilitate the development of campaigns by identifying behavioural determinants (Luca & Suggs, 2013). For example, behavioural theories allow social marketers to garner insight into the current behaviour of consumers (Akbar *et al.*, 2019; French & Gordon, 2020) and provide practitioners the tools with which they can affect behavioural change (Crosby & Noar, 2010). A systematic review identified the transtheoretical model (see Prochaska & DiClemente, 1983) and theory of planned behaviour (see Ajzen, 1985, 1991) as being frequently adopted theories in social-marketing-related literature (Luca & Suggs, 2013), though the adoption of theory in the social-marketing field is discussed further in Chapter 3.

As highlighted earlier, in better understanding the motives behind consumers' behaviour, social marketers can make use of this insight to better inform the development of campaigns (Luca & Suggs, 2013; Smith, 2018). Consumer research assists social marketers in identifying which factors enable and reinforce the targeted behaviour of consumers (Akbar *et al.*, 2019; French & Gordon, 2020). Therefore, to better inform the future implementation of social-marketing campaigns in alignment with traditional marketing approaches (Saunders *et al.*, 2015; Andreasen, 2018), the forthcoming section contextualises the traditional marketing mix from a social-marketing perspective.

Taking heed of Kotler and Zaltman's (1971:5) definition of social marketing, "involving considerations of product planning, pricing, communication, distribution and marketing

research" and Andreasen's (2002) fifth benchmark criteria for social-marketing interventions of using all four Ps of the traditional marketing mix, the elements of the social-marketing mix are outlined in Table 2.2.

Table 2.2: Conceptualisation of the Social-Marketing Mix

Element	Description
Product	Represents the offer made to target consumers and is often intangible in nature. For example, the adoption of an idea or behaviour (Andreasen, 2018).
Price	Relates to the opportunity cost of consumers adopting new ideologies or behaviours and can be physical and psychological in nature. For example, forgoing the consequences of prior, assumedly undesirable behaviours may result in social pressure and financial costs (French & Russell-Bennett, 2015; Akbar *et al.*, 2019).
Place	Refers to the distribution channel/s through which social marketers communicate with consumers (see Section 2.3.2; Gordon, 2012).
Promotion	Represents the way desirable behaviours are promoted, for example, mass media, social media, and the internet (Bristow *et al.*, 2020).

Table 2.2. provides context into the four Ps from a social-marketing perspective. In considering the focus of social marketing on consumer behaviour, the exchanges between marketer and consumer are of interest (Noble & Basil, 2011) and are thus discussed next.

The principle of exchange was debated by Kotler and Levy (1969) and Luck (1969) yet commonly used by social marketers to induce change in consumers' behaviour (Stead *et al.*, 2007a). Rooted largely in behavioural economic theory (Bagozzi, 1978), *exchange* refers to the transaction between an organisation and consumer whereby a product or service is traded for a monetary or other outlay (Noble & Basil, 2011). Exchange theory reminds practitioners and researchers that, in the context of social marketing, there is a need to consider and evaluate what consumers gain in exchange for changing their behaviour (Hassan & Shiu, 2018). Social marketers are encouraged to assess the wants and needs of consumers in exchange for their changing behaviour (Smith, 2018).

Gordon (2012) and Truong (2014) posit that the success of social-marketing processes depends on the mutual exchange between practitioners and consumers, as too the fulfilment of promises made by practitioners to consumers. Contrary to generic exchanges between marketers and consumers, social-marketing applications often do not offer consumers an immediate, tangible outlay in return for their behavioural compliance (Andreasen, 2018; Smith, 2018). Further, Donovan and

Henley (2003) and Hassan and Shiu (2018) suggest that social-marketing efforts are not made for monetary profits, nor for brand promotion. Instead, they suggest that social marketing is conducted for the wellbeing of society. Regarding social-marketing exchanges, consideration is to be made for identifying competing forces, as dynamic markets are characterised by varying priorities and preferences among consumers (Andreasen, 2018; Shams, 2018). Thus, competition in the context of social marketing is discussed next.

Competition, which refers to the product and promotion efforts made by opposing organisations (Andreasen, 2018), is of interest to social marketers as it forms a barrier to decision-making by consumers to change their behaviours (Lefebvre, 2011; Gordon, 2012). Competition can be categorised as either organisational- or individual-level in nature (Noble & Basil, 2011). Peattie and Peattie (2003) conceptualise competition as a battle of ideas between social marketers' offerings and commercial efforts to promote targeted behaviour. In context, the effectiveness of a social-marketing campaign is dependent on these forces (ie, commercial advertising and promotion of behaviour) 'battling' against the societal problem (ie, obesity) for support and attention (Bristow *et al.*, 2020). Further, Noble and Basil (2011) note that forces competing for behavioural inhibition differ from forces competing for behavioural adoption. Moreover, social-marketing campaigns are often aimed at pre-determined sub-groups of consumers (Andreasen, 2018). Therefore, segmentation within the social-marketing field is now discussed.

Segmentation of target populations is an established concept in marketing (Andreasen, 2018) and refers to the differentiation of populations into homogenous subgroups (ie, groups of consumers who share certain characteristics; Bryman *et al.*, 2016). Commercial marketing campaigns traditionally make use of demographic characteristics of populations to identify distinct segments (for example, age, sex, or race; Forthofer & Bryant, 2000). Social marketers, however, often segment populations based on behavioural characteristics (Andreasen, 2018), for example, smoking versus non-smoking individuals (Grier & Bryant, 2005). In acknowledging that different people respond differently to information presented to them and to the way in which it is presented (Donovan & Henley, 2003), social marketers emphasise their behavioural segmentation efforts more than do commercial marketers (Andreasen, 2018). This is done to better tailor the development of subgroup-specific strategies (Hassan & Shiu, 2018).

Social-marketing applications go beyond the scope of merely informing and persuading consumers to alter their behaviour (Akbar *et al.*, 2019; French & Gordon, 2020). Furthermore, Shams (2018) suggests that education, law enforcement and marketing are the solutions to behavioural change. According to Rothschild (1999), education provides consumers with the knowledge and skills required to change their behaviour by delivering information relevant to the behaviour. For consumers without a desire to alter their behaviour and who are deliberately resisting these changes,

enforcing laws and regulations regarding the behaviour is appropriate (Basil, 2019). Marketing bridges the gap between the education and law enforcement approaches to behavioural change (Storey, Saffitz & Rimón, 2008). This gap is of interest to marketers (Shams, 2018) and is discussed next.

2.2.3. Importance of Social Marketing

Marketing and communication are becoming increasingly important considerations for health-related research, with evidence suggesting that marketing and communication can influence the health-related behaviour of consumers (Akbar *et al.*, 2019; French & Gordon, 2020). Specifically, social marketing plays an important role in public health, offering policymakers the tools with which socially beneficial changes in consumer behaviour can be promoted (Wymer, 2011; Hornik, 2018). Such approaches to public health problems are akin to commercial marketing approaches in that they share the same goal of influencing behaviour (Grier & Bryant, 2005; Andreasen, 2018). Social marketing is thus used to better inform the development of public health communication in achieving this goal (Helmig & Thaler, 2010). Within the context of this study, consumers are encouraged to practice healthy behaviours and avoid unhealthy behaviours (Shams, 2018).

Social marketers believe that assisting consumers in making the right choices regarding their consumption of goods and services is the responsibility of society (Smith, 2018). Moreover, social marketers understand the need for consumer research to better understand and guide consumers in doing so (Andreasen, 2018). By recognising and, in turn, managing the determinants of consumers' unhealthy behavioural tendencies, social marketing can be used as an approach to changing said tendencies (Smith, 2018). Behavioural change among societies may be brought about through intervention programmes, often through the dissemination of information regarding certain health-related behavioural risks (Stead & Hastings, 2018). For example, simply publicising the benefits of immunisation has been shown to increase its use (Smith, 2018). However, Hoek and Jones (2011) argue that programmes involving the enforcement of health policies to supplement the dissemination of said information are highly successful in effecting behavioural change. To this end, health interventions comprising fiscal policy implementation (for example, taxation), along with educational material to create awareness that certain consumption behaviours are 'unhealthy', are likely to enhance the effectiveness of the overall intervention (Roy *et al.*, 2015; Thow *et al.*, 2018). Despite this, Pirouz (2017) maintains that there is scepticism surrounding the effectiveness of social-marketing campaigns, citing the fact that resources expended on interventions might be better spent elsewhere. However, this also conveys the need for future research into the optimisation of social-marketing practices (Smith, 2018). Hence, multi-faceted intervention strategies are of interest to social marketers (Hornik, 2018) and thus PHCs are discussed in the following section.

2.3. PUBLIC HEALTH CAMPAIGNS

The promotion of public health is an important communicative function for society (Pendleton, 2013; Chin & Mansori, 2018). Health promotion as a field of study elucidates the ways in which public health policymakers' efforts can significantly influence behavioural outcomes through mediated communication (Luca & Suggs, 2013). Further, the relevance of and urgent requirement for public health promotion is exacerbated by health challenges of increasing complexity (Chin & Mansori, 2018), particularly within the context of South Africa (Delobelle *et al.*, 2016). Therefore, the definition of PHCs is introduced in the section below, which is followed by an overview of the application of PHCs to health-related problems, as encountered in the previous literature.

2.3.1. Definition of Public Health Campaigns

PHCs are broadly defined as the strategic dissemination of persuasive information to a predefined target audience to engage in healthy behaviours and refrain from unhealthy behaviours (Kreps, 2002b; Springston, 2013). Further, PHCs are delineated as the application of strategically integrated communications, designed to inform, influence, and persuade a target population's attitudes toward health behaviours (Centers for Disease Control and Prevention [CDC], n.d.). Moreover, PHCs can be defined as communication and distribution efforts, which (1) make use of messages formulated to increase the demand for, or awareness of, the use of a product or service (see Mayén *et al.*, 2016) and (2) provide a product to facilitate the adoption of healthy behaviours and cessation of unhealthy behaviours (Robinson *et al.*, 2014). For example and as alluded to earlier, the first documented PHC was implemented in 1951, promoting the use of contraceptives (Wiebe, 1951). Since then, family planning campaigns have further involved the distribution of contraceptives to the public (Robinson *et al.*, 2014). Thus, in better understanding the determinants of health-related behaviour, PHCs can be developed to communicate the risks and benefits of health behaviours to consumers (Luca & Suggs, 2013; Chin & Mansori, 2018). In so doing, PHCs are used to compel consumers to cease or adopt a behaviour and to prevent undesirable outcomes from occurring (Ha *et al.*, 2014; Mayén *et al.*, 2016). As such, the effectiveness of PHCs is of interest to policymakers (Pendleton, 2013). Thus, this study seeks to identify the role that PHCs play in consumer behaviour. With the definition of PHCs having been introduced above, the following section provides an overview of the applications of PHCs within the context of various health-related issues.

2.3.2. Overview of Public Health Campaigns

Behavioural change may be brought about through various social-marketing approaches, although the dominant approach focuses on individual-level behavioural change (Hoek & Jones, 2011; Kite *et al.*, 2018). Often referred to as a "downstream"

approach to health campaigning, individual-level strategies typically view behavioural change as voluntary (Hoek & Jones, 2011:32) and rely on effecting individuals' decision-making processes (Wakefield *et al.*, 2010; Kite *et al.*, 2018). Furthermore, considerable investment by industry into the marketing of various unhealthy products (for example, alcohol and tobacco products; Hoek & Jones, 2011) has created information asymmetry among consumers, emphasising the benefits of consumption, while to a large extent ignoring the risks thereof (Dunstone *et al.*, 2017). Specifically, commercial advertising is attributed to being one of the major drivers of global public health issues (Choi & Reid, 2015), with corporate practices cited as contributors to unhealthy behaviours within the context of South Africa (Delobelle *et al.*, 2016).

In contrast to the downstream approach, a population-level approach, referred to as an upstream (McGill *et al.*, 2015) or indirect (Wakefield *et al.*, 2010) strategy, focuses largely on environmental change to support and promote behavioural change among large (or larger) groups of consumers (Dunstone *et al.*, 2017). Additionally, upstream PHC approaches focus on market regulation and policy to facilitate behavioural change, as opposed to directly effecting such changes at the individual level (Hoek & Jones, 2011). Specifically, Wakefield *et al.* (2010) state that indirect PHC strategies may lead to increased discussion regarding health issues within social networks. In addition, behavioural changes may, in the long-term, become the norm and thus influence consumers within said networks to change their consumption behaviour (Wakefield *et al.*, 2010; Choi & Reid, 2015). Despite the potentially valuable integration of each approach into one comprehensive PHC (Hoek & Jones, 2011), the interplay of political and economic factors has often hindered the possibility of such a campaign being implemented effectively (Thow *et al.*, 2018). Specifically, while the recent adoption of integrated PHC strategies has gained momentum (WHO, 2016; Afshin *et al.*, 2017), the effectiveness of such PHCs remains largely unknown, thus conveying the need for further research into integrated approaches to better affect health behaviour change (Hoek & Jones, 2011; Thow *et al.*, 2018).

Given this information asymmetry and the increasing prevalence of obesity among consumers (WHO, 2016), PHCs provide social marketers the means through which to redress the imbalance of information and knowledge, while simultaneously improving societal wellbeing and health (Dunstone *et al.*, 2017; Bristow *et al.*, 2020).

The content of PHC messages is transmitted through various channels, such as mass media (ie, newspaper, television, magazines, and radio); social media and the Internet (ie, Twitter and Facebook; Robinson *et al.*, 2014); small media (ie, flyers, brochures; Baron *et al.*, 2010); interactive meetings (ie, group workshops, communal gatherings); and personal guidance (ie, hotlines, consultations; Bala *et al.*, 2017). However, as noted by Kuipers, Beard, West and Brown (2018), consumers interpret and respond differently to each message and through each channel of communication. Specifically, the advantage of using traditional mass media in public health communication is that the potential reach of the campaign is large (Morley *et al.*, 2018) and allows for

messages to be transmitted faster than many other channels (Randolph & Viswanath, 2004). Furthermore, mass media-based PHCs possess high awareness-building potential among target audiences (Mozaffarian *et al.*, 2012), despite the often-prohibitive nature of the costs of its use (Robinson *et al.*, 2014). For example, advertisements broadcast on television have the potential of being viewed by large proportions of consumers within a city, region, or country (Robinson *et al.*, 2014).

The success of PHCs is dependent on the variables that exist in the environment wherein the PHC is implemented (Yom-Tov, Shembekar, Barclay & Muennig, 2018), namely, the existence of counter messages, the difficulty associated with adopting or ceasing a behaviour, the addictive nature of a behaviour, and the pressures of society, societal morals, and norms (Bettinghaus, 1986). Many consumers accept health-campaign messages at face value, not necessarily questioning and contemplating their own behaviours, of which may be in their best interests (Mickey, 2003). Regarding counter messages, consumers are exposed to and influenced by a myriad of mass-media, economic, social, and environmental factors (Mozaffarian *et al.*, 2012). PHCs often aim to affect behaviour through invoking emotional and cognitive responses from consumers (Wakefield *et al.*, 2010; Dunstone *et al.*, 2017). It is common for consumers to make consumption decisions based purely on emotion than by logical and rational processes (Kite *et al.*, 2018). Within the context of food consumption, commercial advertisements highlighting claimed nutritional benefits produce biases of a cognitive nature (Mozaffarian *et al.*, 2012). Consumers are made to believe that foods are as beneficial as advertised, which is not always the case (Delobelle *et al.*, 2016). Such biases result in consumers evaluating foods higher on the claimed health benefits than on the often-unclaimed unhealthy attributes thereof (Mayén *et al.*, 2016). Addictive behaviours, such as smoking, recreational drug use and excessive alcohol and food consumption, might be reinforced through marketing cues (Delobelle *et al.*, 2016; Pirouz, 2017), which convey the need for further research to understand the drivers of health behaviours.

According to Wiebe (1951), mass persuasion regarding behavioural change is a function of five interrelated factors: force; direction; mechanism; adequacy and compatibility; and distance. Specifically, the force of message comprises one's predisposition toward a particular behaviour and the level of motivation present following exposure to the message (Wiebe, 1951). For example, one may have a predisposition toward the consumption of fast foods, though the level of motivation elicited through repeated exposure to an anti-fast food message may persuade one to question, and ultimately alter, their current behaviour (Bristow *et al.*, 2020). Direction refers to the specificity of the communication, both in terms of how and where consumers may affect changes in their personal and social lives Wiebe (1951). For example, Hoek and Jones (2011) posit that enforcement of health policies (ie, the 'how') may be used to supplement the dissemination of health communication, which informs consumers of the contexts wherein change is to be affected. The mechanism of a message is purely the manner through which behavioural change can be

influenced (Wiebe, 1951). As argued by Schnoll and Zimmerman (2001), Michels, Bloom, Riccardi, Rosner and Willett (2008), Hoek and Jones (2011), Roy *et al.* (2015), and Thow *et al.* (2018), a message's mechanism is best defined as a system wherein both fiscal and health policies are enforced in addition to the dissemination of health-related information and guidance. Adequacy and compatibility refer to the ability of said mechanism to succeed in providing consumers with a means through which behavioural change is facilitated (Wiebe, 1951). As previously alluded to, this can be done through the strategic formation and dissemination of health-related messages (Mayén *et al.*, 2016), as too the provision of products to facilitate the adoption of healthier behaviours (Robinson *et al.*, 2014). Finally, the distance of a message refers to the subjective judgment of benefits versus costs, associated with changing behaviour at the individual level (Wiebe, 1951). For example, the exchange between social-marketing practitioners and consumers is not dictated by a product/monetary system, but rather a call to improve the wellbeing of individuals and society (Hassan & Shiu, 2018).

With these environmental variables and communication requirements in mind, the forthcoming section outlines the importance of PHCs within both global and South African contexts.

2.3.3. Importance of Public-Health Campaigns

The integration of public-health strategies into social marketing has provided social scientists and medical practitioners the means through which a holistic approach toward societal wellbeing can be taken (Hoek & Jones, 2011). Furthermore, the ability of PHCs to disseminate well-defined, health-related information to a general population is of interest to marketers (Wakefield *et al.*, 2010). Due to lifestyle-related health concerns (for example, diabetes), the unsustainable consequences of unhealthy behaviours call for intervention by governments and policymakers alike (Institute of Medicine, 2010; Mozaffarian *et al.*, 2012). Research has found that both population- and individual-based health-campaign strategies complement one another; in unison, there is the potential for sustainable and broad-based outcomes (Kumanyika *et al.*, 2008; Farley *et al.*, 2017).

Local environments, specifically those related to food, play a role in public health, both at the population and individual level. These unhealthy circumstances foster behaviours of the same nature among society (Spires *et al.*, 2016). Thus, despite personal responsibilities and environmental conditions driving the prevalence of health-related diseases among individuals, the very emphasis and aim of PHCs are to nurture the interaction between said forces (Roberto *et al.*, 2015). Put simply, a combination of micro- and macro-level strategies is important for successful PHC implementation (Lister *et al.*, 2015). Without sustained action in the form of PHCs, health-related issues will become more prevalent, and societies will suffer the consequences, including higher mortality rates and lower levels of life expectancy

(Patterson *et al.*, 2018). Yom-Tov *et al.* (2018) suggest that, through targeted, online-based public health advertising, changes in behaviour can be elicited. To this end, if marketers understand the ability of such campaigns to influence the health behaviours of consumers on a large scale, albeit at the individual level, they will be better equipped to identify and predict more accurately the resulting responses of these consumers to similar campaigns (Kite *et al.*, 2018). As such, the effectiveness of PHCs is of interest (Kite *et al.*, 2018), with mass media PHCs deemed to be a useful means through which governments may enact policy changes (Murukutla *et al.*, 2020).

While previous research has varied significantly through its focus and findings, further research is required on the influence that PHCs have on the knowledge, attitudes, and behaviour of consumers (Kite *et al.*, 2018; Morley *et al.*, 2018). Thus, to better understand how to combat the threat of various health-related behaviours (Bristow *et al.*, 2020), the forthcoming section provides a context into prior literature examining the efficacy of PHCs.

2.3.4. Evidence of Public Health Campaign Effectiveness

In better understanding the causes of unhealthy modern lifestyles, insights into effective approaches to health-related behaviour change are useful for the development of policies and campaigns aimed at facilitating such change (Anker, Feeley, McCracken & Lagoe, 2016). When implemented as part of a holistic approach to behavioural change, PHCs have been shown to be effective (cf. Wakefield *et al.*, 2010; Dunstone *et al.*, 2017). The role of PHCs in NCD prevention is to disseminate information with the aim of raising awareness, affect beliefs, norms and attitudes, and empower the public to make healthy/healthier consumption decisions (Stead & Hastings, 2018). Consumption behaviours, including alcohol abuse, smoking, unhealthy eating, and sedentary lifestyles, are preventable causes of NCDs (Bala *et al.*, 2017). The proliferation of unhealthy behaviours in society (Mozaffarian, 2016; Snuggs *et al.*, 2019) has and will continue to prompt researchers to evaluate the effectiveness of PHCs (Farley *et al.*, 2017; Kibler *et al.*, 2018). Despite prior research advocating the use of PHCs within the contexts of alcohol consumption (cf. Crawford-Williams *et al.*, 2015; Young *et al.*, 2018) and anti-smoking PHCs (cf. Grigaliunaite & Pileliene, 2017; Durkin *et al.*, 2020), further research is required to evaluate the efficacy of PHCs within an SSB context (Von Philipsborn *et al.*, 2019; Murukutla *et al.*, 2020). Thus, the following section will provide the context for the current study through the synthesis of previous anti-alcohol and anti-smoking PHC studies, beginning with a discussion of alcohol-related PHCs.

2.3.4.1. Anti-alcohol Public-Health Campaigns

According to the WHO (2019), alcohol abuse is a prominent causal factor of NCD development among societies. Specifically, excessive alcohol consumption can lead to the development of heart and liver diseases (WHO, 2019), and features prominently

on the list of risk factors for reduced life expectancy (Patterson *et al.*, 2018). Fiscal policies (ie, taxation and price increases) and restrictions on availability in retail outlets have been shown to reduce the consumption of alcohol in various contexts (Xuan *et al.*, 2016; Allamani, Beccaria & Einstein, 2017). In addition, restrictions on the advertising and marketing efforts of alcohol-beverage manufacturers have been deemed an effective, albeit controversial, strategy, 2017) to combat alcohol abuse (Farley *et al.*, 2017).

While warnings on alcohol packaging widely used in health communication to reduce harmful behaviour by consumers (Manyiwa & Brennan, 2012) are correlated with a high rate of recall (Kaskutas & Greenfield, 1992; MacKinnon & Fenaughty, 1993), other authors found that the alcohol consumption behaviour of consumers is not affected by such warnings (Mayer, Smith & Scammon, 1991; MacKinnon & Fenaughty, 1993). Research has demonstrated that anti-alcohol mass media PHCs can affect changes in the knowledge, attitudes and beliefs surrounding alcohol consumption among consumers, although substantial evidence for behavioural change due to these campaigns is yet to be established (Allamani *et al.*, 2017; Young *et al.*, 2018). The literature further suggests that, despite no immediate-term change in reported alcohol consumption, influencing consumers' knowledge and attitudes is understood to pave the way for reduced consumption in the long-term (Dunstone *et al.*, 2017). The consumption of alcohol and tobacco smoking are both highly addictive and habitual behaviours (West, 2017; Stead *et al.*, 2019). PHCs provide a cost-effective approach to raise awareness of their respective consumption risks whilst simultaneously promoting relevant changes in behaviour (Dixon *et al.*, 2015). As such, the following section discusses anti-smoking PHCs and their effectiveness.

2.3.4.2. Anti-smoking Public-Health Campaigns

Tobacco smoking is one of the "most potent" habits and has been shown to affect multiple organs of the human body, whilst being a leading cause of NCD prevalence (Yanbaeva, Dentener, Creutzberg, Wesseling & Wouters, 2007:1557). Specifically, smoking has been shown to cause several potentially fatal diseases, including heart disease, stroke and cancers (West, 2017). The promotion of awareness about the consequences of tobacco smoking and the risks associated with exposure to smoke is mandated by the WHO's Framework Convention on Tobacco Control (2003). Despite this, the tobacco epidemic remains a public health concern (Hoffman & Tan, 2015). Anti-smoking PHCs have been implemented to reduce the prevalence of smoking, of which tobacco taxation plays a prominent role (Durkin *et al.*, 2020), especially within the context of South Africa (Van Walbeek & WHO, 2003).

In addition to taxation policies, anti-smoking PHCs have been shown to be effective in reducing the prevalence of smoking (cf. Kuipers *et al.*, 2018; Durkin *et al.*, 2020). Specifically, research by Durkin *et al.* (2020) found negatively valenced PHC content (ie, those which evoke negative emotions by way of highlighting negative consumption

consequences) to be most effective in motivating behavioural changes within a tobacco-smoking context. Similarly, changes in government investment in an anti-smoking PHC in England between 2008 and 2016 resulted in short-term reductions in smoking prevalence: a 10% change in monthly government spending resulted in a 0.51% increase in the number of quit attempts by consumers (Kuipers *et al.*, 2018). Further research by Hoffman and Tan (2015) demonstrated that a ban on smoking in public areas and increases in the price of tobacco products is likely the most effective approach to reducing the prevalence of smoking. Moreover, it has been shown that simply warning consumers about the potential consequences of smoking by way of PHCs, as well as the graphic representations of such consequences on cigarette packaging (Grigaliunaite & Pileliene, 2017), can lead to an increase in quitting attempts and a reduction in smoking prevalence (Hoffman & Tan, 2015).

With the context provided into anti-sugar PHCs by way of anti-alcohol and anti-smoking PHCs, the following section discusses the problem that is obesity.

2.4. OBESITY

Obesity poses a serious threat to society, given its current prevalence (Orehek & Vazeou-Nieuwenhuis, 2016; Kaltenbrun *et al.*, 2020). Obesity is defined by WHO (2020) as the excessive accumulation of fat which may negatively affect one's health. Within a global context, obesity has nearly tripled since 1975 (WHO, 2020) and, given the relationship between obesity and NCDs, the need for public health action has been further exacerbated (Redondo *et al.*, 2018; Abdool Karim *et al.*, 2020). According to McGill *et al.* (2015:2), poor diet and nutrition pose a "greater" threat to mortality rates, due to NCD prevalence, than do alcohol, tobacco and physical activity combined. To this end, resistance from commercial sectors has shaped global markets in such a way that fiscal policy and legislation remain wholly ineffective (Delobelle *et al.*, 2016; Stacey *et al.*, 2019). Casswell (2019) and Reeve and Gostin (2019) note that aggressive interference by tobacco, alcohol and food industries has led to the reduced uptake of public-health policies, further exacerbating the global concerns of obesity, NCDs, and poor life expectancy (Farley *et al.*, 2017).

The failure by governments to halt the rising obesity incidence (Mchiza, Parker & Labadarios, 2016), coupled with the rising burden of NCDs as a result, constitute challenges to policymakers (Delobelle, 2019; Reeve & Gostin, 2019). Moreover, food has never been as affordable as it is now, with the cheapest available foods predominantly high in sugar and fat content (Van Empelen *et al.*, 2018; Reeve & Gostin, 2019). Resultantly, societies are obesogenic environments (Abdool Karim *et al.*, 2020), those in which the overconsumption of food has led to lifestyles which are highly sedentary, with increased risk of obesity (WHO, 2007). Kaltenbrun *et al.* (2020) highlight that, in addition to South Africa's concerning obesity prevalence, the widespread issues of hunger and malnutrition continue to prove problematic. This dual-incidence of obesity and malnutrition is common for low- and middle-income

countries (LMICs; Reeve & Gostin, 2019) and particularly common in countries with a stark inequality of wealth (Delobelle, 2019; Wrottesley *et al.*, 2020).

The increasing prevalence of obesity in South Africa has been attributed to changes in national consumption behaviours, toward Western-oriented dietary patterns (for example, increased daily kilojoule, calorie-dense and sugar-rich food consumption) (Ronquest-Ross, Vink & Sigge, 2015). Within a South African context, the increase in the consumption of SSBs has been attributed to being a "major" cause of obesity (Murukutla *et al.*, 2020:2). This is demonstrated by the fact that the average consumption of SSBs by South Africans is estimated to be over 200 millilitres per day, which contributes to the prevalence of NCDs among consumers in South Africa, at both personal and economic costs (Tugendhaft *et al.*, 2019). The consumption of SSBs is deemed to be a leading cause of the prevalence of NCDs (Redondo *et al.*, 2018; Murukutla *et al.*, 2020). Furthermore, within the context of South Africa, obesity has emerged as a national-level problem, which, in combination with national tobacco and alcohol use, contributes to the prevalence of NCDs (Delobelle *et al.*, 2016; Wrottesley *et al.*, 2020). Thus, the following section discusses prior anti-sugar PHC research to better understand how this study could inform future PHC policies.

2.5. ANTI-SUGAR PUBLIC-HEALTH CAMPAIGNS

Anti-sugar PHCs have typically been supplements of SSB taxation policies, whereby a tax is imposed to raise costs to consumers and thereby reduce the accessibility thereof (Taber *et al.*, 2019; Wrottesley *et al.*, 2020). There is increased interest in the regulation of promoting products of an unhealthy nature (Department for Digital, Culture, Media & Sport and Department of Health & Social Care, 2019), with existing gaps in the evidence base conveying the need for further research into the effectiveness of anti-sugar PHCs (Delobelle, 2019; Forde *et al.*, 2019). Within the context of health promotion, specifically strategies aimed at a reduction in obesity prevalence, anti-sugar PHCs together with media narratives have led to a shift in attitudes toward favouring a tax on SSBs (Farley *et al.*, 2017; Murukutla *et al.*, 2020).

The imposition of a Sugary Beverage Levy on SSBs in South Africa, collected by the South African Revenue Services, was effective as from the 1st of April 2018 (Rates and Monetary Amounts and Amendment Revenue Laws Act, No. 14 of 2017, 2017:chap17). While it cannot be guaranteed that the Sugary Beverage Levy will be effective in directly reducing the prevalence of obesity among consumers in South Africa, data suggest that such a tax will reduce the consumption thereof (Manyema *et al.*, 2014). To this end, PHCs have been implemented to reduce the consumption of various products such as alcohol and tobacco; the implementation of such campaigns has often been accompanied by new taxation policies and consumption and production regulations (see Section 2.3.4). The influx of money to South Africa's Government is deemed to offset the financial strain on an already-struggling healthcare system (Kaltenbrun *et al.*, 2020), although it is unclear whether the

proceeds of the Sugary Beverage Levy are indeed being allocated to the health budget by the National Treasury (Myers *et al.*, 2017).

Research conducted by Murukutla *et al.* (2020) demonstrates that, within the context of South Africa, anti-sugar PHCs can influence consumers' attitudes toward SSBs. Murukutla *et al.* (2020) evaluated the efficacy of South Africa's "Are You Drinking Yourself Sick?" anti-sugar PHC, which was launched in a partnership between the Healthy Living Alliance (HEALA) and Vital Strategies. This PHC was found to be effective in raising awareness and changing attitudes toward SSBs, although little behavioural data were collected. In addition, the scale items adopted by Murukutla *et al.* (2020) were aimed primarily at evaluating the participants' awareness about the consequences of excess SSB consumption. Considering this, as well as the aim of the current study, a gap in the literature exists regarding the effects of this campaign, which this study has adopted (see Chapter 4), on consumers' implicit and explicit attitudes toward SSBs. Thus, this conveys the need for further research into the effectiveness of such an anti-sugar SSB within a South African context.

Morley *et al.* (2018) evaluated Australia's "LiveLighter" anti-sugar PHC over a six-week period by assessing participants' self-reported SSB and water consumption. Findings suggest a significant reduction in SSB consumption among the experimental group (ie, intervention group), with an increase in water consumption within the same group. Furthermore, increased levels of awareness and knowledge regarding the negative effects of SSB over-consumption were demonstrated. As was the case in the research conducted by Murukutla *et al.* (2020), Morley *et al.* (2018) were unable to prove causality owing to their adopted research designs and inability to control for influences between pre- and post-test periods. Thus, the current study sought to adopt an experimental research design whereby a causal effect of changing attitudes could be evaluated due to exposure to an anti-sugar PHC (see Chapter 4).

Research by Farley *et al.* (2017) indicated that, despite achieving results of an effective nature with respect to campaign recall, knowledge and beliefs, they concede that their subjective approach to assessing SSB consumption (ie, by way of self-reported telephonic interviews) and did not simultaneously evaluate measures within each of their three allocated test regions of the USA. Farley *et al.* (2017) encourage future research into anti-sugar PHCs using rigorous experimental approaches.

2.6. CONCLUSION

To address the inconsistencies and uncertainties surrounding the effectiveness of PHCs, this study focused on the influence that an anti-sugar PHC has on consumers' implicit and explicit attitudes toward SSBs in South Africa, thereby attempting to deal with the inconclusive nature of previous studies of a similar nature. In Chapter 3, the nature of implicit and explicit attitudes will be put forth, while the Associative-

Propositional Evaluation (APE) Model (Gawronski & Bodenhausen, 2006) will be explored to highlight the theoretical foundation for the current study.

CHAPTER 3: COGNITION, IMPLICIT AND EXPLICIT ATTITUDES, AND NEUROMARKETING

3.1. INTRODUCTION

The previous chapter outlined the uses of PHCs within the contexts of social marketing, obesity and SSBs. To this end, the forthcoming chapter attends to detailing and discussing the nature of the human mind, to better inform the design and implementation of said PHCs, improving their potential efficacy in the future. Cognition is first outlined to provide a context into the consumer behaviour and is followed by a discussion of the role of memory and knowledge accessibility in better understanding consumer decision-making. Motivation, persuasion, and goals are subsequently explored, and attitudes are then defined, with the distinction made between implicit and explicit attitudes. Finally, consumer neuroscience is discussed, which concludes the chapter.

3.2. COGNITION

As new information becomes apparent to the consumer, neural processes become operational and lead to context-specific interpretations of said information (Wyer, 2017; Prestwich *et al.*, 2018). However, in lieu of new information, behaviour is typically based on access to a limited amount of knowledge at the time of action (Carlston, 2010; Wyer, 2010). Skinner (1953:71) conceptualised the study of consumer behaviour as follows:

> Behavior is strong or weak because of many different variables, which it is the task of a science of behavior to identify and classify.

Thus, better understanding *why* and *how* consumers make decisions is of importance to researchers (Jansson-Boyd & Zawisza, 2017; Jansson-Boyd, 2019), particularly within the context of health behaviours (Conner & Norman, 2015). Notwithstanding the distinction between thoughts (ie, cognition) and feelings (ie, effect/emotion; see Robinson, Watkins & Harmon-Jones, 2013; Allen, 2017), the causal link between cognition and behaviour is of particular interest to researchers (Schwarzer & Luszczynska, 2015; De Houwer *et al.*, 2020). As such, the following sections provide an overview of cognition, outlining how it effects decision-making through memory and knowledge, and how and why contextual circumstances can affect individuals' cognitive processes.

3.2.1. <u>Overview of Cognition</u>

Context into consumer cognition is deemed to assist practitioners in better understanding the drivers of decision-making (Jansson-Boyd & Zawisza, 2017; Jansson-Boyd, 2019). To this end, understanding the environmental conditions

conducive to a favourable outcome is an important determinant of marketing effectiveness (Rajaobelina, 2018). This is because of the unique way in which each consumer processes information and subsequently acts on these external stimuli (Jansson-Boyd & Marlow, 2017; Spiteri-Cornish, 2017). The processing of information is dependent on several factors, such as how it is initially constructed (ie, interpreted), how it is stored in memory, how it might be re-interpreted in the future, and how it may be of use in judgements and behaviour (Graf & Schacter, 1985). Thus, cognition can be conceptualised as mental representations of objects (Smith & Queller, 2001). Food and drink consumption behaviours involve gathering nutritional information and subsequently deciding on the applicability and usefulness of this information (Spiteri-Cornish, 2017). Thus, dietary consumption decisions depend on the initial interpretation of nutritional information, and the social and environmental contexts in which it is presented (see Robinson, Blissett & Higgs, 2013; Conner & Norman, 2015). For example, in their investigations of dietary consumption behaviours, De Castro, Brewer, Elmore and Orozco (1990) and De Castro and Brewer (1992) found that dietary intake quantity is strongly correlated with the mere presence of others, with larger gatherings of others leading to larger portion sizes. In line with this, Olson and Zaltman (2010) posit that one's thoughts and feelings about an environment are important to consider within an experiential context.

To this end, the importance of experience has been brought to the attention of marketers, particularly in the fields of cognition and decision-making (Dimofte, 2017; Rajaobelina, 2018, 2021). Olson and Zaltman (2010) suggest that useful indicators of experiences are those which vividly reflect consumers' prior interpretation of events, such that the associated memories are accessed and used as the basis for decision making (cf. Tversky & Kahneman, 1974). However, simply requesting a consumer's account of an event after the fact is unlikely to provide detailed insight into their cognitive processes, as faced whilst grocery shopping, for example (Olson & Zaltman, 2010). Thus, questions such as "what happened?" are not true indications of one's experience as they may not 'vividly reflect' one's prior interpretations of events, conveying the need to better understand experiences as opposed to so-called 'recall' (Olson & Zaltman, 2010). As alluded to earlier, the first step in the broader decision-making process of consumers involves the search and acquisition of information, to be stored and retrieved as required (Prestwich *et al.*, 2018). This storage and retrieval of selected bits of information (ie, memory) is an important feature and function of human cognition (cf. Anderson & Bower, 2014/1973; Christiansen & Lechman, 2016). Furthermore, consumer behaviour research is rooted largely in the study of memory, as the recollection and interpretation of prior experiences influences the behaviour of consumers and their cognitive makeup (Mantonakis, Whittlesea & Yoon, 2008). Thus, the role of memory in decision making is discussed in the next section to provide context into cognition.

3.2.2. Memory

Faced with countless complex decisions every day, consumers rely on their ability to integrate the appropriate information as stored in memory (Kar, Vijay & Mishra, 2013), whilst simultaneously evaluating alternative, competing options (Camilleri & Newell, 2013). Memory and memory processes pave the way for learning, particularly in cases where behaviour is shaped by repeated experiences (Mantonakis *et al.*, 2008). Specifically, memory processes involve the encoding, storage, and retrieval of contextual information (Camilleri & Newell, 2013; Kar *et al.*, 2013), and conceptualised as a network of ideas and concepts, interconnected in the human mind (Anderson & Bower, 2014/1973). Within the context of this study, common concerns associated with dietary intake may include the quantity to be consumed (ie, too much or too little) and how healthy one option is relative to another (see Kakoschke *et al.*, 2017; Spiteri-Cornish, 2017). Thus, this section seeks to provide a context into the functions of memory within the context of consumer behaviour.

The probability that one piece of information is retrieved whilst deliberating a host of options depends on the associative strength between that information and socially or environmentally activated concepts at the time of deliberation (Mercurio & Forehand, 2010). Additionally, complex decisions (ie, requiring numerous bits of information) may lead to a failure in recalling one piece of information. For example, the recall of information in the presence of competing motivations, such as competitors' advertising (Keller, 1991) or social and environmental contexts (Kumar & Krishnan, 2004), can affect memory performance (Mercurio & Forehand, 2010). To this end, food and drink consumption decisions have been complicated by the sheer volume of options and choices available (Spiteri-Cornish, 2017), with most food predominantly high in sugar and fat content (Van Empelen *et al.*, 2018). The successful recall of appropriate information (ie, memory performance) is affected by the depth with which the information is encoded, with the environmental context in which the encoding takes place also influencing the probability of recall (Fliessbach, Buerger, Trautner, Elger & Weber, 2010). Specifically, encoding depth refers to the semantic strength of stimulus evaluations (Craik & Lockhart, 1972; Craik & Tulving, 1975). More formally, Craik (1973:48) defined encoding depth as "the meaningfulness extracted from the stimulus", as opposed to the frequency with which the stimulus was thought of or deliberated. Thus, how fast and accurately the word *LOWERCASE* can be described structurally as uppercase, depends on how easy it is to distinguish between upper and lowercase text, whereas determining whether the word *occurred* rhymes with the word *CHAUFFEURED* requires additional levels of cognitive processing (see Craik & Tulving, 1975).

Considering the distinction between said levels of cognitive processing, Tulving (1983, 1985) differentiated between the processes involved in remembering (ie, recall) and knowing (ie, long-term information retention), despite similarities in how the respective information is encoded and retrieved. Knowledge is categorised broadly as either

declarative or procedural in nature (Wyer, 2008; Hutchinson, Lu & Weingarten, 2017), with declarative knowledge being further classified as concerning either episodic or semantic memory processes (Craik & Tulving, 1975; Tulving, 1983)., 1993)

Declarative knowledge, often referred to as 'open' knowledge (Anderson, 2020), can be broadly defined as the information which humans are consciously aware of (Yilmaz & Yalcin, 2012). Declarative memory processes may involve information of an explicit and associative nature (Hutchinson *et al.*, 2017), such that the subsequent thoughts are deliberate (ie, consciously controlled; Tulving, 1993). Of the two classifications of declarative knowledge (Craik & Tulving, 1975), episodic information is based on one's personal experiences, thus capturing one's own interpretation and recollection of events (Tulving, 1995). Conversely, semantic information is generic and factual in nature and representative of concepts in an objective sense (ie, not specific to one's experiences and subjective interpretation thereof; Tulving, 1984, 1985). For example, 'this drink is delicious' is episodic in nature (Wyer, 2008), as it is based on one's prior (subjective) experience of consuming the drink. However, 'using a car's turn indicator' while driving to the supermarket (so that one may purchase said drink) is semantic in nature, as it refers to the knowledge imparted whilst learning to drive a car (Wyer, 2017).

Procedural knowledge refers to processes whereby a sequence of steps is cognitively conceptualised, allowing for certain objectives to be met (Georgeff & Lansky, 1986; Baumard, 1999). Furthermore, cognitive 'rules' are typically learned through experience, paving the way for these step-by-step instructions to be conceptualised (Hiebert & Lefevre, 1986). Using the earlier example of 'using a car's turn indicator', each action involved in driving form part of the procedure necessary to arrive at a destination (Wyer, 2010, 2017). Although procedural information is typically explicit or implicit in nature, environmental cues and repetition may eventually render such procedural information as purely implicit (ie, automatic; Hutchinson *et al.*, 2017). As such, Tulving's (1983) differentiation between remembering and knowing is loosely described as episodic and semantic or procedural memory processes. Hutchinson *et al.* (2017) suggest that to understand the role of memory in the broad conceptualisation of cognition, it is useful to define each function of the brain in memory encoding, storage, and retrieval (Purves *et al.*, 2013). Thus, a hierarchy of memory is presented in Table 3.1.

Table 3.1: Hierarchy of Memory

Source	Description
External environment	Physical energy is interpreted as objects or events and allow for interactions to achieve various goals
Sensory stimulation	Physical energy is converted into neural firing along specific continua, through a process known as 'transduction'
Sensory memory	Information is processed but lost within milliseconds of being processed
Short-term memory (STM)	Primary function of 'working memory' is executive control, which paves the way for conscious, deliberate, and controlled behaviours, though unfamiliar and unlearned information from the environment is lost after several seconds
Long-term memory (LTM)	Interference by environmental and social cues allows for retrieval of information, giving rise to automatic behaviours

SOURCE: Purves *et al.* (2013), Gazzaniga, Ivry and Mangun (2014) and Hutchinson *et al.* (2017)

To this end, cognitive processing ability dictates how information is integrated during the decision-making process, at each stage of the memory hierarchy presented in Table 3.1. Furthermore, the capacity of memory and speed of processing influences how information is processed in the human brain (Wyer, 2010). Additionally, environmental and social interference may hinder memory performance with respect to accessing the necessary information as and when required (Hutchinson *et al.*, 2017; Wyer, 2017). Furthermore, understanding the nature of knowledge in terms of its content and structure is of interest to marketers, as this knowledge effects the response of consumers following marketing of a brand, for instance (Keller, 1993). As such, the following section describes the processes whereby bits of information are accessed for the purpose of decision-making.

3.2.3. Knowledge Accessibility

As information is presented to consumers, they construe the meaning of the information in line with previously acquired knowledge (Wyer, 2017). Further, consumers deliberate on their choice of product by making inferences as to the true meaning of this information, by accessing subsets of this knowledge (Kardes, Posavac, Cronley & Herr, 2008). The cognitive processing which facilitates this deliberation is not limited to the mere comprehension of the information being presented but also involves the retrieval of contextual information, as stored in memory

(Camilleri & Newell, 2013; Wyer, 2017). Moreover, the pervasiveness of knowledge accessibility in consumer behaviour research (Bargh *et al.*, 2012; Sheeran *et al.*, 2013) conveys the need to consider its role in cognition (Wyer, 2008, 2010).

Consumers pay varying amounts of attention to objects within the external environment, each of which provides information regarding its structural and conceptual nature (Orquin, Bagger, Lahm, Grunert & Scholderer, 2020). Once consumers comprehend and subsequently encode this information, each characteristic of the object is conceptualised such that similar exemplars of these characteristics are organised in subsets or clusters of existing knowledge (Lindsay & Norman, 2014). Such subsets or clusters of information have also been referred to as memory 'nodes', due to the similarity and interconnected nature of these related concepts (Baumgartner & Pieters, 2010; Anderson & Bower, 2014/1973). When a knowledge node or schema is accessed, the information within that neural network and its surrounding networks is activated (Mantonakis *et al.*, 2008). Such facilitation of knowledge accessibility was first described as a *priming* mechanism by Meyer and Schvaneveldt (1971), whereby words in a lexical decision task were more accurately described if the preceding words were related to those which followed. For example, when exposed to words such as *happiness* and *beverage,* consumers can accurately perceive the beverage as a particular brand. This conditioned association between semantic attributes and products is the result of a learning process (Belboula & Ackermann, 2021).

Accordingly, consumers may automatically categorise a particular product or a characteristic thereof as 'healthy/unhealthy' which predisposes their product or brand preference (Freeland-Graves & Nitzke, 2002; Balconi, Fronda, Venturella & Crivelli, 2017). Such dispositions are, in part, based on a contextual summary of prior experiences. The interpretation of this accessed or activated knowledge occurs automatically (ie, at the implicit level; Anderson, 1983; Mantonakis *et al.*, 2008). To this end, four determinants of whether and to what extent knowledge is accessed have previously been established (Smith, 1990; Wyer, 2004). Specifically, such determinants of active knowledge access are (1) the associative strength between acquired knowledge and any contextual cues encountered in the current situation; (2) how recently the relevant information was acquired and encoded in memory nodes; (3) how often said information has previously been activated and employed in decision-making processes; and (4) the depth of encoding of such information (Wyer, 2008).

With reference to point (1) above and as previously discussed (see Chapter 2), the success of a PHC depends on the stimuli which exist in the viewing environment (Yom-Tov *et al.*, 2018). Social and environmental cues are deemed to influence the efficacy of PHCs (Mozaffarian *et al.*, 2012; Dunstone *et al.*, 2017), thus conveying the need to consider said cues within the context of this study. Further to points (2) through (4), Chapter 2 highlighted how reinforcing the claimed nutritional benefits through

seemingly perpetual food and beverage marketing cues (Pirouz, 2017; Delobelle, 2019) whilst the often-unclaimed unhealthy attributes and associated consumption risks thereof (see Choi & Reid, 2015; Mayén *et al.*, 2016) may reduce the efficacy of PHCs, thereby conveying the need for this study to better understand the role of knowledge accessibility in this efficacy. Knowledge activation has traditionally been assessed by way of self-reported, explicit questioning (Smith & Nosek, 2011; Greenwald & Banaji, 2017). However, due to the level of conscious awareness involved and the deliberate nature of attempts to respond to said questions, such measures may not accurately elucidate whether the resultant responses were activated automatically (Gawronski & Bodenhausen, 2014b; De Houwer *et al.*, 2020). To this end, the influence of motivation in both automatic and deliberate processes underlying consumer decision-making has previously been established (Herzenstein, 2010; Locke, 2015; Prestwich *et al.*, 2018), conveying the need to better understand this concept within the context of consumer behaviour. Thus, the following section discusses motivation and its role in consumer behaviour.

3.2.4. Motivation

In contrast to the aim of cognition to understand *how* behaviour is initiated and executed (Schumann, Haugtvedt & Davidson, 2008), motivation concerns the reasons behind consumers' behaviour (Baumgartner & Pieters, 2008, 2010). As discussed in Chapter 2, motivation involves *what* the consumer wants and *how much* they want it (Locke, 2015; Prestwich, Sheeran, Webb & Gollwitzer, 2015). Thus, motivation may come in one or more forms and to varying degrees of strength (Kreslake, Price & Sarfaty, 2016; Rawolle, Schultheiss, Strasser & Kehr, 2017).

Of interest to researchers, motivations in the shape of goals, desires, needs, and wants impel consumers to behave in certain ways (Locke, 2015). According to Conner and Norman (2015), there is value in understanding and identifying the motivational forces behind consumer behaviour. To this end, Gollwitzer (1993) distinguishes between goals and the implementation thereof, implying a difference between the two. Specifically, a goal intention refers to the broad objective to be achieved, whereas the implementation is more a 'plan-of-action' as to how this outcome can be reached (Prestwich *et al.*, 2015; Gollwitzer *et al.*, 2017). For example, the goal of losing weight (ie, 'intend to achieve *X*') may direct how this is to be achieved, though typically through dietary changes and exercising (ie, 'intend to achieve *X* by doing *Y*'; Bagozzi & Edwards, 2000). Thus, motivation is an important concept in consumer behaviour (Bagozzi & Dholakia, 1999; Vohs, Baumeister & Tice, 2008), particularly within the field of health (Conner & Norman, 2017).

Effecting changes in health-related consumption requires that said goal intentions are developed. Thus, the primary objective of health-related information dissemination concerns motivating consumers (Schwarzer & Luszczynska, 2015), such that they intend to achieve improved states of health and wellbeing (Gollwitzer *et al.*, 2017). In

considering the likelihood and feasibility of said goal being achieved, consumers seek to develop strategies through which this can be accomplished (Schwarzer & Luszczynska, 2015). Conner and Norman (2017) suggest that, in cases where certain behaviours have been changed, the maintenance of such behaviours requires that motivational cues be reinforced regularly, to ensure that changes are not merely initiated in the short-term and discontinued later (Hagger, Polet & Lintunen, 2018). Unhealthy product consumption, such as smoking cigarettes and drinking SSBs, has functional and psycho-social (ie, social desirability) determinants (Baumgartner & Pieters, 2010; Norman & Conner, 2015), which are important to consider within the context of health-related behaviour. To this end, unhealthy consumption is seen as largely habitual, particularly in the case of addictive behaviours, such as smoking and alcohol consumption (Delobelle *et al.*, 2016; Pirouz, 2017). Specifically, habit refers to consumers' tendency to repeat prior behaviours (Prestwich *et al.*, 2018) such that the circumstances under which this consumption occurs trigger associated cues in memory (Gochman, 1997; Tam, 2010). Thus, attempting to persuade consumers to alter their behaviour through effective advertising is contingent on the habitual nature of the targeted consumption decisions; however, habitual decision-making is processed automatically (ie, unconsciously, implicitly; Ouellette & Wood, 1998).

Petty and Cacioppo (1986) highlight the importance of the two primary roles for communicating information through advertising: (1) the information should be persuasively structured, such that consumers' level of cognitive processing whilst interpreting the information leads to favourable evaluations; and (2) to enhance the motivation of consumers to process the information conveyed in the communication (Cacioppo & Petty, 1985; Petty, 2013). Additionally, persuasive advertising can be presented in a subliminal manner (ie, below conscious levels of awareness and perception) and thereby lead to favourable subconscious, automatic evaluations (Grimes, 2010; Moorman, 2010). As such, successful information dissemination and motivation can affect behavioural change by invoking cognitive responses (Dunstone *et al.*, 2017; Durkin *et al.*, 2020). Thus, the distinction between deliberate and automatic modes of evaluative processing requires further consideration, to better understand the influence of each process on decision making (Grayot, 2020). The resultant dissociation between measurements of said modes of processing is commonly interpreted with reference to DPT, whereby it is assumed that each measure reflects a distinct mental process (Gawronski & Bodenhausen, 2006; Rydell & McConnell, 2010, 2014). As such, the forthcoming section describes the nature of these two cognitive mechanisms, through the lens of DPT.

3.2.5. Dual Process Theory

Behaviour is commonly treated as being under the control of one's conscious thoughts (Fazio, Sanbonmatsu, Powell & Kardes, 1986; Greenwald & Banaji, 1995). However, decision-making is facilitated by the evaluation of outcomes, such that a more favourable result is obtained (Kahneman, 2011; Tversky & Kahneman, 2013, 2021).

In the face of complex decisions and without a ‘gut’ feeling, humans adopt a relatively slow and deliberate form of reasoning (Kahneman, Slovic & Tversky, 2013/1982; Grayot, 2020, 2021). Gut feelings are deemed to be derived from what psychologists understand as automatic evaluations (Bar-Anan & Vianello, 2018). Accordingly, DPT is conceptualised as the interplay between the mechanisms underlying consumer behaviour: automatic and controlled processing (Cunningham, Packer, Kesek & Van Bavel, 2009; Bargh *et al.*, 2012).

Within this context, automatic processing refers to the largely unintentional and fast evaluation of objects (Kahneman, 2011; Kahneman, Sibony & Sunstein, 2021), such that evaluations are reactive, intuitive, and unconscious in their nature (Grayot, 2020). This associative category of processing is commonly referred to as ‘System 1’ thinking (see Evans & Stanovich, 2013a; De Neys, 2018). Conversely, ‘System 2’ thinking is conceptualised as slow, deliberate, and effortful processing of information, which correspond to conscious and controlled contextual evaluations (Deutsch & Strack, 2006; Kahneman, 2011; Wyer, 2017). Thus, DPT plays an important role in the field of consumer-behaviour research (Evans & Stanovich, 2013b; Grayot, 2020) and is of interest to researchers, particularly in the study of judgement and decision-making (Packer *et al.*, 2011; Tversky & Kahneman, 2013). Moreover, it is important for researchers to understand the underlying causes of discrepancies between varying forms of consumer evaluation (Tormala & Briñol, 2015; De Houwer *et al.*, 2020), such that insights and understanding into broader behavioural drivers are established (Moran, Bar-Anan & Nosek, 2017; Grayot, 2020). To this end, developments in the measurement of covert and uncontrollable processes have allowed cognition to be better understood (Olson & Kendrick, 2008; Blascovich, 2014). Whereas System 2 has been assessed by way of self-report responses (Smith & Nosek, 2011; Greenwald & Banaji, 2017, 2021), the application of physiological and neurophysiological measurement tools has facilitated improved System-1-related insights and understanding in research (Plassmann & Karmarkar, 2015; Cerf, Garcia-Garcia & Kotler, 2017, 2020).

According to Fishbein *et al.* (2001), attitudes are key determinants of consumer behaviour, particularly in the context of health-related consumption (cf. Hollands *et al.*, 2011; Prestwich *et al.*, 2018; Asbridge, Pechey, Marteau & Hollands, 2021). Blascovich (2014) suggests that, despite the usefulness of directly assessing attitudes (ie, explicit self-report), cognitive indices require multiple forms of measurement, such that multimethod triangulation occurs (ie, robust assessment of a construct by means of self-report and observational methods; Brewer & Crano, 2014). Further, the stronger the influence made by a motivational tool on an individual’s sub-conscious processing and evaluative associations (ie, an individual’s attitudes), the more difficult it is for the individual to overcome this influence at a conscious level (Bargh *et al.*, 2012; Kakoschke *et al.*, 2017). Thus, attitudes are discussed in the following section, in addition to a distinction between implicit and explicit attitudes.

3.3. ATTITUDES

Allport (1935:798) described an attitude as “the most distinctive and indispensable concept”, giving rise to a myriad of debates and definitions among researchers and academics alike (Fazio *et al.*, 1986; Greenwald & Banaji, 1995). First described as a “complex affair” (to define) by Thurstone (1928:531), the broad definition of attitudes referring to the general evaluations of objects or people (Petty & Cacioppo, 1979), is a commonly adopted conceptualisation of the term (Brewer, 2003; Gawronski, 2007; Greenwald & Banaji, 2017). The attitudes held by individuals are powerful because they allow for the association of a product with an emotion, perception, or series of thoughts, which is captured in an individual’s memory (Wänke *et al.*, 2002; Friese, Wänke & Plessner, 2006; Friese & Hofmann, 2009). Thus, attitudes are of importance in consumer behaviour, as they are capable of shaping consumers’ dispositions toward environmental and social objects (Albarracín *et al.*, 2008). Individuals’ attitudes comprise three correlated components, namely, cognition, affect and behaviour (Brewer, 2003). *Cognition* refers to the thought processes and processing of individuals, *affect* to the feelings or emotions experienced, and *behaviour* to the social and environmental interaction of individuals (Breckler, 1984). For example, the cognitive component refers to personal beliefs and thoughts regarding an object; the effective component represents one’s feelings toward an object; and the behavioural component refers to one’s actions in relation to the object (Brewer, 2003).

To this end, favourable or unfavourable attitudes toward an object are deemed to have some predictive value as to how one is likely to behave (Likert, 1932). Thus, attitudes reflect one’s disposition towards an object, such that these dispositions may be used to infer the likelihood of that individual exhibiting favourable or unfavourable behaviour toward the object of interest (Fishbein & Ajzen, 1975; Eagly & Chaiken, 1993). As such, attitudes play an important role in the decision-making of consumers with respect to their health and general wellbeing, from spurning disagreements concerning prejudicial behaviour to provoking decisions regarding brand preference, attitudes are at the centre of many potentially consequential outcomes (Petty, Wegener & Fabrigar, 1997; Petty & Wegener, 1998). Attitudes cannot be measured reliably through observation, in isolation or otherwise (Charlesworth & Banaji, 2019; Jost, 2019; De Houwer *et al.*, 2020). However, the (un)favourability towards an attitude object can be inferred through evaluating one’s response toward such an object (see Greenwald, 1968; Fishbein & Ajzen, 1974; Eagly & Chaiken, 1993). As mentioned, consumers may evaluate an object as ‘good/bad’, thereby predisposing their choice, even though it may be difficult to measure this evaluative judgement (Freeland-Graves & Nitzke, 2002; Balconi *et al.*, 2017). In other words, an attitudinal disposition is a construct (ie, it is hypothetical) and thus cannot be subjected to traditional methods of quantification (Ajzen & Cote, 2008). Accordingly, attitudes have both judgement and memory components in cognition. The judgement aspect involves conscious reasoning and deliberation regarding the attitude object, whereas the memory component refers to

the presence of the attitude and its association in memory (Eagly & Chaiken, 2005; Albarracín *et al.*, 2008).

Notwithstanding the conceptualisation of attitudes and their importance in research (Schwarz, 2008), debates surrounding the construct waned towards the start of the new millennium (Eagly & Chaiken, 2005; Greenwald & Banaji, 2017). However, as Gawronski (2007) points out, a new class of attitudinal measurement tools has been developed. Specifically, sequential priming (Neely, 1977) and response interference tasks (Kornblum *et al.*, 1990) have been used as the basis for attitudinal measurement in 21st century experimental paradigms (Greenwald & Banaji, 2017; Kurdi *et al.*, 2019). Dubbed the 'Implicit Revolution' by Greenwald and Banaji (2017), these methodological developments are now discussed.

3.3.1. The Implicit-Explicit Distinction

Psychological research recognises the existence of attitudes in two different forms, manifest as either explicit or implicit; the difference between the two lies in how such attitudes interact with other attitudes in one's behaviour (Cacioppo, Petty, Kao & Rodriguez, 1986; Fazio, 1995; Greenwald, McGhee & Schwartz, 1998). Consequently, implicit cognition broadly refers to information or knowledge which is accessed from memory (ie, from prior experience) and which influences decision-making and behaviour without one being consciously aware of this influence (Vargas, 2008; Gawronski & De Houwer, 2014). Earlier, the role of memory in learning processes was discussed, where behaviour is shaped by repeat experiences (Mantonakis *et al.*, 2008), product purchase decisions (Belboula & Ackermann, 2021), or through other behaviours, such as learning to drive a car (Wyer, 2017). Implicit memory, first conceptualised by Graf and Schacter (1985) in their study of repetition-priming effects, is revealed when decisions are made without the conscious recollection of influencing information. Conversely, explicit memory was described as task performance influenced by information that is consciously retrieved from memory (Graf & Schacter, 1985; see also Greenwald & Banaji, 2017).

Whereas implicit attitudes are elicited from one's memory and reinforced or altered through one's evaluated association between concepts (Carruthers, 2018; De Houwer *et al.*, 2020), explicit attitudes are formed through reasoning and can be conceptualised as self-reported evaluative judgments (Gawronski & Bodenhausen, 2011, 2014b). Over 90% of information that humans are exposed to is processed subconsciously in the brain (Zurawicki, 2010). To this end, one's explicit (spoken or verbally reported) attitudes may not reflect accurately their implicit (verbally unreported) attitudes towards an object (Peters & Gawronski, 2011; De Houwer *et al.*, 2020). Once identified, implicit attitudes can be useful in predicting an individual's behaviour (see Brunel, Tietje & Greenwald, 2004; Hollands *et al.*, 2011; Asbridge *et al.*, 2021). For example, simply asking a consumer about their attitude might appear a straightforward solution to evaluate these characteristics, though social desirability

bias concerns (ie, responding in a way that conforms to social norms) may inhibit an individual from responding with an accurate and truthful answer (Gawronski & De Houwer, 2014). Thus, understanding how implicit and explicit attitudes can affect consumer behaviour is of importance to researchers (Hofmann & Schmitt, 2008; Greenwald *et al.*, 2020), and thus within the context of this study. Implicit processes operate largely subliminally (ie, at the sub-conscious or non-conscious level) and are deemed as fast, automatic responses to stimuli, without any awareness of the process itself by an individual (St. Quinton & Brunton, 2017; Kurdi *et al.*, 2019). Conversely, explicit measurements are of limited value in isolation with respect to constructs seeking to evaluate introspectively inaccessible or non-conscious information (De Houwer & Moors, 2010; Gawronski & De Houwer, 2014).

Consequently, when an individual is exposed to a form of motivation, for example, an anti-sugar PHC warning against the health risks associated with the consumption of SSBs, the transfer of this motivation into action (for example, ceasing their consumption of SSBs) depends on the individual's self-regulatory abilities: the ability to ignore persuasive stimuli and ward off compelling stimuli within the environmental and social contexts (Mozaffarian, 2016; Yom-Tov *et al.*, 2018). Given these social and environmental cues (Cosme, Ludwig & Berkman, 2019), self-control (ie, self-regulation) is an important concept to consider in understanding consumer behaviour, particularly within the context of obesity (Spiteri-Cornish, 2017). Despite evidence that explicit attitudes correlate with targeted behaviours, there exists a gap in the knowledge between what an individual intends to do, as measured explicitly, and what their actual behaviour is (Greenwald & Banaji, 2017; Kurdi *et al.*, 2019). Both behavioural intent and actual behaviour are concerned more with self-regulation and self-report (ie, which are often subject to social desirability bias) than with unconscious, implicit processes and responses (Balconi *et al.*, 2017; Dimofte, 2017; Greenwald & Banaji, 2017).

To this end, Greenwald and Banaji (2017) distinguish between implicit and explicit measures of attitude by way of an exemplar task (theoretically completed over the course of two consecutive days). Day 1 entails the repeated presentation of one of two words to subjects (for example, *BRAWN* or *MODAL*). Day 2 requires that subjects complete five-letter word terms (for example, *BR*_ _ _), and when asked if they recognised the previously presented terms (for example, 'was *MODAL* one of the words presented to you yesterday?'), to answer *yes* or *no*. As the authors explain, an implicit memory effect is observed if the rate of successful *BRAWN* word-completion tasks is higher for those subjects to whom the term was presented on Day 1, while an explicit memory effect is apparent if the rate of correct recognitions of *MODAL* having been presented is higher for those who indeed were presented the term, that is, they respond *yes* in cases when they did see the word. Thus, information recall (ie, learning effects) may occur via conscious, deliberate processing and by subtle, unconscious acquisition methods (Albarracín *et al.*, 2008).

Greenwald and Banaji (2017) posit that despite implicit and explicit attitudes having the same indirect and direct nature as their memory namesakes, these types of measurements do not necessarily imply that either represent distinctly unconscious or conscious processes. Instead, the two measures of attitude may be seen as distinct in their nature, though can interact with one another (cf. Albarracín *et al.*, 2008). As such, Gawronski and Bodenhausen (2006, 2011) make the distinction between associative and propositional processes to understand implicit and explicit attitudes; their associative-propositional evaluation (APE) model is thus discussed in the next section.

3.3.2. Associative-Propositional Evaluation Model

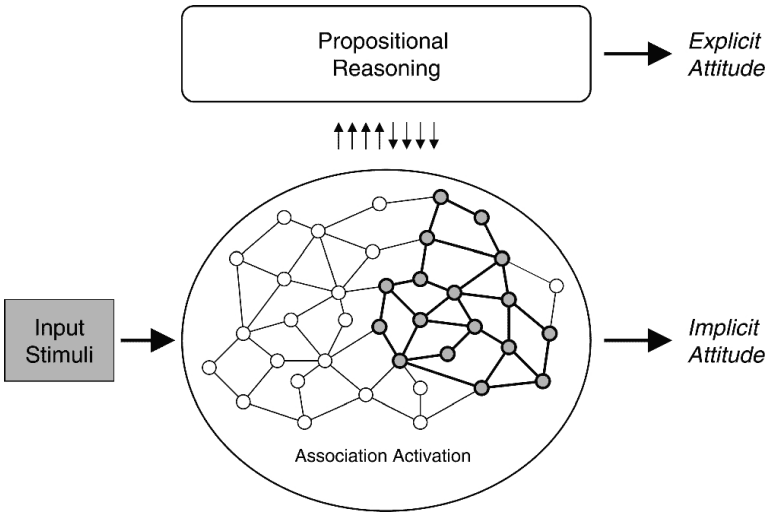
While implicit and explicit attitudes can be distinguished according to their measurement technique (Greenwald *et al.*, 1998; Nosek, Greenwald & Banaji, 2005), or simply conceptualised as related constructs, reflected by distinct levels of processing (Fazio *et al.*, 1986; Fazio & Olson, 2003), a third perspective conceptualises implicit and explicit attitudes as distinct but interactive with each other (Gawronski & Bodenhausen, 2006; Petty & Briñol, 2006; Gawronski & Bodenhausen, 2018). This third perspective was designed to overcome the predictive power of preceding models of implicit and explicit attitudes on behavioural outcomes (Rydell & McConnell, 2010; Gawronski & De Houwer, 2014) and is represented by the APE model, theorised by Gawronski and Bodenhausen (2006, 2011). Together, these distinct manifestations of attitude are deemed to guide behaviour (Prestwich *et al.*, 2015; Prestwich *et al.*, 2018).

Gawronski and Bodenhausen (2006) suggest that implicit and explicit attitudes are to be understood in terms of their underlying mental processes: associative and propositional processes. Associative processes are deemed to determine the content of one's memory that is activated in response to a stimulus, and largely influenced by the concepts of feature matching (ie, familiarity of a stimulus or concept). Conversely, propositional processes are defined as the validation of information, which is implied by these activated evaluations (Gawronski & Bodenhausen, 2011; De Houwer *et al.*, 2020). In other words, when associations in memory are activated, they are described as associative processes; when this activated information is deliberately validated and becomes present in one's realm of conscious awareness, such processes can be described as propositional in their nature (Gawronski & Bodenhausen, 2018; De Houwer *et al.*, 2020).

A further difference between the two processes underlying each manifestation of attitude is that, in the presence of counter-attitudinal information (for example, negatively valenced attitude-object evaluations), propositional processes (ie, explicit attitudes) are not as rigid as are associative processes (ie, implicit attitudes; Deutsch & Strack, 2006; Gawronski & De Houwer, 2014). To this end, selective information exposure (ie, one's disregard for relevant information in the presence of a self-reported

and automatic/implicit attitude inconsistency) is deemed to be overcome in decision-making processes that are highly deliberate. Gawronski and De Houwer (2014) further posit that the extent to which a choice is deliberate has implications for the usefulness of implicit measures insofar as predicting such decisions (cf. Gawronski & Bodenhausen, 2014b; De Houwer *et al.*, 2020). While associative processes are deemed to be driven by similarity, propositional processes are guided by consistencies in logical thinking (Sheeran *et al.*, 2013; Prestwich *et al.*, 2015). Propositional processes are therefore subject to biases (Ito, 2010; De Houwer *et al.*, 2020). As such, associative and propositional processes have been linked to implicit and explicit measures (Gawronski & Bodenhausen, 2006, 2018). The APE model is presented in Figure 3.1 to visualise the interplay between associative and propositional processes.

Figure 3.1: Schematic of Processes in Attitude Formation



SOURCE: Gawronski and Bodenhausen (2006:697)

To this end, implicit attitudinal measures are deemed to reflect behavioural outcomes based on associative processing, whereas propositional processing-based behavioural outcomes are reflected by explicit attitudinal measures (Gawronski & De Houwer, 2014; Gollwitzer *et al.*, 2017). Thus, the APE model conceptualises changes in implicit and explicit attitudes, and potential correspondence between the two, as the result of multiple cognitive processes (Gawronski & Bodenhausen, 2006; Van Osselaer, 2008). Accordingly, the APE model assumes that mutual interactions between its constituent processes can predict a range of implicit and explicit attitudinal evaluations, such that their responses either converge or diverge (Gawronski & Bodenhausen, 2011, 2014a, 2014b, 2018). While the environmental context of an encounter may influence the activation of certain associations (ie, associative processes), this activation is not purely context-dependent, as these associations need to exist in one's memory, prior to activation (Gawronski & Bodenhausen, 2014a;

Greenwald & Banaji, 2017; Kurdi *et al.*, 2019). Notwithstanding the variability of environmental context, the APE model's predictions concern four core outcomes arising from exposure to and influence from an external factor (Gawronski & Bodenhausen, 2006, 2011; for example, an anti-sugar PHC): (1) explicit, but not implicit attitudinal changes; (2) implicit, but not explicit attitudinal changes; and (3) and (4) changes in both implicit and explicit attitudes, with changes in explicit attitudes mediating changes in implicit attitudes, and vice versa (Gawronski & Bodenhausen, 2006, 2011; McGill *et al.*, 2015). Thus, Table 3.2 below illustrates each of the eight cases that can be observed, according to the APE model.

Table 3.2: Change Patterns of Implicit and Explicit Attitudes

	Implicit change	Explicit change	Mediation
1	Yes	Yes	Explicit changes fully mediated by implicit changes
2	Yes	No	No
3	No	Yes	No
4	Yes	Yes	Implicit changes fully mediated by implicit changes
5	Yes	Yes	No
6	Yes	Yes	Explicit changes partially mediated by implicit changes
7	Yes	Yes	Implicit changes partially mediated by implicit changes
8	Yes	Yes	See cases 6 and 7

SOURCE: Gawronski and Bodenhausen (2006:703)

According to the APE model, each of the eight possible cases of change/s in implicit and explicit attitudes has specific conditions under which their corresponding outcomes may be observed (Gawronski & Bodenhausen, 2006, 2018). In line with the APE model, the influence of an external stimulus on implicit and explicit attitudes may be direct or indirect in nature; a direct influence implies that the external factor caused the change in the attitudinal manifestation, whereas an indirect influence implies that the observed change is due to a full or partial mediation of that manifestation's change by the other manifestation (Gawronski & Bodenhausen, 2011). Moreover, it is possible that both direct and indirect effects are observed; in this case, as is evident in cases 4, 6, 7 and 8 that exposure to the stimulus causes changes in the associative and propositional evaluations of attitude objects, whilst such changes in these evaluations simultaneously influence the other processing type (Gawronski & Bodenhausen, 2006, 2014a).

Considering the APE model and study's aim to evaluate the efficacy of an anti-sugar PHC on implicit and explicit attitudes toward SSBs, the following five hypotheses were formulated:

H_1: Anti-sugar PHCs significantly influence consumers' explicit attitudes toward SSBs.

H_2: Anti-sugar PHCs significantly influence consumers' implicit attitudes toward SSBs.

H_3: Explicit attitudinal change is mediated by implicit attitudinal changes.

H_4: Implicit attitudinal change is mediated by explicit attitudinal changes.

H_5: Anti-sugar PHCs significantly influence consumers' explicit and implicit attitudes toward SSBs.

Thus, H_1 and H_2 sought to assess whether any direct influences of the anti-sugar PHC on explicit and implicit attitudes could be observed. Further, H_3 and H_4 posited that indirect effects of the anti-sugar PHC could be observed, whilst H_5 sought to assess the overall efficacy of this intervention.

Wänke *et al.* (2002) suggest implicit attitudes to be useful in evaluating the efficacy of communications of a persuasive nature, and as a precursor for consumer brand choice, as well as for behaviour. Therefore, this study focuses on both implicit and explicit attitudes to garner a more realistic understanding of consumer behaviour. To do this, a neuromarketing-based approach was used. As such, neuromarketing is outlined in the following section.

3.4. NEUROMARKETING

Consumer neuroscience, or neuromarketing, is emerging as a new, inter-disciplinary field of study (Agarwal & Dutta, 2015). Neuromarketing is deemed to facilitate the formation of deeper understanding and the generation of insights into consumer cognition and behaviour (Hsu, 2017). Moreover, marketers are focused on communicating with consumers in a way that creates brand awareness and interest but have often failed to initiate behaviour in accordance with their respective communications (Agarwal & Dutta, 2015; Falk *et al.*, 2015; Plassmann & Karmarkar, 2015). These failures are due to a mismatch of understanding between the attitudes and eventual behaviour of consumers (Spunt & Lieberman, 2014; Agarwal & Dutta, 2015; Greenwald & Banaji, 2017). Consumer neuroscience comprises the fields of neuroscience, consumer behaviour, marketing, psychology, and economics (Cerf *et al.*, 2017; Hsu, 2017; Anderson, 2020). To develop a deeper understanding of consumer behaviour, neuromarketing aims to assess behavioural outcomes by using neuroscientific tools and methodologies (Plassmann, Yoon, Feinberg & Shiv, 2010; Plassmann & Karmarkar, 2015). To this end, traditional market research methods have been conducted using explicit attitudinal measures, but by using neuromarketing

measures, such as EPTs, electroencephalography (EEG), and galvanic skin response (GSR), research can be conducted to reveal a better sense of reality than can traditional research methods (Falk *et al.*, 2015; Plassmann & Karmarkar, 2015; Cerf *et al.*, 2017) and, as such, better understanding consumer cognition, preferences and behaviour (Hsu, 2017; Cosme *et al.*, 2019; Grayot, 2020).

Evidence suggests that neural or neuroscience-based measures of individual consumers can better predict their behaviour than can self-report measures (Falk *et al.*, 2015); to marketers, the implications of the application of consumer neuroscience to research are thus valuable and could shape models and theories in the future (Agarwal & Dutta, 2015; Cerf *et al.*, 2017; Kiefer, Liegel, Zovko & Wentura, 2017). With reference to Chapter 4, the following section concludes this chapter, with this study's methodology put forth thereafter.

3.5. CONCLUSION

This chapter began with an overview of cognition, where the importance of understanding *why* and *how* consumers make one choice over another and behave in a particular way. The role of memory in better understanding behaviour highlighted the importance of how information is presented and subsequently interpreted and stored by consumers. On this note, the accessibility of information was outlined to elucidate the ways in which consumers draw on experiences in making decisions. Further, the influence of stimuli of a motivational nature was discussed, where the aim of understanding the reasons underpinning consumers' decisions was put forth. In keeping with the focus on consumer behaviour, DPT was introduced and described to explain why certain types of consumer evaluation may differ from one another. As a predictor of behaviour in certain contexts, attitudes were defined, and the distinction was made between implicit and explicit attitudes. To this end, the APE model was delineated, and this study's hypotheses identified. To evaluate these hypotheses, a conclusive, causal, true-experimental design was adopted, which is discussed and described in the forthcoming methodology chapter.

CHAPTER 4: METHODOLOGY

4.1. INTRODUCTION

The focus of this chapter is on the methodology utilised in the present study, by providing the following methodological elements: an overview of research paradigms with a focus on the one most appropriate for this study; the research design and method; the sampling design process; the measurement of key constructs; and the means of data analysis. The present study seeks to examine the effectiveness of an anti-sugar PHC on consumers' implicit and explicit attitudes toward SSBs. To evaluate this efficacy, the role that implicit attitudes play in explicit attitudinal formation and the influence of an anti-sugar PHC on consumers' implicit and explicit attitudes toward SSBs was assessed.

PHCs aim to facilitate health-related behaviour change among consumers (Kite *et al.*, 2018; Stead *et al.*, 2019). Thus, the effectiveness of PHCs is of interest (Mayén *et al.*, 2016; Yousuf *et al.*, 2020). Notwithstanding the lack of application of implicit and explicit attitudinal measurements to research (Gawronski & De Houwer, 2014; De Houwer *et al.*, 2020), the efficacy of PHCs remains of interest to researchers, particularly in the context of SSB consumption (Morley *et al.*, 2018). Assessing the efficacy of the most basic of public health initiatives has taken on a renewed sense of urgency (Anderson, Charles, Olivares & Rees, 2019). Moreover, it is important that new methods are used to better understand how effective PHCs can be designed and implemented (Falk *et al.*, 2015). This chapter attends to the considerations made and steps followed in the execution of the current study, offering justifications for their use. Aguinis, Ramani and Alabduljader (2018) note that methodological transparency is often neglected by researchers, resulting in the preclusion of research replicability. In response to this, this chapter will attend to the methodology in sufficient detail to enable the future replication of this study and the assessment of its subsequent findings.

A research paradigm leads a researcher to be interested in certain constructs of interest and approaches to methodological aspects of their studies (Kivunja & Kuyini, 2017). The understanding and selection of a research paradigm by a researcher are thus of importance. Therefore, the following section discusses the various research paradigms, as well as justifies the appropriateness of the selected paradigm.

4.2. THE RESEARCH PARADIGM

A paradigm is defined by Guba and Lincoln (2005/1981) as one's system of thought characterised by the assumptions made regarding the topic of interest into which research is to be conducted. It refers to the definition of a researcher's worldview, constituting the way in which they shape their views of the world and how they act within the world (Kivunja & Kuyini, 2017). O'Leary (2017, 2021) notes that researchers

require awareness of their worldview and consideration of its implications on their research and approaches. Žukauskas, Vveinhardt and Andriukaitienė (2018) highlight that one's research paradigm will influence one's research strategy, problem statement formation, and data collection and analysis. Several paradigms exist, for example, positivism, pragmatism, and interpretivism (Žukauskas *et al.*, 2018). Traditionally a quantitative approach to conducting research (Gratton & Jones, 2010), the positivist paradigm is considered a way to the truth which is useful for prediction purposes (Malhotra, 2010). This paradigm is the preferred outlook for research when observations are interpreted in terms of 'measurable entities' or 'facts' (Fadhel, 2002), underpinned by an objective approach to research (Žukauskas *et al.*, 2018).

Positivism advocates the application of natural science methods to social studies, through deducing verifiable facts. Additionally, research is conducted in an objective manner by the positivist. Positivism thus encapsulates the proposition that the role of research is theory-testing and evidence-provision for further developmental improvements to knowledge (Bryman *et al.*, 2016). With reference to research methods, the following section attends to detailing the research design and method adopted in the current study.

4.3. RESEARCH DESIGN AND METHOD

A research design outlines the overall strategy used by researchers in addressing the research question at hand (Malhotra, 2010). They are further described as blueprints for collecting, measuring and analysing data, thereby entailing a detailed plan for conducting research (Schindler, 2021). Malhotra (2010) classifies research as either exploratory or conclusive; Schindler (2021) refers to the conclusive research as 'formal' research. The research method refers to the way in which information is obtained from respondents (Schindler, 2021). Research methods provide further indications of the administration techniques used to elicit responses from subjects, and the nature of the responses collected (Malhotra, 2010; Schindler, 2021). To best describe this study's research design and method, this section discusses causal research designs and quantitative methods, which is followed by an outline of the procedures followed. This design and method are described and, where applicable, the advantages and disadvantages, and their appropriateness for this study, are discussed.

4.3.1. <u>Research Design</u>

Exploratory research designs are employed with the objective of uncovering insights and understanding into constructs of interest (Schindler, 2021). Thus, exploratory research is often conducted to develop hypotheses or future research questions (Schindler, 2021), with the information required only loosely defined and the research process unstructured and flexible (Malhotra, 2010). Conducting exploratory research, the findings and results of which are often "tentative", is commonly followed by

conclusive research to verify the insights garnered (Malhotra, 2010:103). Conclusive research designs aim to test specific hypotheses, examine relationships between variables of interest (Malhotra, 2010), and are structured in a formal manner (Schindler, 2021). The hypotheses relevant to this study (see Chapter 3) were developed based on pre-existing literature. The current study sought to statistically analyse these hypotheses. Due to the nature of exploratory research, which has as its primary objective the provision of insights into and understanding of the topic at hand, exploratory research designs do not allow for already-developed, clearly defined hypotheses to be tested quantitatively (see Section 4.3.2; Schindler, 2021). By contrast, conclusive research designs are appropriate in studies where clearly defined hypotheses are attended to, by adopting large and representative samples, formalised processes and a quantitative approach to data analysis (Malhotra, 2010). Thus, a conclusive research design is suitable for studies such as this one, where research can be conducted in a formal and structured manner.

Conclusive research can be characterised as either descriptive or causal in nature (Malhotra, 2010; Schindler, 2021). Descriptive research aims to describe constructs of interest and is conducted to measure the extent to which they are associated with each other, necessarily without testing whether a causal relationship exists between these constructs (Malhotra, 2010). Further, descriptive research serves the objective of describing phenomena associated with a particular population (Schindler, 2021). Causal research is used to obtain evidence of cause-and-effect relationships between variables. If such a relationship exists, causal research is used to understand which variables are the cause of and which are the effect variables of a given phenomenon. Therefore, causal research aims to determine the nature of the relationship between variables (Malhotra, 2010). The essential element of causal studies is to provide evidence of 'causality' (ie, variable *A* causes variable *B* to occur; Malhotra, 2010; Schindler, 2021). While it is possible to infer such cause-and-effect relationships between variables, it is impossible to demonstrate this conclusively (Malhotra, 2010). Despite this, research designs of a causal nature are conducted by manipulating the independent variable (IV) and monitoring any possible changes in the dependent variable (DV). Additionally, controlling for any influence by extraneous variables (ie, any variables other than the treatment variable) on the observed effects allows for valid inferences to be made about the nature of the relationship between the independent and DVs (Malhotra, 2010; Schindler, 2021). In manipulating various IVs, several studies seeking to examine the effect of health-related communication in various contexts have implemented designs of a causal nature (cf. Morley *et al.*, 2018; Murukutla *et al.*, 2020; Van Kleef *et al.*, 2020; Jensen *et al.*, 2021). Similarly, prior studies examining the APE model in various contexts have implemented similar causal designs (cf. Strahan, Spencer & Zanna, 2002; Vianello, Galliani & De Carlo, 2009). Thus, it is appropriate that the present study adopted a causal research design, manipulating the IV (the anti-sugar PHC) to identify any effects on the DVs, consumers' implicit and explicit attitudes toward SSBs.

As is commonplace in causal research (Malhotra, 2010), an experimental design was adopted for this study. An experimental design is defined as a set of procedures detailing: (i) the test units and how they are to be divided into homogenous groups; (ii) what IV is to be manipulated; (iii) what DVs are to be measured; and (iv) the way by which extraneous variables are to be controlled (Malhotra, 2010). It is to be noted that the use of an experimental design may both benefit and disadvantage the research, which are now discussed. The foremost advantage of an experimental design (ie, a research design of a causal nature) is the ability of the researcher to manipulate IVs (Schindler, 2021). This manipulation allows the researcher to infer causal relationships between IVs and DVs, while simultaneously controlling for any extraneous variables (Malhotra, 2010; Schindler, 2021). The use of a control group serves as a 'baseline' upon which the efficacy of the manipulation can be assessed (Schindler, 2021). Additionally, in controlling for any extraneous variables, experimental designs allow the researcher to isolate variables and assess their efficacy over time (Malhotra, 2010; Schindler, 2021). Experimental designs are replicable, such that the procedure is repeated with different groups of subjects (ie, experimental and control groups) and different treatment conditions. This replication allows for inferences into the average effect of the IV, across subjects, treatments, and times, to be made (Schindler, 2021). However, experimental designs are often expensive to implement, with the requirements of at least two groups and multiple measurements significantly adding to the cost of the research (Malhotra, 2010; Schindler, 2021). In addition, experiments are time-consuming, particularly in examining the long-term effects of an IV. Furthermore, experiments may be difficult to administer and the control of the effects of all extraneous variables is not always possible (Malhotra, 2010).

This study used a true-experimental design, which allows researchers to ensure between-groups equivalence. This equivalence is achieved through randomly assigning subjects to treatment conditions (Malhotra, 2010; Schindler, 2021). A traditional pre- and post-test control group design consists of two distinct but homogenous groups of subjects to which subjects are allocated through randomisation. Randomly allocating subjects to experimental and control groups allows researchers to control for extraneous variables (Malhotra, 2010; Schindler, 2021). This control is an essential determinant of a study's internal validity (Sullivan, 2009). Distinct groups are required for comparative purposes; one group is exposed to some form of treatment variable, the other not and thus is used as a control group (Malhotra, 2010). Further, two measurements on each group are administered; one prior to, and one following treatment exposure (Malhotra, 2010; Schindler, 2021).

Morley *et al.* (2018) implemented a pre- and post-test control group design to evaluate the effect of an anti-sugar PHC on consumers' SSB consumption and attitudes toward this consumption. Specifically, they conducted a longitudinal study, whereby Australian consumers were randomly allocated to either experimental or control condition and the effect of the anti-sugar PHC measured by intergroup differences, both for pre- and post-test measurements (Morley *et al.*, 2018). Despite their research

taking place in Australia, their focus on anti-sugar PHCs provides a context for this study by encouraging the use of a pre- and post-test control group design.

Siedner *et al.* (2020) implemented a similar research design to that adopted by Morley *et al.* (2018). Specifically, they used a pre- and post-test comparison group design to evaluate the influence that the implementation period of various social-distancing measures had on infection growth rates within each state in the United States of America, during the Covid-19 pandemic. While these social-distancing measures were the same across the country, some states implemented certain measures later (for example, cancellation of mass gatherings and school closures). Each state was treated as a comparison group and the state-specific growth rates of Covid-19 infections were evaluated relative to when state-wide social-distancing measures were implemented (Siedner *et al.*, 2020). The relevance of their study is its evaluation of the efficacy of various PHC elements in achieving change among consumers, which provides further context for the current study by providing evidence for the use of a pre- and post-test control group design in evaluating the efficacy of PHCs.

Van Kleef *et al.* (2020) evaluated the influence that a healthy school-lunch programme had on children's after-school intake of and attitudes toward healthy foods by adopting a pre- and post-test control group design. In their six-month long study based in the Netherlands, three intervention groups and three control groups were used. Differences in measures between intervention and control groups at the pre-test, halfway (ie, three months after intervention), and post-test stages were used to evaluate the efficacy of the healthy school-lunch programme (Van Kleef *et al.*, 2020). Despite their study being conducted in the Netherlands, their focus on intervention-invoked health-related consumption changes provides a justification for the appropriateness of a pre- and post-test control group research design in the current study.

Additionally, Jensen *et al.* (2021) implemented a longitudinal, pre- and post-test control group design to evaluate the impact of exposure to television-based food advertising on the intake of unhealthy foods (measured in calories). They assigned respondents to one of four distinct groups, categorised by exposure frequency. The control group comprised respondents who were not exposed to any food advertising, while three intervention groups were established to segment respondents into low, medium, and high-frequency exposure brackets. The impact of varying frequencies of television-based food advertising was measured by the change in average daily caloric intake from pre- to post-exposure (Jensen *et al.*, 2021). While their study was conducted within the context of Chile, their approach to evaluating the influence of food advertising on the consumption of unhealthy foods provides further context for this study and thereby provides evidence for the use of a pre- and post-test control group design.

Within the context of South Africa, Murukutla *et al.* (2020) evaluated the "Are You Drinking Yourself Sick?" anti-sugar PHC in South Africa, by adopting a pre- and post-test control group design. This PHC was designed with the aim of building public support for a tax on SSBs in South Africa and was disseminated via multiple platforms, including television, radio, billboards, posters, and print media. Respondents were categorised into either the intervention or the control group, dependent on whether they were aware of the PHC. The effectiveness of this anti-SSB PHC was measured by self-reported campaign believability, relevance, insightfulness, whether it was thought-provoking, knowledge of SSBs and their associated risks, intention to reduce SSB consumption, and support for government action to curb SSB consumption (Murukutla *et al.*, 2020). Their study is relevant to this study, as their focus on the relationship between an anti-sugar PHC and self-reported consumer sentiments regarding SSB consumption and related risks is what the current study aimed to achieve. Based on the above studies and their relevance to this study, a pre- and post-test control group research design was adopted based on research within the context of various countries, but a common focus on evaluating the influence of a PHC on health-related outcomes (see Morley *et al.*, 2018; Murukutla *et al.*, 2020; Siedner *et al.*, 2020; Van Kleef *et al.*, 2020; Jensen *et al.*, 2021).

The pre- and post-test control group design used in this study can be symbolised as shown in Table 4.1. In Table 4.1, 'EG' represents the experimental groups, 'CG' the control groups, 'R' the random assignment of subjects across groups, 'O' the measurement of constructs, while 'X' symbolises the exposure to the treatment (see Malhotra, 2010; Monette, Sullivan, DeJong & Hilton, 2014; Schindler, 2021).

As the current study sought to evaluate two distinct measurements of attitude, it was appropriate that each of these measures was assessed both pre-test and post-test. Given the suggestion of Pokhrel *et al.* (2016) to assess both the implicit and explicit attitudes of subjects to evaluate the efficacy of the treatment and the determination of this effect measured as the difference between the changes from pre-test to post-test in each group (Malhotra, 2010; Schindler, 2021), this measurement adaptation is justified. This study made use of four distinct groups: two experimental and two control groups. The rationale for this adaptation was to ensure that the order of explicit and implicit attitudinal measurements did not result in the occurrence of testing effects. Testing effects, namely main and interactive, often occur because of pre- and post-test measures of the treatment (Malhotra, 2010).

Table 4.1: Pre- and Post-test Control Group Design

Group		Pre-test		Treatment	Post-test	
EG1	R	O_{e1}	O_{i1}	X	O_{e2}	O_{i2}
EG2	R	O_{i3}	O_{e3}	X	O_{i4}	O_{e4}
CG1	R	O_{e5}	O_{i5}		O_{e6}	O_{i6}
CG2	R	O_{i7}	O_{e7}		O_{i7}	O_{e7}

Note. This table describes the research design adopted by this study, where EG = experimental groups 1 and 2, CG = control groups 1 and 2, R = randomised group assignment, O_e = explicit attitude observations, O_i = implicit attitude observation, and X = exposure to the treatment.

Across all four groups, the same measurement instruments were utilised, with the only difference being the exposure or non-exposure to the treatment and the order of measurements. For example, EG1 and CG1 respondents completed the explicit attitudinal measurements before the implicit attitudinal measurements, both pre-test and post-test; the opposite order applied to EG2 and CG2 subjects. A delay of 24-72 hours between the pre- and post-test data collection sessions was observed. The reason for the delay following the treatment is that, although modest interventions can produce immediate effects on implicit attitudinal measurement scores, immediate results are often non-durable changes, and thus a period of 24-72 hours following the treatment is recommended between treatment exposure and post-test measurements (Carter *et al.*, 2020; Gonzalez, 2021). Similar studies that had evaluated the efficacy of PHCs within the contexts of SSBs (see Morley *et al.*, 2018; Murukutla *et al.*, 2020), food consumption (see Van Kleef *et al.*, 2020; Jensen *et al.*, 2021), and Covid-19 preventative outcomes (see Siedner *et al.*, 2020) also used conclusive research designs. Therefore, it is appropriate that this study be conclusive in nature.

The research design is deemed to guide the method employed to obtain data (Malhotra, 2010; Schindler, 2021). In conducting research of a causal nature, the most common method of primary data collection is through conducting experiments (Malhotra, 2010). In line with this study's objectives of examining the hypothesised influence of an anti-sugar PHC on implicit and explicit attitudes toward SSBs, a causal relationship between these variables was evaluated. The hypothesised inter-relationships, across groups and between time periods, between implicit and explicit attitudes (see H_3 and H_4), and the anti-sugar PHC (see H_1, H_2, and H_5) required that a systematic and standardised method for examining these relationships be considered. Specifically, quantitative methods attempt to describe, explain and predict the relationship between variables of interest and are often used to develop and test theories (Khaldi, 2017; Schindler, 2021).

To this end, through the collection of quantitative data, a consistent benchmark is provided to the researcher (Bryman *et al.*, 2016). It is further suggested that, to gather data useful in evaluating causal relationships between variables, quantitative methods of data collection be adopted (Malhotra, 2010; Bryman *et al.*, 2016; Khaldi, 2017; Schindler, 2021). Thus, as this study is causal in nature, it is appropriate that quantitative research be conducted. Therefore, this study is a quantitative study. Considering this, the forthcoming section justifies the use of quantitative methods in this study, though preceded by an outline of each research method available.

4.3.2. Research Method

Research methods refer to an orientation towards research, each of which are associated with various research designs (Bryman *et al.*, 2016; Schindler, 2021). To this end, this section discusses quantitative and qualitative research to better understand each approach to research and which approach was adopted in this study. Qualitative research provides insights and understanding of the topic or problem at hand but is often misused when implemented to garner conclusive findings (Bryman *et al.*, 2016; Schindler, 2021). While qualitative research methods typically comprise the collection and analysis of non-numerical data, such methods allow for the emergence of themes and concepts from the research which limit their ability to accurately describe and predict intervariable relationships (Bryman *et al.*, 2016). By contrast, quantitative methods provide researchers with the means through which to not only prove causality but to explain *why* these cause-and-effect relationships occur (Bryman *et al.*, 2016). Similar research that had assessed the effectiveness of PHCs within an SSB context (cf. Farley *et al.*, 2017; Morley *et al.*, 2018; Murukutla *et al.*, 2020) adopted a quantitative approach to data collection.

Specifically, Farley *et al.* (2017) conducted telephone-based surveys to measure participants' recall of, attitude towards and believability of a PHC and self-reported consumption level of SSBs. Morley *et al.* (2018) similarly conducted telephonic surveys to assess respondents' self-reported consumption level of SSBs, whether they were aware of certain SSB overconsumption health risks, understood the link between SSB consumption and obesity, and the extent to which they agreed or disagreed with certain stereotypes associated with overweight people. Murukutla *et al.* (2020) conducted face-to-face interviews to assess whether respondents could recall the PHC, what they thought the underlying messages of the PHC were, the extent of their agreement/disagreement that the PHC achieved regarding the various outcomes, whether respondents were aware of various SSB-induced health risks, and the extent to which they shared various sentiments regarding SSBs.

Within the context of this study, data were collected through administering explicit (ie, self-reported electronic surveys) and implicit attitudinal measurement instruments (ie, EPTs; see Section 4.5). Specifically, EPTs are deemed to enhance the persuasiveness of motivational messages (Strahan *et al.*, 2002) and can be used to

assess subjects' implicit attitudes toward the product or brand of interest (Kiefer, Sim & Wentura, 2015; Heider, Spruyt & De Houwer, 2017), which are discussed later (see Section 4.5.2). With the approach to this study outlined above, the next primary concern is that of sampling. While employing a true-experimental design allows more control of extraneous variables than do pre-experimental research designs (Khaldi, 2017), the external validity of a study is threatened in cases where a sample of a population is used, as opposed to conducting a census (Malhotra, 2010; Shapiro, 2011). Additionally, a concern regarding the size of the sample's appropriateness given the statistical approach employed warrants consideration, with Wolf, Harrington, Clark and Miller (2013) and Alessandri, Zuffiano and Perinelli (2017) suggesting that a noticeable change or difference is unlikely to be observed without at least 100 respondents. Thus, sampling and details of the procedures and considerations made are discussed in the following section.

4.4. SAMPLING

The reality faced by researchers almost always precludes the exhaustive measurement of an entire population. As such, researchers must select a sample (ie, a subgroup of the population) for participation in a study (Malhotra, 2010; Schindler, 2021). The process of sampling entails the careful selection of research participants in line with the characteristics of the target population of interest (Bryman *et al.*, 2016) to ensure that the conclusions drawn may be generalised to the greater population (Trobia, 2011b; Kabir, 2016). Furthermore, Kalaian and Kasim (2011) note that ensuring generalisability is a key aspect of all successful research. Therefore, before an appropriate sample was selected, the target population was clearly defined. As such, an explanation of the target population and sampling design follows.

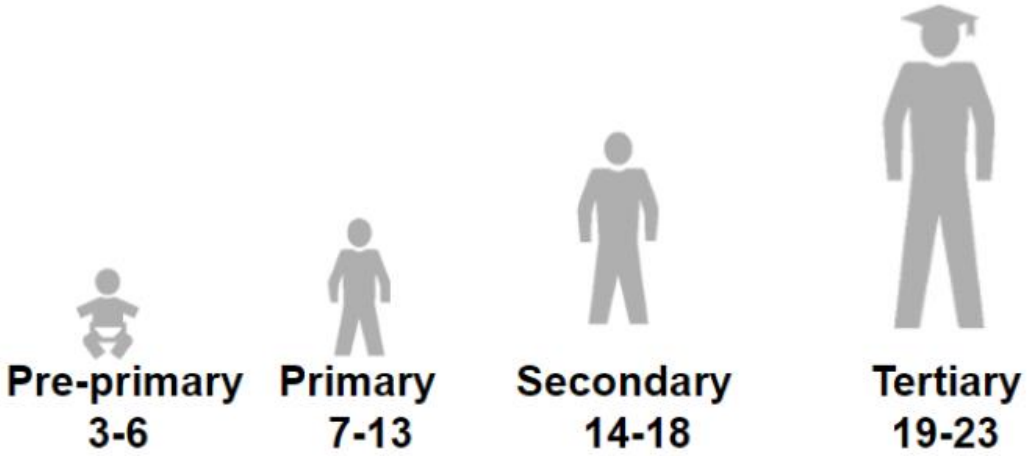
4.4.1. Target Population

A target population is defined as the collection of objects that possess the information related to the topic of interest, with which the researcher can garner insights and understanding (Malhotra, 2010). Similarly, Schindler (2021) defines a target population as the people, events, or records possessing the information sought by the researcher which determines whether a census or sample is to be selected. The target population for this study can be broadly defined as young adults, both male and female, aged between 18 and 24 years old, who reside in South Africa. The unit of analysis is the individual consumer. The rationale for researching young adults pertains to the consumption of SSBs in this market. Shisana *et al.* (2014) indicate that the mean 'sugar score' for consumers aged between 15 and 24 years was the highest of all age groups in 2012. This sugar score refers to an index they created, based on the dietary habits of individuals regarding the consumption of sugar. According to Tugendhaft *et al.* (2016), consumers in South Africa between the ages of 18 and 24 years have the highest consumption of SSBs, with the same group exhibiting the highest recorded increases in SSB consumption from 2012 to 2016. Additionally, the

findings of the All Media Product Survey (2015) suggest that consumers between the ages of 15 and 19 and 20 and 24 had the highest consumption of SSBs in 2015 (South African Audience Research Foundation, 2015). Thus, although these findings may be slightly outdated, the latest available data are sufficient for this study. Figure 4.1 illustrates the official school ages by level of education of persons in South Africa in 2016. Accordingly, the target population detailed above is represented by those persons enrolled at tertiary education institutions in South Africa with respect to their age. As is illustrated in Figure 4.1, the official age of persons enrolled in tertiary education varies from above 18 years (from the upper boundary of those with secondary education) up to 23 years. Thus, tertiary education students were deemed appropriate for participation in this research.

Tertiary education can be defined as specialised learning activities aimed at high levels of complexity (International Standard Classification of Education, 2012). Regarding tertiary education, Pelletier and Laska (2013) found that 38% of their sample of university students in the United States of America consumed beverages on-campus (ie, whilst present on university property) at least 1-2 days per week. It was also suggested that 35.7% of students purchased foods and beverages from the vending machines on-campus with the same frequency. Although 19.8% of students brought their own food and beverages from home five days or more per week (Pelletier & Laska, 2013), the nutritional value of food and beverages available from vending machines on-campus is largely poor (Grech, Hebden, Roy & Allman-Farinelli, 2017). Glock *et al.* (2015) assessed the influence of an anti-alcohol PHC on the implicit and explicit attitudes of a student sample toward alcohol, making use of undergraduate students from the University of Luxembourg.

Figure 4.1: Official School Ages by Level of Education



SOURCE: UNESCO Institute for Statistics (UIS) database, http://data.uis.unesco.org, [13 December 2018].

Considering this study's focus on the consumption of SSBs, the use of a sample similar in nature to those of Pelletier and Laska (2013) and Glock *et al.* (2015) is somewhat justified. Furthermore, Becker, Jostmann, Wiers and Holland (2015) recruited students (ie, young adults) with an average age of 21.18 years, for each of their three studies examining the efficacy of approach-avoidance training on implicit and explicit attitudes towards food products, in addition to behavioural outcomes. Moreover, Genschow *et al.* (2017) recruited a sample of students (ie, young adults) with an average age of 22.80 years, to assess cognitively and effectively driven attitudes toward healthy and unhealthy foods. Sato *et al.* (2016, 2017) recruited young adult participants for their studies, with average ages of 23.30 and 22.90 years, to assess the efficacy of a priming paradigm on implicit and explicit preference ratings toward food products. Thus, in line with these studies, this study sought to collect data from a sample of young adults, specifically, tertiary education students. The selection of this sample is detailed and further justified in the following section.

4.4.2. Sampling Frame

A sampling frame can be defined as a representation of all the elements that form part of the target population (Malhotra, 2010; Kabir, 2016). Additionally, this representation, often a list, is from which the sample is selected (Shapiro, 2011; Schindler, 2021). The compilation of a complete list of elements of a target population is not always possible. In the light of this, an incomplete or incorrect list may lead to sampling frame error, whereby variation exists between the target population defined and the sampling frame used by the researcher (Malhotra, 2010). In response to this, a filter question requiring respondents to indicate whether they were between 18 and 24 years of age was used in the conduct of the research.

The sampling frame comprises class lists of students from the University of Cape Town (UCT). Respondents were selected for participation in this study from said lists of UCT students. Obtaining class lists was subject to approval being granted from the UCT Commerce Faculty Ethics in Research Committee, and approval from the Director of Student Affairs to contact UCT students. Despite the use of student samples being criticised for their external validity (Lamb & Stem, 1980; Liefeld, 2003), researchers have argued that using student samples, which are typically homogenous in demographic nature, help to control error when undertaking the testing of theory (Calder, Phillips & Tybout, 1981; Sasinandini & Hansa, 2010; Becker *et al*., 2015; Genschow *et al*., 2017). The contentious issue of student sample usage in academic research is deemed to have both proponents and opponents. One argument in favour of using student samples relates to the case where a study is examining theories or psychological processes that are autonomous of the characteristics of the sample (ie, the theories and processes being tested are relevant to all humans and their behaviour). Thus, the use of a student sample can result in generalisable findings (Peterson & Merunka, 2014). However, the selection of a sample from only one department or faculty within an education institution is a concerning notion. This

sample selection may result in homogeneity among respondents, which effects the external validity of a study and reduces its generalisability (Liefeld, 2003). In response to preventing a homogenous sample from being used in the current study, the researcher made the research available to students across all faculties and departments of the university (see Becker *et al.*, 2015; Glock *et al.*, 2015). The procedure adopted to select respondents from the sampling frame is now discussed.

4.4.3. Sampling Technique

A sampling technique refers to the method by which a sample of respondents is selected for participation in a study from a target population (Malhotra, 2010; Schindler, 2021). Decisions made in selecting a sample of respondents can affect the generalisability of the results (Onwuegbuzie & Collins, 2007). As such, the validity of the results relies on the representativeness of the sample selected (Malhotra, 2010). Sampling techniques are classed as either probability or non-probability techniques (Onwuegbuzie & Collins, 2007; Malhotra, 2010). In selecting one of these techniques, researchers are required to consider the resources available to them, as well as the validity associated with each approach (Malhotra, 2010).

Probability sampling techniques ensure that each element of a target population has a known and non-zero probability of being included in the research (Onwuegbuzie & Collins, 2007; Malhotra, 2010). This subsequently ensures that the sample is selected randomly and is thus representative of the target population. In adopting a probability sampling approach, the researcher is required to obtain a sampling frame; this is often costly and time-consuming to obtain and implement (Malhotra, 2010). Despite the current study obtaining a sampling frame of students at UCT, this frame excludes other students registered at all other tertiary-education institutions in South Africa. Thus, and in addition to the time and budgetary constraints faced by the researcher, adopting a probability sampling technique was not possible. By contrast, non-probability sampling techniques do not make use of chance selection criteria (Onwuegbuzie & Collins, 2007). Instead, non-probability sampling techniques rely on the researcher's subjective judgment and convenience to select a sample from the target population. Such techniques may yield accurate estimations of the population's characteristics, but are not statistically projectible to the population (Malhotra, 2010). Due to the subjectivity with which a sample is drawn, non-probability techniques allow the opportunity for biases to enter and distort the research findings (Malhotra, 2010; Schindler, 2021). However, considerations can be made to alleviate the threat or effect of biases in using non-probability sampling techniques (these are discussed below) (Malhotra, 2010).

Onwuegbuzie and Collins (2007) indicate that non-probability sampling techniques are prevalent in social-science research, despite the threat to the external validity of a study. Thus, due to the above-mentioned constraints faced by the researcher, as well as the prevalent implementation of non-probability sampling techniques in research

similar in nature to that of this study (cf. Glock *et al.*, 2015; Van Kleef *et al.*, 2020), it was appropriate that a non-probability sampling technique was adopted to select an appropriate sample. Specifically, quota sampling was used, with an age quota deemed appropriate based on prior research in similar contexts (see Van Kleef *et al.*, 2020). Quota sampling is defined as a two-stage sampling technique, whereby a sample is produced that reflects a target population in terms of the relative proportion of the population's characteristic distribution (Bryman *et al.*, 2016). For example, a sample of 10 subjects (4 male, 6 female) reflects the demographic distribution of a target population of 100 subjects (40 male, 60 female). Further, quota sampling is classed as a type of purposive sampling technique by which a sample conforms to certain criteria or control categories (Schindler, 2021). Quota sampling attempts to improve the representativeness of the target population in the sample through the development of quotas (Malhotra, 2010; Schindler, 2021). Specifically, the first stage comprises the development of quotas, control conditions used to replicate the characteristic distribution in the target population, to the sample (Malhotra, 2010). Quotas are developed by determining which control characteristics (other than those immediately under evaluation) are relevant and subsequently determining the distribution of these characteristics in the target population (Marriott & Kendall, 1989; Malhotra, 2010). The second stage is to select a sample from the target population that adheres to the control categories as determined in the first stage. The selection of a sample in accordance with the predetermined control categories is typically based on convenience or judgment (Malhotra, 2010).

While quota sampling is arguably the preferred non-probability sampling technique (cf. Onwuegbuzie & Collins, 2007; Malhotra, 2010; Schindler, 2021), there have been frequent criticisms of its implementation (Bryman *et al.*, 2016). It is argued that despite the conformity of sample selection to control categories, researchers may be influenced by their perceptions or implicit biases (ie, unconscious, subjective judgment or evaluation; Staats, Capatosto, Wright & Contractor, 2015). These influences may affect the subsequent selection of each participant (Bryman *et al.*, 2016). Further, even though quotas enforced on certain characteristics may improve representativeness, it provides no guarantee as to the representativeness pertaining to the characteristics under immediate investigation (Schindler, 2021).

4.4.4. Sample Size

Much the same as the sampling technique, the sample size can affect the external validity of a study (Onwuegbuzie & Collins, 2007). Sample size refers to the number of elements participating in a study (Malhotra, 2010). The considerations made for this research in determining the appropriate sample size were threefold. First, it is a requirement to have a certain minimum number of respondents per treatment condition for implicit attitudinal responses or scores to be both valid and reliable (Brunel *et al.*, 2004). Second, the sample size needed to be appropriate for the application of the adopted primary inferential statistical technique, namely, structural

equation modelling (SEM) (see Wolf *et al.*, 2013; Alessandri *et al.*, 2017). Finally, due to the nature of the pre- and post-test control group design adopted by this study, and as noted by Bryman *et al.* (2016), sample mortality warrants further consideration by the researcher. Regarding the appropriate sample size for conducting research measuring implicit attitudes (ie, associations), for the scores to be valid and reliable, a large sample of respondents is suggested (Jost, 2019). Specifically, a minimum of 100 respondents in each of the experimental and control group is suggested (Brunel *et al.*, 2004). Moreover, Sawyer and Gampa (2018) note that large samples may highlight changes in implicit attitudes on a group- or even societal-level. Wolf *et al.* (2013) determined the appropriate sample size for SEM studies to be between approximately 150 and 250 respondents per treatment condition. They further suggest that large samples may improve the precision and enhance the power with which a model is fitted. However, the number of indicators used may affect the precision and power of the model itself (Wolf *et al.*, 2013; Sawyer & Gampa, 2018). Indicators refer to the observed (ie, measured) variables that are used to estimate unobserved (ie, latent) constructs (Malhotra, 2010).

Sample mortality is defined as the loss of test units during an experiment (Malhotra, 2010). The research design specified a 24–72-hour delay between pre- and post-test measurements (see Section 4.3), meaning that respondents' responses may have been incomplete. Therefore, the sample size was increased to meet the targeted sample size (Malhotra, 2010; Schindler, 2021). Considering this and the time and budgetary constraints faced, this study pursued a sample size of N=400. This conformed to the sample size suggested by Malhotra (2010), who notes that sample sizes should range between 300≤N≤500 for causal studies. As the sample size considerations have been discussed, the following section addresses the measurement of this study's key constructs.

4.5. MEASUREMENT

Measurement involves assigning (non)numeric values to characteristics of constructs, based on predetermined rules (Malhotra, 2010). As the current study was conducted under the framework of the APE model (Gawronski & Bodenhausen, 2006), explicit and implicit attitudes were measured (for details, see Chapter 3). Gawronski and Bodenhausen (2006:715) note that in equating propositional processes with self-report evaluations, and associative processes with performance on "indirect" measures, warrants further methodological consideration. These considerations are discussed later but are preceded by an outline of the explicit attitudinal measurements.

4.5.1. Explicit Attitudinal Measurement

This section explains how consumers' explicit attitudes toward SSBs were measured. First, the measurement instrument is described; second, the design considerations

are addressed; third, the questionnaire layout is explained; and finally, the scales adopted are discussed.

4.5.1.1. Measurement Instrument

This study made use of Qualtrics (see Qualtrics.com), an online-based survey platform. Surveys are described as structured questionnaires, designed to elicit information pertinent to the phenomenon of interest (Malhotra, 2010; Ballou, 2011). Electronic self-report surveys were used, akin to those used previously (cf. Gibson, 2008; Glock *et al.*, 2015; Sawyer & Gampa, 2018). Prior to explaining the measurement procedure, the advantages and disadvantages of electronic surveys are discussed.

- **What are the advantages of electronic surveys?**

Electronic surveys offer researchers a low-cost method of data collection (Kumar, Leone, Aaker & Day, 2019). Trobia (2011a) highlights the benefit of accommodating skip logic (for example, refusal to consent to participate results in being redirected to the end of the survey). Preventative data-entry fields, which limit each response to one or more options, can preserve the quality of data (Holyk, 2011; Sylvia & Terhaar, 2018) and hosting the survey online renders the data management and processing easy, offering the opportunity to sample consumers who may otherwise be unavailable (for example, domestic/international limitations; Malhotra, 2010; Bryman *et al.*, 2016; Schindler, 2021). Notwithstanding these advantages, the disadvantages of electronic surveys warranted consideration.

- **What are the disadvantages of electronic surveys?**

Electronic surveys present the following limitations to scholars. First, the rate of illiteracy in developing countries is a threat to the quality of data collected electronically as opposed to in-depth personal interviews (Basson, 2011). Second, a sample may have limited or no internet access, which effects response rates (Bryman *et al.*, 2016). Finally, clarifying any instructions for respondents is not possible unless the researcher is present during data collection (Lambries, 2011).

Given that the sample had access to the internet on UCT's campus (see Section 4.4), it was presumed that they were literate and could access the electronic survey. To account for researcher absence concerns, practice tasks were employed, and detailed instructions provided throughout the procedure.

With the advantages and disadvantages addressed, the next section discusses how the electronic surveys were conducted.

- **Conducting electronic surveys**

Respondents' explicit attitudes were measured once randomly assigned to the experimental or control condition. This was facilitated by a Qualtrics feature (see Qualtrics.com), to ensure that each group were assigned an equivalent number of respondents. Random assignment addresses selection bias: an extraneous variable, which occurs when participants are improperly or subjectively assigned to groups (Malhotra, 2010; Bryman *et al.*, 2016).

Questionnaires should be appropriately designed to ensure data quality and integrity (Holyk, 2011; Bryman *et al.*, 2016). These design considerations are now discussed.

4.5.1.2. Questionnaire Design Considerations

Questionnaire design processes aim to reduce measurement error (Holyk, 2011), which Bound, Brown and Mathiowetz (2001) define as the variance of the observed scores from true scores caused by improper questionnaire design. Bland and Altman (1996) indicate that repeated measure scores vary due to inherent errors in measurement instruments. Therefore, the following considerations were made in designing the questionnaire. Holyk (2011) recommends that a professional affiliation is indicated in a questionnaire, encouraging subjects to take their participation seriously. Therefore, the UCT logo was placed in the top left-hand corner of the survey, with the researcher's faculty indicated alongside. This was done for two reasons: (1) to acknowledge the association of the research with UCT and (2) to establish researcher credibility. The preamble to the survey followed, with the purpose of the study indicated.

In response to the suggestion of Coldwell and Herbst (2004) to conceal the true purpose of the research, and thereby ensure data integrity, the questionnaire indicated that the research concerned the influence of beverage advertisements on attitudes. While this is only in part truthful, this sought to ensure that participants were not biased by the researcher. In response to Holyk's (2011) suggestion to be fully transparent with participants, the introduction to the questionnaire indicated that all responses would be kept fully confidential, informed the respondents of the approximate time required to complete their participation, and made them aware that their participation was voluntary. Bryman *et al.* (2016) highlight the ethical importance of obtaining consent from respondents. They indicate that consent should be explicitly requested prior to any data being collected, whilst allowing respondents to terminate their participation at will. Therefore, respondents were told that they could withdraw from the study at any time and their explicit consent to participate was requested. This consent required participants to select either "I consent, begin the study", or "I do not consent". Contact details of the researcher were included, in case respondents had any queries or concerns, as suggested by Bryman *et al.* (2016). Bryman *et al.* (2016) recommend that respondents be guided through the questionnaire, to ensure data

quality. Therefore, the introduction indicated that two tasks were to be completed (ie, pre-test) and repeated 48 hours thereafter (ie, post-test; see Section 4.3). Filter questions are used to ensure that respondents conform to the target population's characteristics (Malhotra, 2010; Bryman *et al.*, 2016; Schindler, 2021). Therefore, two filter questions were included to ensure that the sample was representative of the target population (see Section 4.4). First, participants were requested to confirm that they were between 18 and 24 years old. Second, participants were requested to indicate whether they were students registered at UCT. As is commonplace in electronic surveys (see Sylvia & Terhaar, 2018), respondents were redirected to the end of the questionnaire if their responses indicated that they did not conform to the target population's characteristics. Holyk (2011) suggests that the layout of a questionnaire be logical, intuitive and should aim to reduce the cognitive burden of respondents in participating. Thus, the layout of the questionnaire is now discussed.

4.5.1.3. Questionnaire Layout

Effectively designed questionnaires share the characteristics of conciseness, clarity and simplicity (Holyk, 2011); this section outlines how this could be achieved.

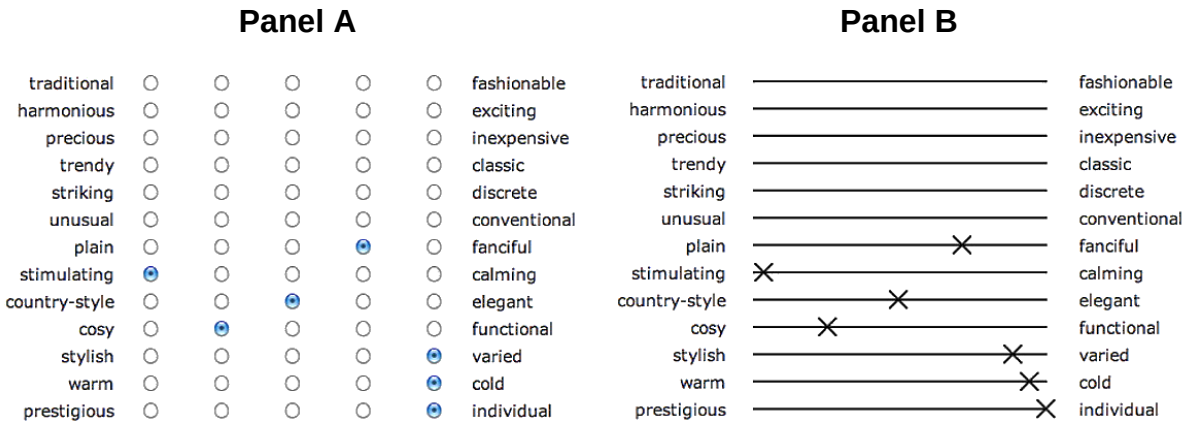
The questionnaire comprised 45 questions (see Appendix A). In assessing the efficacy of an anti-alcohol PHC, Glock *et al.* (2015) used practice questions to ensure participants understood how to respond. Therefore, a practice item was included in the questionnaire. In addition to the filter and practice questions, 42 further questions were used to measure respondents' explicit attitudes toward SSBs. These 42 questions were separated into 14 sets of three questions, assessing 14 beverages on three distinct explicit attitudinal evaluations. In response to the suggestion made by Holyk (2011) regarding questionnaire layout, each of these 14 sets of questions was presented separately, to maintain a logical and simple flow within the questionnaire. These scales and the selection of the relevant beverages included in the questionnaire are discussed in the following section.

4.5.1.4. Measurement Scales

A scale is the by-product of the scaling process: the generation of a continuum upon which items are located (Malhotra, 2010). In scaling procedures, techniques are classified either as comparative or non-comparative (Malhotra, 2010; Schindler, 2021). The current study made use of non-comparative scaling techniques, as each object (ie, beverage) was assessed independently. To determine which attitudinal scale best addressed the relationship between attitudes and behaviour, Vargas, Von Hippel and Petty (2004) used a series of semantic differential scale items to assess respondents' explicit attitudes. These scales are typically seven-point rating scales with bipolar labels (Malhotra, 2010). However, it is suggested that, despite the use of semantic differential scales in research, VASes (Hayes & Patterson, 1921) facilitate more precise gradations of ratings (Funke & Reips, 2012; Kuhlmann, Dantlgraber &

Reips, 2017; Sung & Wu, 2018; Lubiano, García-Izquierdo & Gil, 2021). VASes may offer 100 or more potential responses, whereas semantic differential scales are typically limited to five or seven response options. Figure 4.2 illustrates five-point semantic differential scale items (Panel A) and VASes (Panel B).

Figure 4.2: Non-Comparative Rating Scales



SOURCE: Funke and Reips (2012:313)

Discrete rating scales, such as semantic differentials, can lead to systematic upward or downward biases if the true value of a response is located between two options (Kuhlmann *et al.*, 2017; Sung & Wu, 2018). A much higher degree of differentiation between individual scores on VASes are convincing arguments for the use thereof (Funke & Reips, 2012; Kuhlmann *et al.*, 2017; Sung & Wu, 2018). Garcia-Marques and Bártolo-Ribeiro (2020) state that VASes enrich the data's quality and can therefore accommodate more robust types of data analyses. Therefore, the present study made use of VASes to evaluate the explicit attitudes of respondents toward various beverages. As VASes are continuous rating scales (Kuhlmann *et al.*, 2017; Sung & Wu, 2018), which can result in an infinite number of possible responses being measured along an arbitrary number of points (Lubiano *et al.*, 2021), the researcher made use of a scale with scores from 0 to 200 to mirror the measurement intervals used in the EPTs (see Section 4.5.2.).

Chang and Nayga (2010:262) suggest that obesity can be addressed through various policy changes, as well as focusing on the "subjective wellbeing" of individuals. This wellbeing is classified as the mental and physical health of an individual and measured upon a spectrum between healthy and unhealthy (Chang & Nayga, 2010). Flynn and MacLeod (2015) note that positive health behaviours, including dietary habits, are positively associated with one's subjective wellbeing, and Hong and Peltzer (2017) posit that living healthily leads to a positive sense of personal wellbeing. The Personal Wellbeing Index (International Wellbeing Group, 2013) identifies health as a core domain of subjective wellbeing (Cummins, 2018). Taken together, the use of the *healthy-unhealthy* (HU) scale in this study is justified.

Kahneman and Krueger (2006) suggest that researchers evaluate subjective wellbeing by using indicators such as happiness and sadness, while Gibson (2008) used words encompassing happiness and sadness as scale anchors to assess consumers' implicit and explicit attitudes toward SSBs. In addition to its use in similar research and inclusion in the scale developed by Vargas *et al.* (2004), the *happy-sad* (HS) scale was used to measure respondents' explicit attitudes toward SSBs.

Kemp and Kopp (2011) defined emotion regulation consumption as consumption behaviour which influences one's emotions in the short-term. They found this manifested in individuals experiencing contentment or anxiety. They highlight the usefulness of contentment and anxiety measurements in establishing one's proclivity to engage in such consumption behaviour. Gibson (2008) used the words *enjoyable* and *terrifying* as anchors to their scale items to represent an overall level of satisfaction or dissatisfaction in evaluating consumers' attitudes toward beverages. Thus, this study used the *content-anxious* (CA) scale to assess subjects' explicit attitudes toward SSBs.

Nosek *et al.* (2005) highlight the importance of using appropriate exemplars to represent the target category of interest in measurement scales. In evaluating the consumers' implicit attitudes toward beverages, Gibson (2008) selected beverages (for example, Coca-Cola and Pepsi) on the basis of being pervasive among the population, thereby ensuring respondents' familiarity with the beverages. Therefore, the beverages included in this study were selected based on the findings of the All Media and Products Survey (South African Audience Research Foundation, 2015). Regarding these data, the beverages from each of the following categories were included: diet fizzy drinks, energy/stimulant drinks, fizzy drinks (not diet), fruit juice concentrates, mineral/spring water, and sports drinks. This sought to ensure respondents' familiarity with the beverages, owing to their pervasiveness in the population (see Gibson, 2008). Based on the beverage consumption frequencies reported in their research, the following 14 beverages were included in this study's measurement instrument: Coca-Cola, Fanta, Pepsi, Sprite, Red Bull, Appletizer, Liquifruit, still water, full cream milk, Coke Zero, Pepsi Zero, Fanta Zero, Sprite Zero, and Red Bull sugar-free. Each of these beverages were assessed on the HU, HS, and CA attitudinal scales.

With the discussion of the explicit attitudinal measures employed in the current study now concluded, the forthcoming section attends to detail the measures employed in assessing subjects' implicit attitudes toward SSBs.

4.5.2. Implicit Attitudinal Measurement

The following sub-sections detail the way in which the implicit attitudes of subjects toward SSBs were measured. To begin, a description of the measurement instrument is provided, followed by an outline of the measurement design considerations made.

This is followed by the layout of the questionnaire and concludes with a discussion of the scales adopted in the current study.

4.5.2.1. Measurement Instrument

The present study made use of Sentient Prime® Implicit Research Technology (see SentientPrime.com) for the assessment of subjects' implicit attitudes toward SSBs. Sentient Prime® Implicit Research Technology tasks measure the strength of non-conscious associations between stimuli and an emotion (Reid, 2014), through a process known as *priming* (see Fazio & Olson, 2003; Petty, Fazio & Briñol, 2015; Barakji, 2017). Specifically, EPTs are deemed to enhance the persuasiveness of motivational messages (Strahan *et al.*, 2002) and can be used to assess subjects' implicit attitudes toward the product or brand of interest (Fazio & Olson, 2003; Petty *et al.*, 2015; Heider *et al.*, 2017). EPTs entail a series of sorting tasks in which a graphic *prime* (for example, a can of Coca-Cola) is presented on the screen for approximately 500 milliseconds (ie, less than 1 second) (Kiefer *et al.*, 2017). Subjects are told to ignore the image (ie, the prime) that appears prior to the sorting task (Strahan *et al.*, 2002). Following the presentation of each prime, words and graphics representing emotions, such as healthy or unhealthy, happy or sad, and content or anxious appear on-screen. For each trial, two 'bins' are presented on a spectrum. Each bin represents target categories, which are the same as the target items (ie, 'happy' and happy face) (Kiefer *et al.*, 2017). The subjects are then asked to sort the items which appear on the screen into the appropriate bin (Fazio *et al.*, 1986; Herring *et al.*, 2013; Kiefer *et al.*, 2015).

EPTs assess the speed with which respondents complete each trial, which is then analysed against each of the preceding primes (Fazio & Olson, 2003; Kiefer *et al.*, 2015; Petty *et al.*, 2015). EPT scores are computed as a function of the difference in average response time between positive and negative attribute-prime pairings (ie, the difference in response times for Coca-Cola with 'happy' and Coca-Cola with 'sad'; Hollands *et al.*, 2011). Functionally, this represents an individual difference score, such that the relative strength of association between Coca-Cola with 'happy' is greater or less than that between Coca-Cola with 'sad' (Strahan *et al.*, 2002). Furthermore, these scores are indexed, providing a continuum along which scores can be interpreted (Babbie, 2011). Sentient Prime® Implicit Research Technology indexes scores from 0 to 200, where scores approaching 0 represent a negative association and 200 representing a positive association (see SentientPrime.com).

EPTs were used to examine the non-conscious associations between the primes (ie, stimuli) and the associated evaluations among participants (see Fazio & Olson, 2003; Devos, 2008). In context, the primes consisted of the beverages, while the target associative evaluations and categories were previously identified as HU, HS, and CA. EPTs elicit subjects' implicit attitudinal association between the prime and either target/categories (ie, their implicit attitudes) (Fazio & Olson, 2003; Heider *et al.*, 2017;

Kiefer *et al.*, 2017). To further illustrate this task, Appendices B and C depict this study's EPTs. Appendix B depicts one of the primes as used in the current study. Each prime was presented on-screen for approximately 500 milliseconds and respondents were asked to ignore said primes, before completing the exercise as depicted in Appendix C. Appendix C depicts the target items (ie, happy face). Following the presentation of each preceding prime on-screen, respondents are required to correctly sort each of the targets into the appropriate categories (ie, *unhealthy* or *healthy* as in Appendix C). Respondents were to complete the task as fast as possible, as this response latency-based measure is time-sensitive (Heider *et al.*, 2017; Kiefer *et al.*, 2017). As noted by Nosek *et al.* (2005) and Brunel *et al.* (2004), careful considerations are to be made in measuring implicit attitudes, by selecting exemplars which are appropriate and unambiguous. Therefore, the considerations made in EPTs' design is discussed next.

4.5.2.2. Evaluative Priming Task Design Considerations

Greenwald *et al.* (1998) highlight the importance of selecting appropriate pairs of contrasting categories for implicit measures and ensuring a clear distinction. Therefore, EPT design considerations were made to ensure that (1) subjects understood what was required of them and (2) the exemplars were distinct and unambiguous. These considerations are discussed in turn.

First, clear and concise instructions were provided to explain the requirements, in line with the suggestion of Holyk (2011) to maintain clarity and conciseness throughout the procedure. The EPT was administered on desktop computers, though relevant instructions were provided to respondents using other devices (ie, smartphones or tablets; cf. Heider *et al.*, 2017; Kiefer *et al.*, 2017). Second, the researcher ensured that the targets were not misleading or easy to confuse, by including practice tasks to familiarise participants with the 'correct' pairings of targets and categories. The instructions for the practice and test EPT trials are provided in Appendix D for reference.

With the questionnaire and EPTs appropriately designed, the treatment variable to follow the pre-test measures is now discussed.

4.5.3. Treatment Variable

The treatment for this study was adopted based on three independent studies, two which assessed the influence of interventions (ie, PHCs) on consumers' implicit and explicit attitudes (Pokhrel *et al.*, 2016; Morley *et al.*, 2018), with the other study assessing the impact an intervention had on consumers' knowledge of and attitudes toward SSBs. Pokhrel *et al.* (2016) exposed each participant to 20 real-world advertisements for 30 seconds, including six promoting the use of e-cigarettes, following which an implicit attitudinal measuring task and self-report questionnaire

were completed, to examine the influence of such interventions on consumers' explicit and implicit attitudes towards e-cigarette use. Morley *et al.* (2018) examined the effect of a PHC by using video material from the 2012 Australian "LiveLighter" PHC to assess the awareness, knowledge and SSB consumption behaviour of consumers. Murukutla *et al.* (2020) assessed the impact of the "Are You Drinking Yourself Sick?" anti-sugar PHC on consumers' SSB-related knowledge and attitudes within a South African context, despite the focus of their study being different from that of this study, as consumer sentiments regarding SSB consumption were examined in that study, as opposed to the focus of the current study on more granular effects on explicit and implicit attitudes toward SSBs. Therefore, the "Are You Drinking Yourself Sick?" video was used as the treatment variable in this study to assess consumers' implicit and explicit attitudes toward SSBs. The American Marketing Association (2018) said that the use of video content is a prevalent trend in healthcare marketing. Therefore, the employment of a video was appropriate to evaluate intervention efficacy (cf. Murukutla *et al.*, 2020). A visual aid was used to replicate the PHC material employed by Morley *et al.* (2018) and Murukutla *et al.* (2020). A 30-second video uploaded to YouTube by Vital Strategies (2017) was employed as the treatment. This material informs viewers of SSB-consumption risks, to facilitate changes in behaviour (Tedstone, Targett & Allen, 2015).

With the measurement specifications detailed above, the data collection procedure is now addressed.

4.6. DATA COLLECTION

Prior to data collection commencing, permission to proceed with the collection of data from UCT students was sought and obtained from the UCT Commerce Faculty Ethics Committee and the UCT Department of Student Affairs (see Appendices E–H). With the necessary permission secured, the online questionnaire was developed on Qualtrics (see Qualtrics.com; Miller, Guidry, Dahman & Thomson, 2020) and the EPT on Sentient Prime Implicit Research Technology (see SentientPrime.com; Reid, 2014). Per the sampling procedure, all students registered at UCT were emailed an invitation to partake, including a URL link to a Qualtrics-based registration tool applying stringent quota constraints on applicants' age and gender, thereby ensure that the sample's characteristics were representative of the target population. The experiment was held in the UCT Commerce Alumni Labs once permission was granted by the Commerce IT Department. The invitation informed participants of: (i) the research had been approved by both the UCT Commerce Faculty Ethics Committee and UCT Department of Student Affairs; (ii) the study would take a maximum of 40 minutes to complete (20 minutes per session); (iii) full anonymity and confidentiality of responses was assured; (iv) participation in this study was entirely voluntary and that participants could withdraw at any point of the study, for any reason, and without any prejudice; and (v) the prizes, a R250-valued Cavendish Square gift voucher, would be randomly

awarded to eight participants who completed both sessions of the study in full (ie, pre- and post-test; see Morley *et al*., 2018; Murukutla *et al*., 2020).

Prior to the experiment commencing, an automated trigger on Qualtrics was created: 48 hours after pre-test completion, URL links to the post-test were emailed to the addresses provided by respondents (see Carter *et al.*, 2020; Gonzalez, 2021). Respondents were each assigned a unique six-digit identifier, to facilitate correspondence between pre- and post-test responses, as recommended by Malhotra (2010) and Bryman *et al.* (2016), to arrive at a single dataset. The pre-test session comprised the survey and EPTs, concluding with the experimental groups' exposure to the treatment. With the post-test procedures completed, respondents were thanked for their participation in the study. Malhotra (2010) and Bryman *et al.* (2016) highlight the importance of considering the research question and objectives when analysing data. Thus, the procedures followed to analyse the data are now described.

4.7. DATA ANALYSIS

With the study's research question and objectives in mind (see Malhotra, 2010; Bryman *et al.*, 2016), this section outlines the procedures adopted to clean, analyse, and interpret the data collected. To begin, the computational software packages used are identified below. Thereafter, the interpretation of the sample and scales is explained, with the scale validity and item reliability procedures outlined. Tests for data normality are subsequently explained, with the inferential statistical procedures described, to facilitate statistical 'generalisations' (Gayle, 2011).

IBM SPSS Statistics 27 and Ωnyx were used to analyse the data. IBM SPSS offers researchers advanced statistical analyses, by means of hypothesis testing and predictive analytics (see IBM.com). Ωnyx is an open-source SEM software program, capable of extending standard multivariate analyses and building complex models, and is capable of robust model estimations based on either the maximum-likelihood (MLE) or least-squares (LSE) methods (see Von Oertzen, Brandmaier & Tsang, 2015). IBM SPSS was used to generate the descriptive statistics of the data, which is now discussed. Descriptive statistics summarise a set of observed data concisely by describing the composition of nominal variables (Malhotra, 2010). First, the sample's composition was analysed, and the means and standard deviation of the measurement scales were computed. These procedures are discussed in turn.

4.7.1. <u>Sample Descriptive Statistics</u>

Descriptive statistics were computed to assess the sample's appropriateness, given the target population (see Malhotra, 2010; Bryman *et al.*, 2016). Relative frequencies of the gender distribution were computed to achieve this, in line with prior studies (female = 57%; Morley *et al.*, 2018; female = 50%; Murukutla *et al.*, 2020). An age-specific filter question limited responses to those between the ages of 18 and 24 years.

With the sample's descriptive statistics addressed, those of the measurement scales required consideration, which is now discussed.

4.7.2. Scale Descriptive Statistics

Three scales were used to collect attitudinal data: *CA*, *HS*, and *HU*. The average scores and standard deviations were computed for each group at pre- and post-test (see Malhotra, 2010; Bryman *et al.*, 2016), which were later used to address the hypotheses. However, prior to this, Cronbach alpha values were computed to assess scale reliability, and explanatory factor analysis conducted to assess scale validity. These analyses are described in turn.

Cronbach alpha values represent the average of all split-half reliability coefficients (Schindler, 2021), with its sensitivity influenced by the number of items comprising a scale (Malhotra, 2010). De Schryver (2018) suggests that, as implicit measures employ distinct exemplars (for example, Coca-Cola and Pepsi) and across several trials (for example, *CA* and *HS*), scores should be interpreted collectively. That is as indicators of one underlying construct (Nosek & Sriram, 2007). Therefore, scores for each of the scales at pre- and post-test were summated to better reflect and accurately interpret respondents' implicit and explicit attitudinal evaluations of SSBs at each stage (Nosek *et al.*, 2005; Nosek & Sriram, 2007; De Schryver, 2018). Thereafter, a traditional Cronbach alpha value cut-off of 0.6 was adopted, as Malhotra (2010) suggests that such values demonstrate adequate internal consistency.

Exploratory factor analysis was used in this study to assess construct validity, verifying whether related observed variables load onto one factor (Malhotra, 2010). Per the suggestion of Pallant (2020), the principal component method was adopted, with the orthogonal, Varimax approach used, to facilitate item rotation (Malhotra, 2010; Schindler, 2021). Rotation ensures that items are accurately aligned with the relevant factors (ie, constructs; Pallant, 2020).

Malhotra (2010) and Pallant (2020) suggest that normality testing be conducted prior to testing hypotheses. Therefore, the normality tests are described next.

4.7.3. Normality Tests

Normality was tested by examining whether the data distribution was shaped like a bell curve and considered the skewness and kurtosis values (Malhotra, 2010; Pallant, 2020). As the sample size exceeded 50, the Kolmogorov-Smirnov test was employed (George & Mallery, 2020). The skewness (ie, data symmetry about the mean) and kurtosis (ie, peak magnitudes; Leon, 1998) cut-offs of ±2 were considered acceptable (George & Mallery, 2020).

Nosek and Smyth (2007) indicate that the order in which implicit and explicit attitudes are measured may produce testing effects. Therefore, the equality of condition-specific

group scores at pre- and post-test were examined (see Pallant, 2020). To address this, independent samples t-tests and Mann-Whitney U tests were used (Leon, 1998; Pallant, 2020). Condition-specific group scores were pooled (ie, CG1 and CG2; EG1 and EG2) once testing effects had been ruled out. Finally, the pooled scores were assessed for normality (see Flaxman *et al.*, 2020).

In conducting multi-group analyses, measurement invariance (MI) testing should be conducted to substantiate group comparisons (Rocabado, Komperda, Lewis & Barbera, 2020; Steenkamp & Maydeu-Olivares, 2021). As such, MI testing is explained next.

4.7.4. Measurement Invariance Testing

MI evaluates the equivalence of a construct across groups or time, to ensure that a construct measures the same cognition among any treatment group or on any measurement occasion (Rocabado *et al.*, 2020). This is tested within a SEM framework, whereby items making up a construct load on a latent factor (Putnick & Bornstein, 2016). MI testing comprises four main steps: (1) configural, (2) metric, (3) scalar, and (4) residual tests (Widaman & Reiss, 1997), which are discussed in turn.

Configural invariance testing assesses whether the basic organization of items and constructs (ie, latent factors) is supported in all groups, such that the same patterns of factor loadings are observed, and to rule out common-method variance in the data (Steenkamp & Maydeu-Olivares, 2021). To do this, factor loadings of group-specific observed indicators (ie, pre- and post-test explicit and implicit scores) are freely estimated (ie, for explicit and implicit latent factors) and used as a baseline for further testing (Putnick & Bornstein, 2016). This step identifies any similarities in item-factor associations across groups, ensuring that the items are measuring the latent factors in similar way across groups (see Appendix J1; Rocabado *et al.*, 2020). Configural invariance is supported is the model fit indices are acceptable (Putnick & Bornstein, 2016; cf. Hu & Bentler, 1999).

If configural invariance is supported, metric invariance can be assessed to determine whether the contributions of each item to the latent constructs across groups are equivalent (Rocabado *et al.*, 2020). Here, the item-factor loadings are constrained to equality across groups (see Appendix J2; Putnick & Bornstein, 2016). Thereafter, the metric (loading-constrained) model fit is compared to that of the configural (unconstrained) model (Rocabado *et al.*, 2020), where no significant changes in fit indicate that metric invariance is supported (Putnick & Bornstein, 2016). To this end, Chen (2007) suggests that a change of ≤ 0.010 for RMSEA, a change of ≥ -0.005 for Gamma hat, and a change of ≥ -0.010 for McDonald's Non-Centrality Index (Mc) are indicative of non-deteriorating (non-significant) differences between model fit. Thus, these thresholds were used to establish measurement invariance in this study.

If metric invariance is supported, scalar invariance is tested for, to determine whether mean differences in the latent variable capture the mean differences in the items' shared variance (see Appendix J3; Rocabado *et al.*, 2020), to ensure item intercept equality across groups (Putnick & Bornstein, 2016). In addition to constraining the item-factor loadings, the shared variance of all items is constrained to group equality (Steenkamp & Maydeu-Olivares, 2021). Much like the previous step, scalar invariance is supported if no significant deterioration in model fit is observed relative to that of the metric invariance model (Rocabado *et al.*, 2020).

Regarding residual invariance tests, which explore the equivalence of item residuals across groups (Putnick & Bornstein, 2016), it is worth noting that these item residuals do not form part of the latent factors, thereby rendering such invariance as inconsequential to evaluating latent-factor mean differences across groups (Vandenberg & Lance, 2000). Therefore, this step of MI testing is not a prerequisite for comparing group-level differences and MI can be established by conducting the preceding tests (Steenkamp & Maydeu-Olivares, 2021). As such, only configural, metric, and scalar invariance tests were conducted in this study.

Given that the data were found to be reliable, valid, normally distributed, and measurement invariance was supported, inferential statistical analyses addressed the hypotheses. These analyses are discussed in turn.

4.7.5. Inferential Statistical Analyses

Inferential statistical analysis concerns drawing conclusions about a target population from an observed sample (Schindler, 2021), through hypothesis testing (Malhotra, 2010). Given this is a quantitative study, the traditional 5% level of significance was used (cf. George & Mallery, 2020; Pallant, 2020). The procedures followed to test each hypothesis are now explained, beginning with H_1 and H_2.

4.7.5.1. Hypotheses One and Two

Paired sample t-tests were conducted to detect significant intra-group differences in explicit and implicit scores (see George & Mallery, 2020; Pallant, 2020), for H_1 and H_2. Pre- and post-test scores were compared within-groups to detect any changes over time.

4.7.5.2. Hypotheses Three and Four

H_3 examined whether changes in implicit attitudes mediated changes in explicit attitudes and vice versa for H_4. Mediation is evident if the IV effects changes in the mediator (M), which subsequently influences the DV (Cheong, MacKinnon & Khoo, 2003; MacKinnon, Fairchild & Fritz, 2007). However, in traditional mediation models, such as the 'PROCESS' model (see Hayes, 2018) whereby measurements occur on the same occasion, the accuracy of its conclusions about mediation over time is

questionable (MacKinnon, 2008). Further, longitudinal changes (ie, based on two or more measurement occasions) in M and DV are caused by distinct processes: (1) IV influences M's rate of change; and (2) M's rate of change subsequently influences DV's rate of change (Cheong *et al.*, 2003; MacKinnon *et al.*, 2007). Mediation is supported if M accounts for the IV-DV relationship over time (Koo, Leite & Algina, 2016).

Given the two measurement occasions in this study, and the multivariate and multi-group nature of the data, traditional mediation analysis was inappropriate (George & Mallery, 2020; Pallant, 2020). However, Parallel Process Latent Growth Modelling (PP-LGM) estimates the relationships between the IV and respective growth rates of M and DV (Cheong *et al.*, 2003), and accounts for changes in M and DV by considering their respective growth rates (see Cheong *et al.*, 2003; MacKinnon *et al.*, 2007). Therefore, PP-LGM was appropriate to test H_3 and H_4 (cf. Cheong *et al.*, 2003; Koo *et al.*, 2016). The PP-LGM measurement model is illustrated in Appendix K.

PP-LGM estimations provide insight into the nature of the interrelationships between these variables (Baron & Kenny, 1986; Iacobucci, 2012). Specifically, a beta co-efficient and standard error (SE) estimate are computed. Beta represents the slope of the relationship; SE represents the variance of observed values from this slope (Pallant, 2020). Given the lack of a population mean and standard deviation, the ratio between an estimate and its SE can be computed as the critical value (George & Mallery, 2020; Pallant, 2020).

4.7.5.3. Hypotheses Five

H_5 addressed the intervention's efficacy: two waves of data were collected, and multiple groups specified. Without the ability to directly measure attitudes using one scale (Greenwald *et al.*, 1998), multiple indicators of attitudes (ie, multivariate) were measured. This multivariate, time-specific, and multi-group nature therefore required further consideration (see Malhotra, 2010; Schindler, 2021).

Violating the assumptions of the ANOVA-family and regression analysis compromises test outcomes (Alessandri *et al.*, 2017): Type 1 (Tabachnick & Fidell, 2019) and Type 2 error rates hamper the ability to detect true differences (Wilcox, 1998). These complexities meant that regression analysis was inadequate (see Lewis-Beck, Bryman & Futing Liao, 2011).

SEM is used to assess the nature of multivariate relationships, by computing a series of structural equations (Hancock, Kuo & Lawrence, 2001; Lewis-Beck *et al.*, 2011). SEM is typically adopted to assess model validity but can be used to 'find' a model based on multiple waves of multivariate data (see Von Oertzen *et al.*, 2015; Alessandri *et al.*, 2017), and was thus deemed appropriate for this study. According to McArdle (2009), latent curve modelling (LCM) can be used to evaluate an intervention's efficacy, by assessing inter- and intra-individual differences over time (Alessandri *et*

al., 2017). This approach estimates two latent variables simultaneously (McArdle, 2009, 2013) and was therefore adopted in this study, as opposed to using observed variables which may lead to inaccurate estimations (Cole & Preacher, 2014). In context, implicit and explicit attitudes were used as indicators of a latent variable capturing consumers' attitudes, at pre- and post-test.

Alessandri *et al.* (2017) propose the use of Second-Order Multiple-Group LCM (SO-MG-LCM) to evaluate intervention efficacy, by estimating group-specific LCMs. This study specified four groups, yet two conditions, which required two measurement models (cf. Hancock *et al.*, 2001; Alessandri *et al.*, 2017). These models are depicted in Appendix L. SO-MG-LCM provides insight into an intervention's efficacy and establishes whether participants' response to the treatment varied (Muthén & Curran, 1997; Hancock *et al.*, 2001). Put simply, two algebraic equations (ie, lines) are estimated, representing each group's growth trajectory (Muthén & Curran, 1997; McArdle, 2009; Schoemann, Rhemtulla & Little, 2014). However, changes are hypothesised only in the experimental group, in control group designs (Malhotra, 2010; Schindler, 2021). Therefore, a growth factor is estimated only in this group's model to capture changes over time (Hancock *et al.*, 2001; McArdle, 2013; Schoemann *et al.*, 2014), and is expected to be non-zero (Alessandri *et al.*, 2017).

With the data analysis explained, this chapter is concluded below.

4.8. CONCLUSION

The current study has adopted a conclusive, causal, true-experimental design to evaluate the effect of an anti-sugar PHC on consumers' implicit and explicit attitudes toward SSBs. Specifically, a pre-test post-test control group design was implemented. This design was adapted to mitigate the threat of testing effects through the inclusion of two experimental and two control groups. The target population for the current study comprised young male and female adults in South Africa, between the ages of 18 and 24 years.

The present research adopted a non-probability sampling technique, namely, quota sampling to obtain a sample size of 400, that is, 100 respondents in each group. The measurement instruments included a self-report survey and EPTs, with a 30-second video being used as the treatment variable. Data were collected through the Qualtrics and Sentient Prime® web-based online platforms, once distributed to all registered students at UCT. IBM SPSS Statistics 27 and Ωnyx were used to analyse the descriptive and inferential statistics pertaining to the collected data. The forthcoming chapter details the results from conducting the methodology explained above.

CHAPTER 5: RESULTS

5.1. INTRODUCTION

The preceding chapter provided the methodological approach adopted by the study. The research has used a conclusive, causal, true-experimental design to evaluate the influence of an anti-sugar PHC on consumers' implicit and explicit attitudes toward SSBs. Furthermore, the measurement of each key construct was clearly articulated, namely, for the implicit- and explicit-based attitudinal instruments. The target population was subsequently defined and evidence was provided for the application of a multiple group SEM data analysis technique, which, according to Alessandri *et al.* (2017), can provide an accurate and insightful examination of treatment effects.

In this chapter, the results of the descriptive and inferential statistical analyses are reported. The final resultant sample size and its characteristics are discussed to evaluate its suitability with respect to those outlined in the previous chapter. The descriptive statistics, for both the sample and key constructs, are analysed, after which the normality of the data is examined. The chapter closes by reporting the results of the inferential statistical analyses.

5.2. SUMMARY OF RESEARCH QUESTION AND HYPOTHESES

This study sought to evaluate the efficacy of an anti-sugar PHC on consumers' implicit and explicit attitudes toward SSBs. The final conceptual model offered for analysis was introduced in the preceding chapters. Within these chapters, theoretical grounding was provided for each of the hypothesised relationships, including that of the influence of PHCs on implicit and explicit attitudes. Additionally, the interplay between implicit and explicit attitudes toward SSBs was discussed to highlight the relationship between various manifestations of the attitudes held by consumers.

The literature has posited that marketing communications can influence an individual's explicit and implicit attitudes toward consumer goods (see Pokhrel *et al.*, 2016; Morley *et al.*, 2018). Furthermore, explicit attitudinal changes may be the by-product of changes in implicit attitudes, and vice versa, with such outcomes not as a direct result of this factor's influence (Arendt, 2010; Belboula & Ackermann, 2021). Additionally, the mediating influences of explicit attitudes on implicit attitudes, and vice versa, have been demonstrated in prior research (cf. Gawronski & Bodenhausen, 2006, 2014b; Belboula & Ackermann, 2021). To this end, the theoretical framework adopted by this study was the APE model, as theorised by Gawronski and Bodenhausen (2006).

Furthermore, Bryan, Yeager and Hinojosa (2019) posit that by framing unhealthy foods in a negative light, consumers' attitudes toward unhealthy foods can be influenced, leading to improved health and wellbeing (Murukutla *et al.*, 2020). As such, the following research question was developed to examine the influence of a PHC on explicit and implicit attitudes, and the inter-relationships between these variables:

> *Do anti-sugar PHCs influence consumers' explicit and implicit attitudes toward SSBs, and do these attitudinal changes mediate changes in the other attitudinal manifestation?*

In line with this research question, the following hypotheses were developed.

H_1: Anti-sugar PHCs significantly influence consumers' explicit attitudes toward SSBs.

H_2: Anti-sugar PHCs significantly influence consumers' implicit attitudes toward SSBs.

H_3: Explicit attitudinal change is mediated by implicit attitudinal changes.

H_4: Implicit attitudinal change is mediated by explicit attitudinal changes.

H_5: Anti-sugar PHCs significantly influence consumers' explicit and implicit attitudes toward SSBs.

The forthcoming section discusses the nature and characteristics of the final resultant sample.

5.3. SAMPLE SIZE

In addition to approximately half of the participants who signed up for the study, attending both sessions (55%, *n*=122), a considerable proportion of responses across both sessions were partially incomplete (62%, *n*=75). As noted by Malhotra, Miller and Wedeking (2014) and Roberts, Allum and Sturgis (2014), high rates of complete and partial non-response are often due to the time constraints faced by participants, particularly in the case where registering and actual participation occur at different times, or simply owing to participants' desire for incentives (ie, the monetary or other benefit/reward). To this end, Malhotra and Grover (1998) and Olson (2006) posit that low response rates are undesirable and effort should be made to make participation in a study more convenient and less demanding of respondents.

As such and owing to the COVID-19 pandemic and the associated lockdown restrictions in South Africa, another invitation to partake in this study was emailed to all UCT students in early 2020. This second invitation relaxed the requirement of respondents physically attending sessions in the venue. This allowed respondents to participate from remote locations, thereby making their participation somewhat more convenient (Malhotra, 2010; Malhotra *et al.*, 2014). Thus, the final sample size

obtained in this research, which was largely obtained during this second attempted data collection period, is now discussed.

In line with this study's methodological approach and considerations (cf. Wolf *et al.*, 2013; Alessandri *et al.*, 2017), a minimum of 400 respondents overall was sought, with 100 respondents in each of the four treatment groups, as previously outlined. The sample sizes obtained for control group 1 (CG1) was 191 respondents, for control group 2 (CG2) 191 respondents, for the experimental group 1 (EG1) 191 respondents, and for experimental group 2 (EG2) 197 respondents. This resulted in an overall sample size of n=770, which is in keeping with (and indeed exceeds) the requisite sample size as previously highlighted (see Chapter 4). Specifically, considerations were made regarding implicit attitude instrument validity and reliability (n>100; see Brunel *et al.*, 2004; Sawyer & Gampa, 2018; Jost, 2019), and the requirements for adopting an SEM statistical approach (n>150; see Wolf *et al.*, 2013; Alessandri *et al.*, 2017), all of which were achieved in this study.

The sample sizes achieved in similar studies, although exceeding that of this study (n=770), were obtained through the support of various benefactors: Farley *et al.* (2017), supported by the Bristol-Myers Squibb Foundation, Dignity Health, Mountain States Health Alliance, and Wellmont Health System, achieved a sample size of n=1031. Morley *et al.* (2018), supported by the State Government of Victoria, Cancer Council Victoria, and National Heart Foundation of Australia, achieved a sample size of n=1800; and Murukutla *et al.* (2020), supported by a grant from Bloomberg Philanthropies, achieved a sample size of n=1000. As the researcher faced constraints, largely owing to a relative lack of external funding and contributions, the sample size achieved was deemed sufficient to proceed with statistical analyses, in alignment with the guidelines set forth in the literature (see Wolf *et al.*, 2013; Alessandri *et al.*, 2017).

A filter question included in the measurement instrument, which related to age, was used to verify that respondents were indeed between 18 and 24 years old. As pointed out by Sylvia and Terhaar (2018), electronic-based filter questions can be (and were) configured to automatically redirect certain participants to the end of the questionnaire, if their response did not comply with that as desired by the researcher. As such, the ages of all 770 respondents were deemed consistent with that of the defined target population (see Section 4.4.1.). Initial cleaning of the data eliminated any respondents who did not answer all the questions, as incomplete responses are deemed to negatively affect the accuracy and integrity of data (Olson, 2006; Bryman *et al.*, 2016).

Ultimately, due to the abovementioned configurations used within the Qualtrics platform, the final sample (n=770) represented the sample units who responded to all the questions included in the instrument. To this end, the characteristics of each sample unit can provide researchers with useful insights and understanding (Malhotra, 2010; Schindler, 2021) and are therefore addressed in the forthcoming section.

5.4. DESCRIPTIVE STATISTICS

To summarise a dataset, descriptive statistics can provide insight into the composition of the sample (Malhotra, 2010; Bryman *et al.*, 2016). As such, this section presents the sample's characteristics to assess the appropriateness of this sample, given the defined target population. Thereafter, descriptive statistics for each of this study's key constructs are detailed. This section closes with a presentation of the results for the inferential statistical analyses.

5.4.1. Sample Descriptive Statistics

The previous chapter, which described the methodology, defined the target population as young adults, aged between 18 and 24 years old, of any gender, and who reside in South Africa. To assess whether the final sample is reflective of this, the characteristics of the sample are examined below, with a summary of the total number of responses (n) and relative frequencies (%) presented in Table 5.1.

Table 5.1: Sample Descriptive Statistics

GENDER	CG1		CG2		EG1		EG2		TOTAL	
	n	%	n	%	n	%	n	%	N	%
Female	95	49.74	94	49.21	93	48.69	96	48.73	**378**	**49.09**
Male	94	49.21	93	48.69	94	49.21	98	49.75	**379**	**49.22**
Other	1	0.52	2	1.05	1	0.52	1	0.51	**5**	**0.65**
NA	1	0.52	2	1.05	3	1.57	2	1.02	**8**	**1.04**
TOTAL	**191**	**24.81**	**191**	**24.81**	**191**	**24.81**	**197**	**25.58**	**770**	**100**

Note. This table describes the frequencies (*n*) and valid percentages (%) of each groups' gender composition (CG1 = control group 1, CG2 = control group 2, EG1 = experimental group 1, EG2 = experimental group 2).

Regarding the gender composition of the final sample presented above, all four groups exhibited a near-even split of female and male respondents. Specifically, CG1 comprised 49.7% female respondents and 49.2% male respondents. CG2 comprised 49.2% female respondents and 48.7% male respondents. EG1 comprised 48.7% female respondents and 49.2% male respondents, while EG2 comprised 48.7% female respondents and 49.7% male respondents. A total of 0.6% (*n*=5) respondents across the four groups indicated that they identified with a gender other than female or male, with a further 1.0% (*n*=8) of respondents preferring not to disclose their gender.

In terms of the overall gender composition (49.1% female and 49.2% male), the final sample demonstrates a close-to-even female-male composition, which is in keeping with the sample characteristics of previous, similar-natured studies; the sample of Murukutla *et al.* (2020) comprised an equal female-male split (50% each), while Morley *et al.* (2018) sought to collect data from a near-equal gender composition, despite their final sample exhibiting a slight female bias (57.2% female, 42.8% male).

Given the above sample descriptive statistics and the configurations applied to the Qualtrics-based instrument to redirect ineligible respondents to the end of the questions, it was concluded that the final sample is appropriately aligned with the target population and thereby deemed suitable for this research. Having determined the suitability of the final sample within the context of this research, the following section addresses the descriptive statistics for the scales used to assess the study's key constructs.

5.4.2. Scale Descriptive Statistics

This section presents the descriptive statistics pertaining to the key constructs of this study, by highlighting their observed means and standard deviations. Each of the scales measured respondents' explicit and implicit attitudes toward 14 beverage exemplars within the contexts of CA, HS, and HU attitudinal evaluations (see Section 4.5). Given that this study sought to evaluate the efficacy of an anti-sugar PHC, both pre- and post-test measurements were necessary for effect calculations (see Malhotra, 2010; Bryman *et al.*, 2016). These effects are, however, discussed in the forthcoming sections, preceded by a discussion of the measurement scale descriptive statistics presented in Table 5.2.

Table 5.2: Measurement Scale Descriptive Statistics

Construct			CG1		CG2		EG1		EG2	
			μ	σ	μ	σ	μ	σ	μ	σ
Explicit	CA	T1	118.48	25.16	116.82	25.22	116.92	23.49	117.18	22.42
		T2	119.88	27.63	119.89	28.12	84.37	20.69	83.61	22.61
	HS	T1	120.64	25.54	118.63	25.35	119.65	23.79	121.96	21.06
		T2	120.35	25.92	120.08	28.81	88.30	20.53	85.77	22.04
	HU	T1	74.60	30.47	74.60	29.73	72.87	29.55	74.75	28.25
		T2	77.67	30.16	75.54	31.12	51.04	20.28	49.37	20.90
Implicit	CA	T1	103.61	17.96	103.72	18.85	99.91	16.31	103.71	17.04
		T2	103.23	15.06	104.04	16.91	81.06	11.81	79.22	12.84
	HS	T1	103.70	16.01	104.51	17.84	103.22	16.75	104.62	16.44
		T2	104.74	16.39	104.77	17.76	80.73	12.00	79.74	13.27
	HU	T1	97.42	16.53	97.96	17.29	95.36	17.21	95.92	17.17
		T2	96.68	16.19	97.82	17.47	74.34	11.72	75.07	13.28

Note. This table describes the average (μ) and standard deviations (σ) of each groups' scores (CG1 = control group 1, CG2 = control group 2, EG1 = experimental group 1, EG2 = experimental group 2) at the pre-test (T1) and post-test (T2) stages, for the 14 content-anxious (CA), happy-sad (HS), and healthy-unhealthy (HU) scale items. All scale items, across both explicit and implicit measurements, were scored from 0 to 200, where zero indicates a negatively valenced evaluation (ie, anxious, sad, unhealthy) and 200 indicates a positively valenced evaluation (ie, content, happy, healthy).

Given the means and standard deviations of the measurement scales above, the following sub-sections discuss these descriptive statistics for each of the four groups, beginning with the explicit scales.

5.4.2.2. Explicit Scales

As highlighted in previous chapters, an explicit attitude represents one's self-reported evaluative association of a brand, product, person, or group with an attitudinal object, such as an emotion or feeling (cf. Greenwald *et al.*, 1998; Gawronski & Bodenhausen, 2006, 2018). Accordingly, this study sought to measure consumers' explicit attitudes toward SSBs by assessing the self-reported associations between 14 beverages and three attitudinal objects.

The self-reported explicit attitudinal scale consisted of 14 self-report items and was measured on a 200-point visual analogue scale (VAS), with higher scores indicative of respondents self-reporting their evaluative associations as more *content*, *happy*, or *healthy* towards the beverage, and lower scores indicative of respondents self-reporting their evaluative associations as more *anxious*, *sad*, or *unhealthy* towards the beverage. As such, each of these three self-report scale items' means and standard deviations are now discussed, beginning with the CA scale.

The pre-test means for CA in CG1 was 118.48 (σ=25.16); in CG2 the mean was 116.82 (σ=25.22); in EG1 the mean was 116.92 (σ=23.49); and in EG2 the mean was 117.18 (σ=22.42), as presented in Table 5.2. Overall, the mean pre-test explicit CA score was 117.35 (σ=24.05) at the pre-test stage, indicating that, on average, respondents self-reported attitudinal associations of the beverages slightly more with *content* evaluations, than with *anxious* evaluations. Regarding the post-test descriptive statistics for the CA scale, in CG1, the mean was 119.88 (σ=27.63); in CG2 the mean was 119.89 (σ=28.12); in EG1 the mean was 84.37 (σ=20.69); and in EG2 the mean was 83.61 (σ=22.61). The overall post-test explicit CA mean score was 101.79 (σ=30.71).

With respect to the explicit HS scale, the pre-test mean for CG1 was 120.64 (σ=25.54); for CG2 the mean was 118.63 (σ=25.35); for EG1 the mean was 119.65 (σ=23.79), while in EG2 the mean was 121.96 (σ=21.06). The overall pre-test explicit HS mean was 120.23 (σ=23.97), indicating that, on average, respondents self-reported attitudinal associations of the beverages more with *happy* evaluations, as opposed to *sad*. The post-test explicit HS means were as follows: 120.35 (σ=25.92) for CG1, 120.08 (σ=28.81) for CG2, 88.30 (σ=20.53) for EG1, and 85.77 (σ=22.04) for EG2. Overall, the post-test explicit HS mean was 103.49 (σ=29.59), indicating that, on average, respondents were largely neutral regarding their attitudinal associations of the beverages with either *happy* or *sad* evaluations. However, the noticeable difference between the post-test explicit HS means for the control and experimental groups appeared to mirror those for the explicit CA scale, which further warranted an examination of possible treatment effects.

The pre-test explicit HU mean for both CG1 and CG2 was 74.60 (σ_1=30.47; σ_2=29.73); for EG1 the mean was 72.87 (σ=29.55), and for EG2 the mean was 74.75 (σ=28.25). These means indicate that, on average, respondents evaluated their attitudinal associations of the beverages more as *unhealthy* than as *healthy*, despite associating them positively in the CA and HS evaluations. Overall, the pre-test explicit HU mean was 74.21 (σ=29.45), indicating some variance in responses, ranging from ~35 to ~105. Post-test means for the explicit HU scale were as follows: 77.67 (σ=30.16) for CG1, 75.54 (σ=31.12) for CG2, 51.04 (σ=20.28) for EG1, and 49.37 (σ=20.9) for EG2. As was the case for the previous explicit scales, post-test HU means indicated that respondents in either experimental group were influenced by exposure to the treatment. Overall, the post-test explicit HU scale mean was 63.30 (σ=29.20),

demonstrating an average increase (from 74.21 to 63.30) in *unhealthy* beverage evaluative associations.

These findings of a generally favourable (if only slight) (μCA = 109.57; μHS = 111.86; μHU = 68.75) self-reported evaluative associations of the beverages as largely positively valenced, particularly *content* and *happy*, appear to be aligned with prior research examining consumers' evaluative judgement of beverages as moderately positive. The literature suggests that consumers are likely to evaluate SSBs and beverages in general as pleasant, using terms such as *contentment*, *satisfaction*, and *interesting* to describe the emotions and feelings which SSBs evoke (Shimp, Stuart & Engle, 1991; Gibson, 2008).

Furthermore, the explicit HU mean (relative to those for the CA and HS scales) suggests that, although the beverages might be more associated with *content* and *happy* evaluations per self-reported responses, participants are conscious of the fact that the SSBs are *unhealthy*. The rationale for this discrepancy is deemed to be the sub-optimal power of self-reported beverage evaluations to effect behavioural change (Greenwald *et al.*, 1998; Gibson, 2008; Gawronski & Bodenhausen, 2014b). On the note of conscious awareness, the following section attends to discussing the descriptive statistics for the implicit measurement scales.

5.4.2.3. Implicit Scales

Implicit attitudes are deemed to be one's automatic association between an object and an attitudinal evaluation (Greenwald *et al.*, 1998; Maison, Greenwald & Bruin, 2004), which are activated in a manner referred to as *associative processing* (Gawronski & Bodenhausen, 2006; De Houwer *et al.*, 2020). In addition to assessing consumers' explicit attitudes toward SSBs, their implicit attitudes were assessed on the same three scales, though by means of an EPT. Specifically, the EPT produced scores between 0 and 200, computed according to the response latency with which respondents were able to correctly sort target items (for example, a *happy* or *sad* emoji) into the correct categories (for example, the *happy* or *sad* bin). These EPT elements are presented in Appendix C for reference.

The pre-test implicit CA mean for CG1 was 103.61 (σ=17.96); for CG2 the mean was 103.72 (σ=18.85); for EG1 the mean was 99.91 (σ=16.31), while for EG2 the mean was 103.71 (σ=17.04). At the pre-test stage, the overall mean implicit CA score was 102.75 (σ=17.60), indicating that, on average, respondents demonstrated no implicit bias towards associating each beverage more with *content* than of *anxious* automatic evaluations, and vice versa, although it is worth noting the discrepancy between the variance observed in this implicit CA scale (σ=17.60) relative to that observed for the explicit CA scale (σ=24.05).

Post-test implicit CA scale means were as follows: 103.23 (σ=15.06) for CG1, 104.04 (σ=16.91) for CG2, 81.06 (σ=11.81) for EG1, and 79.22 (σ=12.84) for EG2. As was

the case in the explicit CA scale, there was a discrepancy between the control and experimental groups, which is examined later. Overall, the post-test implicit CA mean was 91.79 (σ=18.49), further demonstrating the apparent ambivalence in implicit CA evaluations in relation to those for the explicit CA scale.

The pre-test implicit HS scale mean for CG1 was 103.7 (σ=16.01), for CG2 the mean was 104.51 (σ=17.84), for EG1 the mean was 103.22 (σ=16.75), and for EG2 the mean was 104.62 (σ=16.44). Overall, the mean implicit HS score was 104.01 (σ=16.75), which indicates that respondents were relatively indifferent with respect to their implicit associations of beverages with *content* and *anxious* evaluations.

Post-test implicit HS scale means were as follows: 104.74 (σ=74) for CG1, 104.77 (σ=17.76) for CG2, 80.73 (σ=12.00) for EG1, and 79.74 (σ=13.27) for EG2. The overall implicit HS mean at the post-test stage was 92.40 (σ=19.38), indicating that respondents exhibited a slight bias towards associating the beverages with a *sad* evaluation.

Regarding the pre-test implicit HU scale, the mean for CG1 was 97.42 (σ=16.53), the mean for CG2 was 97.96 (σ=17.29), the mean for EG1 was 95.36 (σ=17.21), while the mean for EG2 was 95.92 (σ=17.17). Overall, pre-test implicit HU scores had a mean of 96.66 (σ=17.05), which is indicative of a general ambivalence in respondents' implicit bias towards associating the beverages with either *healthy* or *unhealthy*. Of interest, the mean implicit HU score appears to be different from that as measured with the explicit HU scale, which is discussed later in this chapter.

Post-test implicit HU scores had the following means: 96.68 (σ=16.19) for CG1, 97.82 (σ=17.47) for CG2, 74.34 (σ=11.72) for EG1, and 75.07 (σ=13.28) for EG2. Overall, the mean post-test implicit HU score was 85.89 (σ=18.61), indicating a weak implicit bias towards associating the beverages with *unhealthy* evaluations, echoing what the findings of the post-test explicit HU scale suggested.

As demonstrated above, while the measurement instruments used to assess explicit and implicit attitudes might differ, it is suggested that the results thereof are often related to one another, provided the measures are reliable and valid (Gawronski & Bodenhausen, 2006; De Houwer *et al.*, 2020). As such, the following sections assess the reliability and validity of this study's scales, which is followed by a discussion regarding the normality of the distribution of data.

5.4.3. Reliability and Validity

The reliability of a scale reflects the degree to which its items consistently produce the same, accurate responses (Schindler, 2021). Within the realm of scale reliability, three primary perspectives exist: stability, equivalence, and internal consistency (Bryman *et al.*, 2016; Schindler, 2021).

While the scale stability (ie, test-retest reliability) and equivalence (ie, parallel forms) of this study's scales were considered, respondents in the experimental groups were expected to be influenced by the treatment variable, resulting in different follow-up responses, with the fieldwork being conducted online and not by multiple researchers, ruling out a valid reflection of the scale stability and equivalence, as noted by Schindler (2021). However, this study did examine the Cronbach alpha values for each scale to assess the internal consistency of the measurements, whilst employing the use of principal component analysis to determine construct validity, as suggested by Malhotra (2010) and Schindler (2021). A discussion of scale reliability is thus presented in the following section.

5.4.3.1. Scale Reliability

Cronbach alpha values, which refer to the mean split-half reliability coefficients, range between zero and one, and are used to assess a scale's internal consistency (Malhotra, 2010; Schindler, 2021). A traditional cut-off Cronbach alpha value of 0.6 was used in this study, as Malhotra (2010) suggests any Cronbach alpha value above this to exhibit internal consistency reliability, whilst considering how many items comprise each scale. Specifically, a high number of items often leads to a higher Cronbach alpha value, while a low number of items commonly leads to lower Cronbach alpha values (Schindler, 2021).

Given the apparent lack of guiding principles regarding implicit measurement reliability computation highlighted by De Schryver (2018), it is argued that, because implicit measures make use of distinct exemplars (for example, Coca-Cola or Pepsi) and employ various blocks or trials (for example, *CA* or *HS*), observed scores should not be interpreted as indicators of separate underlying constructs (Nosek & Sriram, 2007).

Implicit measures assess whether exemplars are more or less difficult to identify correctly as belonging to the positive or negative attributes when each attribute is paired with one of two categories (for example, *happy* or *sad*); however, observed scores reflect an overall implicit bias toward associating certain exemplars more with one category than the other, and therefore are not reflective of any category-attribute-specific implicit bias (Brunel *et al.*, 2004; Nosek *et al.*, 2005, 2007).

In context, implicit scores reflected respondents' implicit bias toward associating beverage exemplars more with favourable (*content*, *happy*, *healthy*) attributes, than with unfavourable (*anxious*, *sad*, *unhealthy*) attributes, or vice versa. Additionally, isolating scores (ie, examining only *CA* scores) does not allow for the construct to be measured accurately (Nosek *et al.*, 2005; Nosek & Sriram, 2007). Instead, these scales are not independent indicators of an implicit attitudinal bias; decomposing and comparing the strengths of implicit biases using separate scales does not wholly reflect the construct of interest (Karpinski & Hilton, 2001; Nosek & Sriram, 2007; Greenwald *et al.*, 2020). Therefore, Nosek and Sriram (2007) and De Schryver (2018) recommend that scores be examined from the perspective of a collection of indicators.

That is, regardless of the categories and attributes used, scores for each exemplar should encompass any instances where that exemplar is evaluated. As such, the implicit CA, HS, and HU scales were combined to form composite implicit attitudinal scores; the same was done for the explicit scales, to produce composite score reflecting respondents' explicit attitudes toward SSBs. Cronbach alpha values were computed for the composite explicit and implicit attitudinal items. These Cronbach alpha values (α) are presented in Table 5.3 below, with the number of items (*n*) indicated.

Table 5.3: Cronbach Alpha Values for Composite Scales

CONSTRUCT		*N*	Cronbach α
Explicit Attitudes	T1	42	0.89
	T2	42	0.94
Implicit Attitudes	T1	42	0.70
	T2	42	0.69

Note. This table describes the Cronbach Alpha values (α) and the number of items (*n*) used to assess this value, for each of the explicit and implicit measurement scales at the pre- and post-test stages (T1 and T2, respectively).

As presented in Table 5.3, the Cronbach alpha values for the explicit attitudinal measure (α = 0.89; α = 0.94) and for the implicit attitude constructs (α = 0.70; α = 0.69) support the notion that multiple indicators are reliable within a collective context, as posited by Nosek and Sriram (2007) and De Schryver (2018). Resultantly, these composite scales were deemed internally consistent, with each Cronbach alpha value exceeding the 0.6 threshold specified by Malhotra (2010).

With scale reliability established, the focus turned to examining whether these measurements were valid; this is now discussed.

5.4.3.2. Construct Validity

Construct validity addresses the extent to which a scale measures an underlying concept, whereby each scale element contributes to evaluating this concept (Malhotra, 2010; Bryman *et al.*, 2016). To this end, validity assesses whether a scale correlates with other measures of the same underlying construct (Malhotra, 2010).

While the validity of explicit and implicit attitudinal measures has been evaluated in previous literature (cf. Nosek & Smyth, 2007; Nosek & Sriram, 2007; Greenwald & Banaji, 2017), the conceptual distinction between the two as either distinct evaluations of one construct or as evaluations of distinct constructs is a contentious issue within the context of implicit social cognition (Fazio & Olson, 2003; Olson & Fazio, 2003;

Gawronski & Bodenhausen, 2011). As such, this study sought to evaluate the validity of each construct through the employment of the principal component method of factor analysis, as suggested by Pallant (2020).

Factor analysis can be used to determine the correlations between scale items (ie, inter-item correlations within the same scale), indicating whether a scale is indeed valid (Malhotra, 2010; Schindler, 2021). Thus, a rotated factor analysis was conducted using Kaiser's criterion, which limits the extraction of factors to those with eigenvalues greater than one (Malhotra, 2010; Schindler, 2021). Furthermore, the orthogonal, Varimax approach was used to rotate items such that they were better aligned with the underlying constructs (Pallant, 2020). To this end, all scale items were included in the analysis to examine the validity for each of the measures, which is now discussed.

The principal component analysis extracted a total of four factors, with a combined explanatory power of 74.48%. Each pre- and post-test measurement of explicit and implicit attitudes loaded onto separate factors. Factor 1 (Eigenvalue = 4.77) explained 20.77% of the variance in the data, loading each of the post-test explicit scale items. Factor 2 (Eigenvalue = 3.03) explained 19.47% of the variance in the data, loading each of the post-test implicit scale items. Factor 3 (Eigenvalue = 2.45) explained 18.95% of the variance in the data, loading each of the pre-test explicit scale items. Factor 4 (Eigenvalue = 1.68) explained 15.30% of the variance in the data, loading each of the pre-test implicit scale items.

The rotated factor loadings for each of the scale items all exceeded 0.6 within their respective factors, which, along with scale reliability having been established, led to the scales being deemed valid. Given that all composite scales demonstrated sufficient internal consistency, reliability and construct validity robust to hypothesis testing, the summation of each variable into its respective construct was justified, which Pallant (2020) recommends be done prior to performing statistical data analyses. Malhotra (2010) and Pallant (2020) further suggest that normality tests be conducted to assess the distribution of data for each of these summated scales, prior to hypothesis testing. As such, the following section presents the results of the normality tests for each scale.

5.4.4. Data Normality

The statistical analyses adopted in this study assume normally distributed data, representing a bell-shaped curve, centred around scores in the middle (ie, 100). Accordingly, normality is tested by examining the hypothesis that the data are indeed normally distributed, with skewness and kurtosis values also considered (Malhotra, 2010; Pallant, 2020).

The Kolmogorov-Smirnov test of normality was used to assess data normality, which is a non-parametric goodness-of-fit analysis, whereby the distribution of a variable's data is compared to one which is normal (Malhotra, 2010). The Kolmogorov-Smirnov

test assesses whether the distributions of sample means differ significantly from that of a normal distribution (George & Mallery, 2020). Skewness refers to how symmetrical the data is distributed about the mean, and kurtosis assesses the magnitude of any peaks in the distribution of data (Leon, 1998; Pallant, 2020). With respect to skewness and kurtosis values, George and Mallery (2020) consider values ranging between -2 and +2 to be acceptable for the assumption of normality. As such, a summary of the Kolmogorov-Smirnov p-values (p), skewness, and kurtosis values for each summated scale by group can be found in Appendix I.

Because skewness and kurtosis values can override the outcome of Kolmogorov-Smirnov hypothesis tests, an examination of these values led to the pre- and post-test explicit attitude observations for EG1 being deemed appropriate (skewness = 0.04 and -0.15; kurtosis = 1.27 and 1.95), while the same applied to the post-test implicit attitude variable for CG1 (skewness = 0.15; kurtosis = 0.24), as skewness and kurtosis values fell between the specified range. Despite this, the post-test explicit attitude variable for EG2 was found to be non-normal, as the kurtosis value of 3.34 fell outside of the specified range [-2; 2]. As such, it could be concluded that all variables were normally distributed, apart from this post-test explicit attitude variable for EG2, which was deemed non-normal.

The inclusion of four groups in the research design (see Section 4.3) sought to address any possible testing effects that could arise by completing the explicit measures prior to the implicit measures, and vice versa (see Nosek & Smyth, 2007). Thus, the equality of scores for CG1 and CG2, EG1 and EG2 at pre- and post-test was assessed to rule out potential testing effects (see Pallant, 2020).

Due to the non-normality of the explicit attitude variable's distribution for EG2 at the post-test stage, a Mann-Whitney U test was conducted (see Pallant, 2020). This test is the non-parametric equivalent of the independent samples t-test and converts scores into ranked-values across two groups to evaluate whether the two groups differ significantly (George & Mallery, 2020). Additionally, parametric independent samples t-tests were conducted to evaluate whether there were any significant differences between the two control and experimental groups, as outlined by George and Mallery (2020) and Pallant (2020). The results of these tests are now discussed.

The independent samples t-test between CG1 and CG2 for the pre-test explicit and implicit scores, and for the post-test explicit and implicit scores resulted in no significant differences being identified at the 5% level of significance, as presented in Table 5.4 below.

Table 5.4: Tests for Control Group Equivalence

CONSTRUCT		CG1 vs. CG2			
		Levene's Test for Equality of Variances		Independent Samples t-test	
		F	p	t Statistic	p
Explicit	T1	0.000	0.990	0.544	0.587
	T2	0.498	0.481	0.325	0.745
Implicit	T1	1.115	0.292	-0.404	0.687
	T2	1.399	0.238	-0.543	0.587

Note. This table describes the results of Levene's test for equality of variances (*F*-statistic and *p*-value) and the independent samples *t*-test (*t*-statistic and *p*-value) in assessing the equivalence between control groups 1 and 2 (CG1 and CG2) regarding the explicit and implicit scale scores at the pre- and post-test stages (T1 and T2).

As all the independent samples *t*-test *p*-values exceeded 0.05, it could be concluded that the order of observations within the control condition did not affect the observed scores for either explicit or implicit attitudinal measurements. Furthermore, this demonstrates that the counterbalancing of explicit and implicit measures across groups was justified (see Nosek & Smyth, 2007), notwithstanding that for the experimental groups, which is now addressed. The results of the independent samples *t*-tests and Mann-Whitney U test between the two experimental groups are presented in Table 5.5.

Table 5.5: Tests for Experimental Group Equivalence

CONSTRUCT	EG1 vs. EG2			
	Levene's Test for Equality of Variances		Independent Samples t-test	
	F	*p*	*t* Statistic	*p*
EXP1	0.459	0.498	-0.734	0.463
IMP1	0.020	0.887	−1.596	0.111
IMP2	2.037	0.154	0.767	0.444
	Mann-Whitney U test			
	Z		P	
EXP2	-0.536		0.592	

Note. This table describes the results of Levene's test for equality of variances (*F*-statistic and *p*-value), independent samples *t*-test (*t*-statistic and *p*-value), and Mann-Whitney U test (Z-statistic and *p*-value) in assessing the equivalence between experimental groups 1 and 2 (EG1 and EG2) regarding the explicit and implicit scale scores at the pre- and post-test stages (T1 and T2).

The same conclusion was drawn regarding the equality of scores between the experimental groups' scores for the pre-test explicit and implicit, and post-test implicit measures, based on the independent samples *t*-test, with all *p*-values exceeding 0.05. The results of the Mann-Whitney U test for the equality of post-test explicit scores produced similar results, revealing no significant differences between the experimental groups' scores at the 5% level of significance. Thus, it was concluded that the order of the measurement in each experimental group resulted in no significant differences in explicit or implicit attitudinal scores. As such, the pre- and post-test scores for the control and experimental groups were pooled to allow for a treatment condition-based group distinction, as is suggested by Flaxman *et al.* (2020).

Prior to presenting the results of this study's hypothesis tests, the normality of data was again examined, as condition-specific data had been pooled. The results of these normality tests are presented in Appendix I. For all distributions other than for the post-test explicit scores in the experimental condition, an examination of the skewness and kurtosis values led to the conclusion that the data were normally distributed, as these values fell within the acceptable range [-2; 2]. However, these post-test explicit scores for the experimental condition were not found to be normally distributed, as the associated kurtosis value was 2.79, outside of the acceptable range. Considering this, a non-parametric approach to hypothesis testing was required (see George & Mallery, 2020; Pallant, 2020). Therefore, with the descriptive statistics now discussed, the following section reports the results of the measurement invariance tests, beginning with configural invariance.

5.4.5. Measurement Invariance

To ensure that this study's constructs measure the same cognition among any treatment group or on any measurement occasion, MI testing was conducted (see Section 4.7.4). This was done in accordance with the accepted index levels and thresholds within SEM frameworks, where Comparative Fit Index (CFI) values close to one are considered strong df-corrected relative model fit, while Tucker–Lewis Fit Index (TLI) values above 0.90 are acceptable, with values exceeding 0.95 indicative of good model fit (Alessandri *et al.*, 2017). Further, Gamma Hat values exceeding 0.95, and Mc values exceeding 0.90 are considered acceptable (Hu & Bentler, 1999). Root Mean Square Error of Approximation (RMSEA) values below 0.08 are deemed acceptable and below 0.05 are indicative of good model fit, whereas Standardised Root Mean Square Residual (SRMR) values below 0.05 indicate good model fit. Finally, Akaike's Information Criterion (AIC) is estimated based on the maximum log-likelihood of each model, whereas the change in AIC (ΔAIC) is calculated as the difference in AIC for that model, relative to the lowest-scoring model's AIC value (ie, the distance between two models; Yaşlioğlu & Yaşlioğlu, 2020).

In line with these thresholds, the configural model showed acceptable fit, with χ^2[0.536(18)], and RMSEA (0.000), Gamma Hat (1.00081), and Mc (1.01142) values all within the acceptable ranges. As such, the combined configural model demonstrated acceptable fit for configural invariance to be established. With configural invariance supported, the metric invariance model was estimated, and its fit indices compared against those of the configural model. Specifically, the thresholds indicative of non-deteriorating differences between models were used (see Section 4.7.4; Chen, 2007). Accordingly, the metric invariance model's RMSEA (0.000; ΔRMSEA ≤ 0.010), Gamma Hat (1.00079; ΔGamma Hat ≥ -0.005), and Mc (1.01371; ΔMc ≥ -0.010) indicated metric invariance, as these differences were non-deteriorating. Thus, with metric invariance established, scalar invariance was tested for. Compared against the metric invariance model, the scalar invariance model's RMSEA (0.000; ΔRMSEA ≤ 0.010), Gamma Hat (1.00076; ΔGamma Hat ≥ -0.005), and Mc (1.01396; ΔMc ≥ -0.010) indicated scalar invariance, with these differences all found to be non-significant. Thus, measurement invariance was established and comparisons across groups was substantiated.

Therefore, with measurement invariance established, the following section outlines the inferential statistics, with each hypothesis examined.

5.5. INFERENTIAL STATISTICS

The forthcoming sub-sections discuss the outcomes of this study's hypotheses, providing evidence for inter-variable relationships across groups and time. Prior to addressing each hypothesis, a discussion of each groups' average scores for each of

the three scales for the explicit and implicit attitudinal measurements is now presented, beginning with the explicit scales.

To ensure group equality at the pre-test stage, Schindler (2021) suggested using a one-way analysis of variance (ANOVA) to test for any significant differences between groups. As such, a one-way ANOVA was conducted and confirmed that there was no significant difference between the groups' explicit CA scores at the pre-test stage ($F_{3,766}$ = 0.195; p = 0.900). This indicates that, at the pre-test stage, all groups self-reported evaluative associations of the beverages more with *content* than *anxious*, though some swayed more towards neither *content* nor *anxious* evaluations. However, a one-way ANOVA confirmed that there was a significant difference between the groups' explicit CA scores at the post-test stage ($F_{3,769}$ = 132.87; p = 0.00). With respect to the explicit HS scores, a one-way ANOVA was conducted and confirmed that the explicit HS group means did not differ significantly at the pre-test stage ($F_{3,766}$ = 0.680; p = 0.565), while a one-way ANOVA was conducted for the post-test explicit HS means, which indicated that a significant difference exists between explicit HS group means at the post-test stage ($F_{3,766}$ = 117.935; p = 0.000). In ensuring group equality regarding the explicit HU scale, a one-way ANOVA indicated that there was no significant difference between the groups' explicit HU scores at the pre-test stage ($F_{3,766}$ = 0.174; p = 0.914), whereas the same statistical analysis confirmed that there was a significant difference between the groups' post-test explicit HU scores ($F_{3,766}$ = 66.216; p = 0.000).

Further one-way ANOVAs were conducted for the pre- and post-test implicit scale scores. The pre-test one-way ANOVA confirmed that there was no significant difference between group means for the pre-test implicit CA scale ($F_{3,766}$ = 2.206; p = 0.086), while the post-test analysis confirmed that there was a significant difference between group means for the post-test implicit CA group scores ($F_{3,766}$ = 174.433; p = 0.000). One-way ANOVAs were again used to assess the equality across groups for the pre- and post-test implicit HS scale scores. Much the same as for the implicit CA scale, no significant difference between the implicit HS scale scores was found at the pre-test stage ($F_{3,766}$ = 0.307; p = 0.821), while there were significant differences between the post-test implicit HS groups' scores ($F_{3,766}$ = 171.234; p = 0.000). Finally, a one-way ANOVA was used and confirmed that there was no significant difference between the groups' implicit HU scores at the pre-test stage ($F_{3,766}$ = 0.995; p = 0.394), while a significant difference was found between the groups' implicit HU scores at the post-test stage ($F_{3,766}$ = 148.486; p = 0.000).

To account for any time-specific issues of non-normal data distribution, a standardised individual difference score (SID; Payne & Jones, 1957) was computed for each respondent. These SIDs were calculated by computing the change in individual pre- and post-test scores (ie, explicit and implicit scores at T2 minus those at T1) and dividing these changes by the standard deviation of the differences within each respective condition (ie, control and experimental) (see Estrada, Ferrer & Pardo,

2019). The SIDs were examined to assess their data distributions, with each found to be normally distributed. Therefore, the SIDs were deemed robust to hypothesis testing, the results of which are now discussed.

5.5.1. Hypothesis One

H_1: Anti-sugar PHCs significantly influence consumers' explicit attitudes toward SSBs.

The first hypothesis posited that the anti-sugar PHC significantly affected consumers' explicit attitudes toward SSBs. Despite prior research advocating the use of PHCs in anti-alcohol and anti-smoking contexts (see Chapter 2), the need for further research into the efficacy of PHCs in influencing consumer attitudes has been conveyed by several authors (cf. Farley *et al.*, 2017; Kibler *et al.*, 2018; Morley *et al.*, 2018; Murukutla *et al.*, 2020). Furthermore, this influence on consumer attitudes within a SSB context remains relatively unclear (Von Philipsborn *et al.*, 2019; Murukutla *et al.*, 2020).

Therefore, this hypothesis sought to address the uncertainty regarding the influence of anti-sugar PHCs on explicit attitudes. This was tested by conducting a paired sample *t*-test, given that the data were normally distributed (see George & Mallery, 2020; Pallant, 2020), with explicit attitudinal scores compared at pre- and post-test.

The results demonstrated a significant difference between the experimental groups' pre- and post-test explicit attitudes, at the 5% level of significance. The test obtained a *t*-statistic of 23.302 and associated *p*-value of 0.000 for the experimental group and −0.980 and 0.328 for the control group. This finding supported prior literature: Farley *et al.* (2017) demonstrated a significant influence of an anti-sugar PHC on consumer beliefs, knowledge and attitudes toward SSBs; Morley *et al.* (2018) provided evidence supporting the notion that Australia's "LiveLighter" anti-sugar PHC was effective in self-reported attitudinal and perception changes toward SSBs; and Murukutla *et al.* (2020) found that South Africa's "Are You Drinking Yourself Sick?" anti-sugar PHC significantly influenced consumers' general attitude toward SSB consumption.

The following hypothesis examined the influence of the anti-sugar PHC on consumers' implicit attitudes toward SSBs.

5.5.2. Hypothesis Two

H_2: Anti-sugar PHCs significantly influence consumers' implicit attitudes toward SSBs.

The second hypothesis posited that implicit attitudes toward SSBs were not robust against change. Implicit attitudes are deemed to be more accurate predictors of certain behaviours as opposed to, or in combination with, explicit attitudes (Wänke *et al.*, 2002; Friese *et al.*, 2006). However, despite the adoption of explicit-natured, self-report measures in anti-sugar PHC research (cf. Farley *et al.*, 2017; Morley *et al.*, 2018; Murukutla *et al.*, 2020), evaluating the influence of an external motivation (ie,

PHC) on one's implicit association is deemed to be a robust indication of the persuasiveness of this motivation (Brunel *et al.*, 2004; Bargh *et al.*, 2012; Falk *et al.*, 2015).

This study again employed the use of a paired sample *t*-test, as the assumption of data normality was adhered to (see George & Mallery, 2020; Pallant, 2020), with implicit attitudinal scores compared at pre- and post-test.

The results demonstrated a significant difference between the experimental groups' pre- and post-test implicit attitudes, at the 5% level of significance. The test obtained a *t*-statistic of 27.980 and associated *p*-value of 0.000 for the experimental group and −0.068 and 0.946 for the control group. This supports the findings of Gibson (2008); the mere exposure to unfavourable SSB-attribute pairings (for example, Coca-Cola and 'horrible') influences viewers' implicit attitudes toward SSBs. This also supported the findings of Yun and Berry (2018), who demonstrated that a community-based physical exercise PHC significantly influenced the implicit attitudes of respondents toward the Canadian "UWALK"-led physical activity campaign.

The following two hypotheses assessed whether changes in explicit and implicit attitudes were mediated by implicit and explicit attitudinal changes.

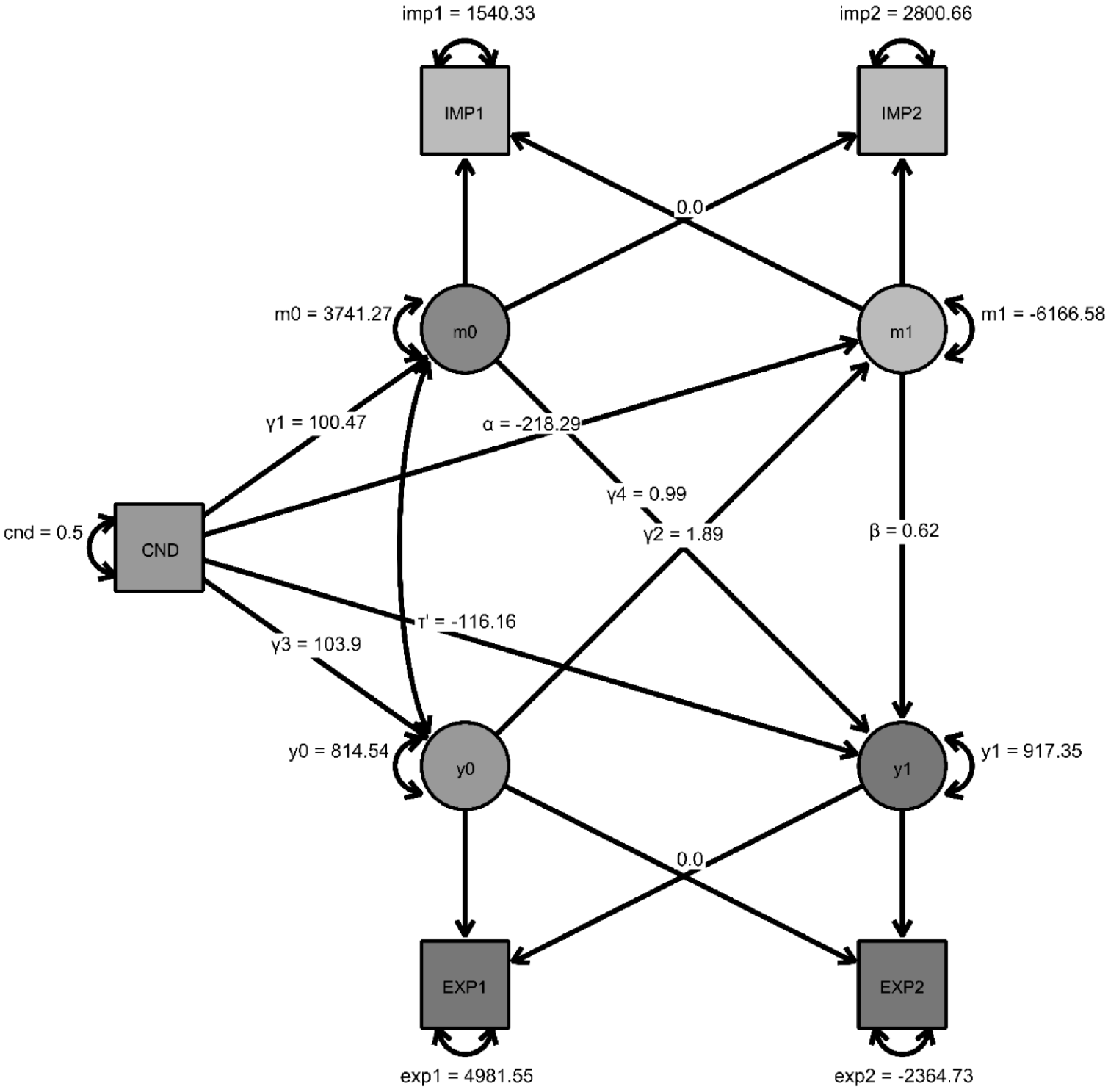
5.5.3. Hypothesis Three

H_3: Explicit attitudinal change is mediated by implicit attitudinal changes.

The third hypothesis posited that changes in explicit attitudes toward SSBs were mediated by changes in those of an implicit nature. As noted by Gawronski and Bodenhausen (2006), an external factor can lead to changes in both associative activation (ie, implicit attitudes) and propositional reasoning (ie, explicit attitudes). To this end, the third hypothesis sought to examine whether changes in explicit attitudes toward SSBs were (in)directly influenced by changes in implicit attitudes toward SSBs.

To test for mediation, it is necessary to evaluate a sequence of regression models (Baron & Kenny, 1986). Explicit attitudinal scores represent the DV, with the scores for the implicit attitudinal measures treated as the mediating variable and the treatment condition as the IV (see Malhotra, 2010; Pallant, 2020). George and Mallery (2020) suggest that when analysing data of a nominal nature (ie, typically binary-type values), such as control and experimental group membership, that a scoring system of zero or one is used to indicate this membership. As such, a dummy coding variable was used to test this third hypothesis, such that control group respondents' scores were coded with a zero, while experimental group respondents' scores were coded with one. The mediation model for this hypothesis is presented in Figure 5.1.

Figure 5.1: PP-LGM for Mediation by Implicit Attitudes



Note. This figure illustrates the specifications of the measurement model, such that the effect of the intervention on the growth rate in implicit attitudes is demonstrated (α = −218.29), and a co-efficient specifying the association between the growth rates of implicit and explicit attitudes (β = 0.62).

As presented, the effect of the intervention, CND, on the growth rate of implicit attitudes, β(M), from pre- to post-test was significant (α = −218.29, SE = 22.56, p<0.001). Furthermore, the effect of the change in implicit attitudes, β(M), on the growth rate of explicit attitudes, β(Y), was also significant (β = 0.62, SE = 0.05, p<0.001). These results imply a mediational process, such that exposure to the anti-sugar PHC led to a negative change (−218.29) in implicit attitudes toward SSBs, which, in turn, led to a positive change (0.62) in explicit attitudes toward SSBs from pre- to post-test.

Additionally, the mediated effect was computed as the product of the α and β estimates (ie, αβ) divided by the estimated SE of this product (ie, $\sigma_{\alpha\beta}$), based on the multivariate delta method established by Sobel (1982; see also MacKinnon, Lockwood, Hoffman, West & Sheets, 2002). The mediated effect (αβ) was −135.47 and the estimated SE of this product ($\sigma_{\alpha\beta}$) was 49.49, indicating a significant mediational effect ($Z_{\alpha\beta}$ = −2.74, p = 0.003). Thus, it is concluded that changes in implicit attitudes mediate changes in explicit attitudes with respect to exposure to an anti-sugar PHC.

The fourth hypothesis of this study is now discussed.

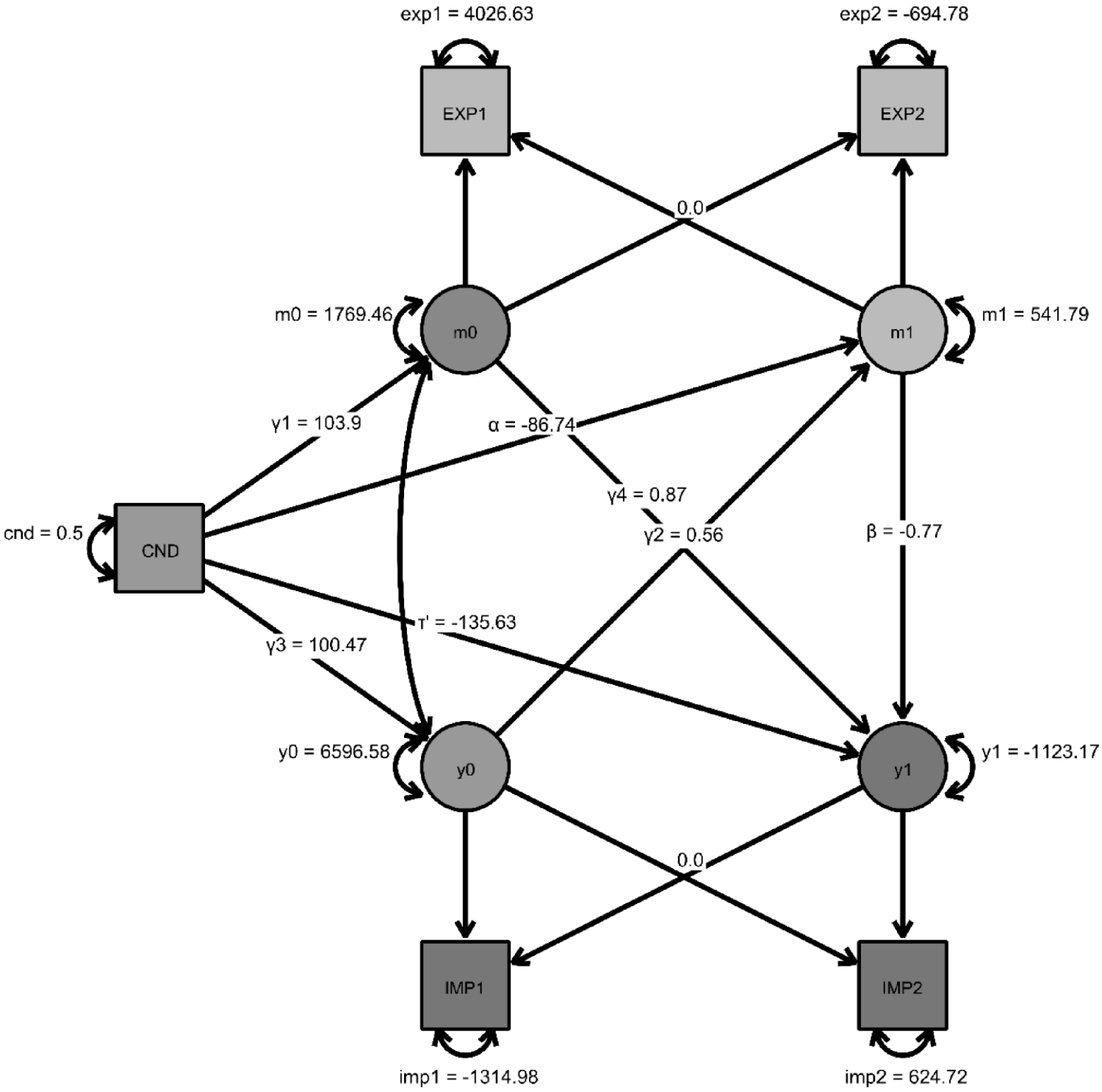
5.5.4. Hypothesis Four

H_4: Implicit attitudinal change is mediated by explicit attitudinal changes.

The third hypothesis posited that explicit attitudinal change mediates changes in implicit attitudes. As mentioned earlier, the APE model (Gawronski & Bodenhausen, 2006, 2011) posits that changes in propositional processes (ie, explicit attitudes) are caused by exposure to some external factor (for example, an anti-sugar PHC), which, in turn, may (in)directly affect associative processes (ie, implicit attitudes). Considering this, the fourth hypothesis sought to examine whether changes in implicit attitudes toward SSBs were (in)directly influenced by changes in explicit attitudes toward SSBs.

Much the same as for the third hypothesis, this hypothesis required a sequence of mediation models to be evaluated, where implicit attitudinal scores represent the DV, with the scores for the explicit attitudinal measures treated as the mediating variable, and the treatment condition as the IV (see Malhotra, 2010; Pallant, 2020). A dummy coding variable was used to test this fourth hypothesis, such that control group respondents' scores were coded as 0, while experimental group respondents' scores were coded as 1. The mediation model for this hypothesis is presented in Figure 5.2.

Figure 5.2: PP-LGM for Mediation by Explicit Attitudes



Note. This figure illustrates the specifications of the measurement model, such that the effect of the intervention on the growth rate in explicit attitudes is demonstrated (α = −86.74), and a co-efficient specifying the association between the growth rates of explicit and implicit attitudes (β = −0.77).

As presented in Figure 5.2, the effect of the intervention, CND on the growth rate of explicit attitudes, β(M) was significant from pre- to post-test (α = −86.74, SE = 4.31, p<0.001) and the effect of the change in explicit attitudes, β(M) on the growth rate of implicit attitudes, β(Y) was also significant (β = −0.77, SE = 0.10, p<0.001). Together, these results imply a mediational process, such that exposure to an anti-sugar PHC led to a negative change in explicit attitudes, which subsequently led to a negative change in implicit attitudes over time.

It is worth noting that, while implicit attitudes effected positive changes in explicit attitudes in Figure 5.1, the mediation model presented in Figure 5.2 suggests that negative changes (−86.74) in explicit attitudes due to exposure to the treatment leads to similar negative changes (−0.77) in implicit attitudes toward SSBs.

The fact that cognitive inconsistencies may lead to a rejection of the associative and propositional processes underlying evaluative responses (see Gawronski & Bodenhausen, 2011) provides a possible explanation for this inconsistency in mediational effects for explicit and implicit attitudes, as demonstrated in the preceding two models. For example, if propositions (ie, explicit attitudes) are produced through the activation of associative processes (ie, implicit attitudes) that are inconsistent, people may reject such propositions as false or find a new proposition that will resolve the apparent cognitive inconsistency (Gawronski & Strack, 2004). Conversely, the acceptance of automatically activated associations (ie, implicit attitudes) depends on their consistency, or 'level of agreement', with salient propositions (ie, explicit attitudes) at the time of decision-making (Gawronski, Peters, Brochu & Strack, 2008b).

The mediated effect (αβ) was 66.66 and the estimated SE of this product ($\sigma_{\alpha\beta}$) was 27.43, indicating a significant mediational effect ($Z_{\alpha\beta}$ = 2.43, p = 0.008). Thus, it is concluded that changes in explicit attitudes mediate changes in implicit attitudes with respect to exposure to an anti-sugar PHC.

The final hypothesis of this study is now discussed, after which this chapter is concluded.

5.5.5. Hypothesis Five

H_5: Anti-sugar PHCs significantly influence consumers' explicit and implicit attitudes toward SSBs.

The fifth and final hypothesis posited is that the treatment variable would influence consumers' explicit and implicit attitudes toward SSBs. Gawronski and Bodenhausen (2006) note that an intervention can influence either explicit or implicit attitudes, though direct influences on both are possible. Furthermore, the extent to which a persuasive message effects one's implicit and explicit associations simultaneously is of interest, particularly within the fields of social psychology and implicit cognition (Bargh *et al.*, 2012; Sheeran *et al.*, 2013).

Adopting SO-MG-LCM meant that a total of four models were specified, each estimating various combinations of no change and latent change. The first model was specified for both groups, CG and EG, with EXP1 and IMP1 used as indicators of the latent variable at pre-test (η1), while EXP2 and IMP2 were specified as indicators of the post-test latent variable (η2). As Model 1 sought to estimate only an intercept factor (ξ1), indicating the pre-test level of observed scores, no slope factor (ξ2) was estimated for either group. Model 2 was specified with a growth/slope factor (ξ2) estimated only in EG (ie, the intervention group), which aimed to capture any evidence of change in explicit and implicit attitudes from pre- to post-test. Thereafter, Model 3 was specified, which modelled a latent change factor in both groups. This was done for two reasons: (1) to determine whether any contamination occurred between CG and EG (Shadish, Cook & Campbell, 2006/2002) and (2) to examine whether a normative average change occurred in CG (Alessandri *et al.*, 2017). Finally, Model 4 was specified as the sensitivity model, where intercept parameters from the best fitting of the previous three models were constrained to group equality, thus ensuring that the pre-test scores were indeed equivalent across groups (see Alessandri *et al.*, 2017). The fit indices of each model are presented in Table 5.6.

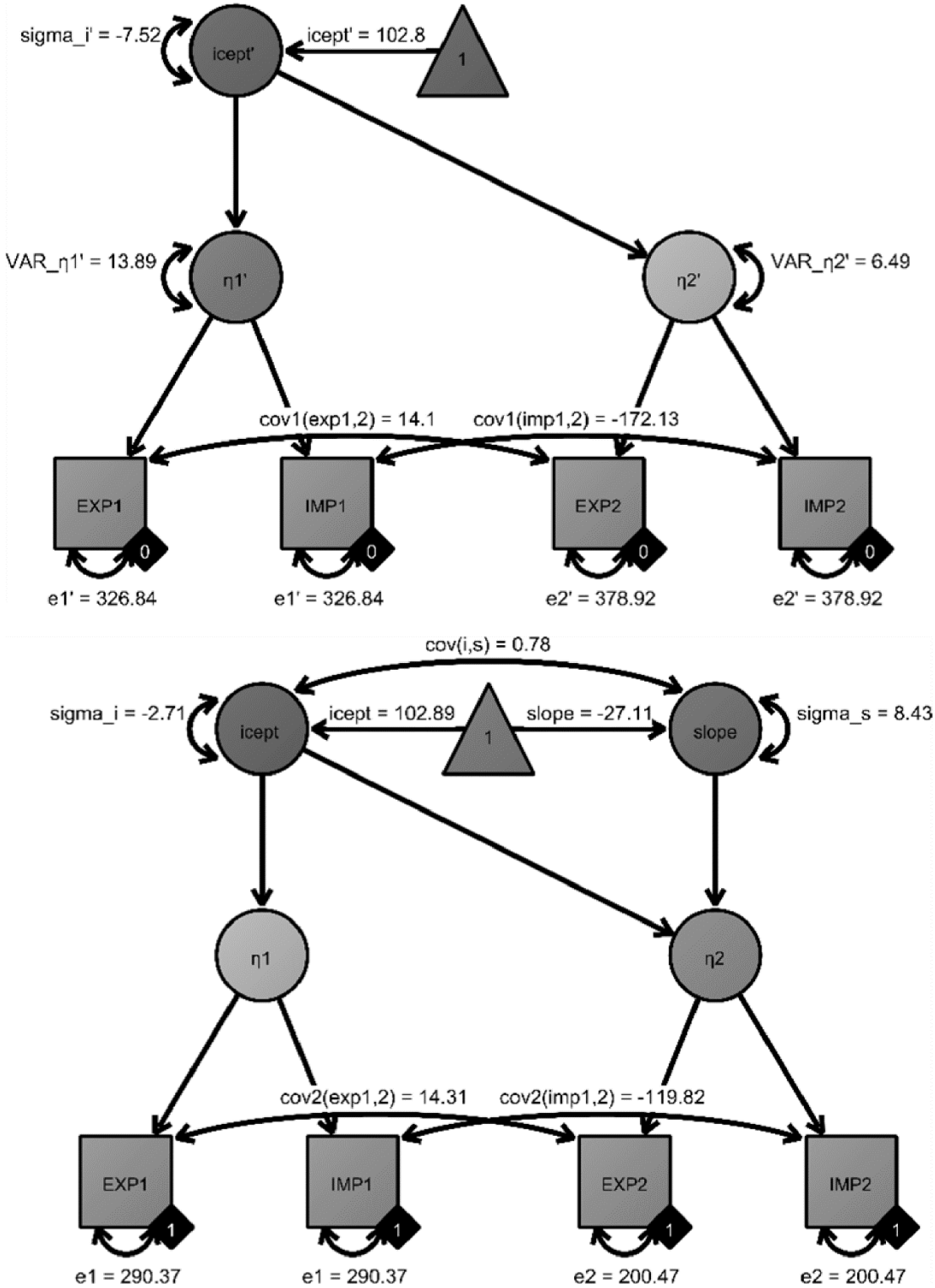
Table 5.6: Model Estimation Summaries

MODEL	X^2(df)	CFI	TLI	RMSEA	SRMR	AIC(ΔAIC)
1	64.78(24)	0.947	0.938	0.092	0.090	26531(475)
2	40.08(23)	0.988	0.973	0.033	0.020	26056(0)
3	39.09(20)	0.955	0.945	0.054	0.052	26139(83)
4	49.30(26)	0.970	0.968	0.041	0.124	26140(84)

Note. This table presents the fit indices of each of the four models, with the Chi-square value (X^2), Comparative Fit Index (CFI), Tucker Lewis Fit Index (TLI), Root Mean Square Error of Approximation (RMSEA), Standardised Root Mean Square Residual (SRMR), Akaike's Information Criterion (AIC) and associated change index (ΔAIC).

In accordance with the acceptable index levels and thresholds within SEM frameworks (see Section 5.4.5), Model 2 was identified as the best fitting model, with χ^2 = 40.08(23), where CFI (0.988) and TLI (0.973) values both indicated good model fit, RMSEA (0.033) and SRMR (0.020) were both below their cut-offs of 0.05 for good fit, whilst the AIC for Model 2 was the lowest relative to the other three models estimated. The best-fitting Model 2 is presented in Figure 5.3, while the remaining models are presented in Appendix M.

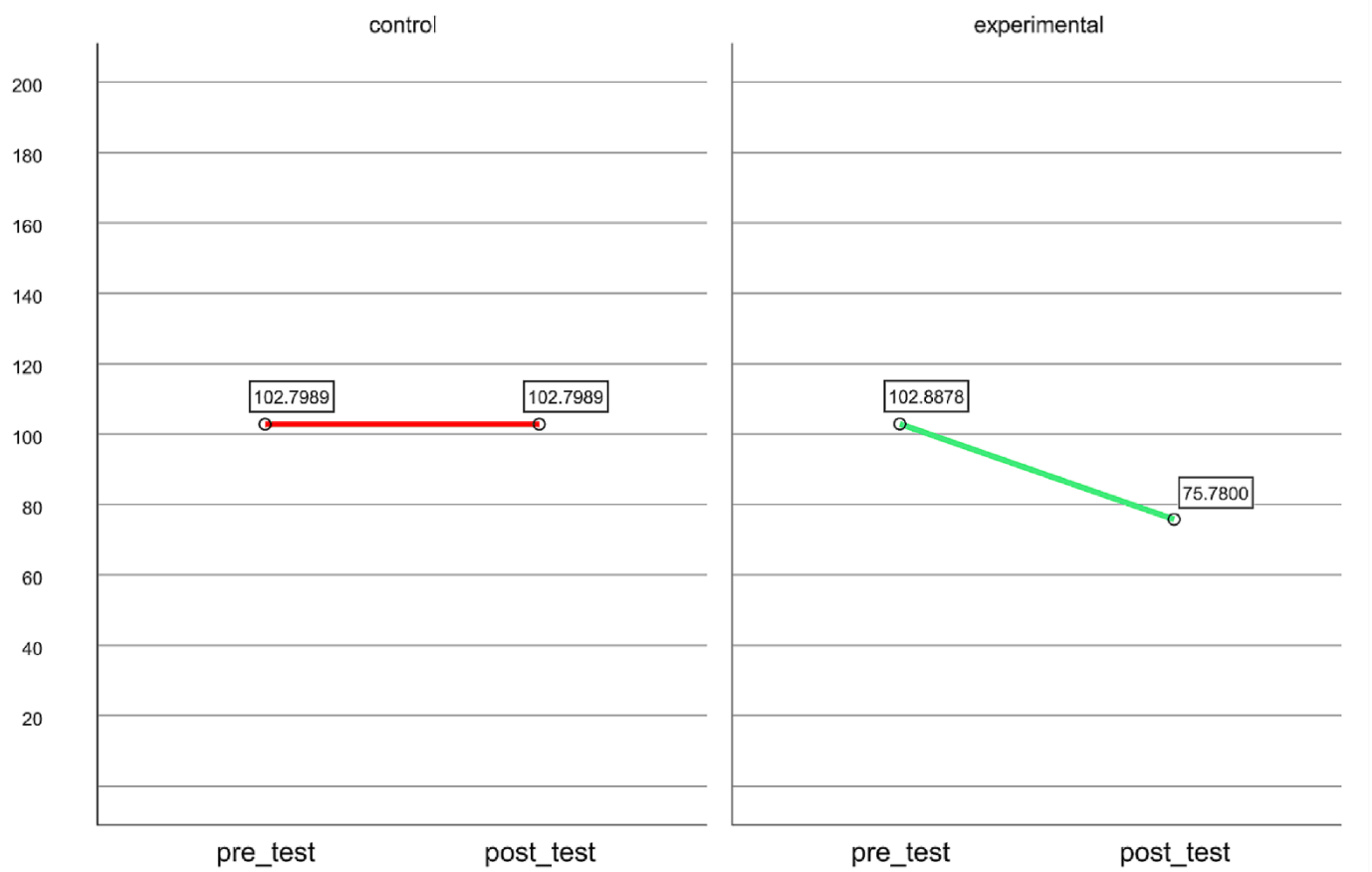
Figure 5.3: Best-Fitting SO-MG-LCM Estimation



Note. This figure illustrates the estimates of the best-fitting models for the control group (no-change model, top; see subscript 0 on observed variables) and experimental group (change model, bottom; see subscript 1 on observed variables). EXP1,2 = explicit attitudes at pre-test, post-test; IMP1,2 = implicit attitudes at pre-test, post-test; η1,2 = latent variable for attitudes at pre-test, post-test; e1,2 = residual variances of observed variables.

As presented in Figure 5.3, the intercept estimates for both models were significant (icept' = 102.80, SE = 0.40, p<0.001; icept = 102.89, SE = 0.59, p<0.001) and the slope factor estimated in the experimental group's model was also found to be significant (slope = -27.11, SE = 0.88, p<0.001). Additionally, as the variance of the estimated slope factor was found to be non-significant (sigma_s = 8.43, SE = 34.21, p = 0.81), the model implies that the attitudinal changes of respondents in the experimental group did not vary significantly in response to their exposure to the anti-sugar PHC. Taken together, these estimates indicate that both groups' attitudes toward SSBs were found to be equivalent at pre-test (102.80 and 102.89). Further, the subsequent exposure of the experimental group to the treatment lead to a significant negative change in their attitudes (-27.11, p<0.001), suggesting that the anti-sugar PHC was effective in influencing consumers' implicit and explicit attitudes toward SSBs. To further illustrate these attitudinal changes, Figure 5.4 presents the trajectories of the pre- and post-test attitudes of respondents toward SSBs, based on Model 2's estimates.

Figure 5.4: Trajectories of Attitudes in the Best-Fitting Model



Note. This figure illustrates the projected change in attitudes from pre- to post-test for each group, based on the estimations from Model 2. As above, both groups' initial level of attitudes was equivalent, with the estimated growth (here, reduction) factor of -27.11 in the experimental group leading to a significant change (p<0.001) in implicit and explicit attitudes due to their exposure to the anti-sugar PHC.

In conclusion, the best-fitting model demonstrated that the anti-sugar PHC had a significant influence on the explicit and implicit attitudes of respondents toward SSBs, where each attitudinal manifestation was specified as an indicator of the same latent variable. Specifically, there was an overall decrease in the average attitude latent variable estimated from pre- to post-test, within the experimental group. Thus, respondents in the intervention group exhibited a less favourable explicit and implicit attitude toward SSBs, associating them more with *anxious*, *sad*, and *unhealthy* evaluations.

5.6. CONCLUSION

This chapter highlighted the results of the descriptive and inferential statistical analyses conducted. The demographic nature of the sample was discussed, demonstrating a relative equivalence of group compositions, after which the reliability and validity of this study's scales were examined. Prior to testing hypotheses, the distribution of data was analysed to ensure normality.

Regarding these hypotheses, the first found that the anti-sugar PHC significantly influenced the explicit attitudes of respondents toward SSBs, while hypothesis two found the same regarding the implicit attitudes of respondents. Further, hypotheses three and four were supported, indicating indirect influences between explicit attitudinal change and implicit attitudinal change. Additionally, hypothesis five was supported, with the estimation of Model 2 exhibiting a good fit, thus demonstrating the efficacy of the anti-sugar PHC used in this study.

The following chapter provides a discussion of each hypothesis test and the implications thereof, both theoretical and managerial.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1. INTRODUCTION

Since as early as 1935 (Allport, 1935), attitudes have been a topic of debate and subsequent study in the fields of psychology, social cognition, marketing, and behavioural economics. This study sought to conceptualise attitudes within the context of social marketing and consumer behaviour, to better understand how marketing tools can be applied to issues under the purview of policy-making entities. The different definitions of social marketing were discussed (see Section 2.2.1). This was followed by a description of each of social marketing's key tenets (see Section 2.2.2). Additionally, the role of marketing in bridging the gap between educational and legal approaches to behavioural change was put forth (see Section 2.2.3). The application of social marketing to health-related consumer behaviours encapsulates the purpose of the developing field of research, which seeks to better understand how the wellbeing of consumers can be enhanced (Brychkov & Domegan, 2017; Pirouz, 2017). Within this context, societal health challenges of increasing complexity have required marketers' urgent efforts to intervene, such that the public health outlook is improved (see Section 2.3.2; Luca & Suggs, 2013; Chin & Mansori, 2018). Following the overview of such interventions (ie, PHCs), the importance thereof and evidence of its efficacy in anti-alcohol and anti-smoking contexts was discussed (see sections 2.3.3–2.3.6). Additionally, the prevalence of obesity was described, following which evidence of anti-sugar PHC efficacy was detailed, which conveys the need to conduct further research into this efficacy in other social and environmental contexts (see sections 2.4 and 2.5).

Despite this study not implementing and examining a comprehensive social-marketing campaign, it is suggested that effecting the beliefs, awareness and attitudes of an individual can bring about behavioural change among such individuals (Walls *et al.*, 2011; Ha *et al.*, 2014). Understanding *why* and *how* consumers reach consumption decisions is thus of importance to researchers (Jansson-Boyd & Zawisza, 2017; Jansson-Boyd, 2019), particularly within health-related contexts (Conner & Norman, 2015). In this regard, Chapter 3 attends to better understanding human cognition, such that future PHCs may be better designed and implemented. Cognition was described as the neural processes that give rise to the mental representations of objects, people, or places. It provided insight into *how* consumers make decisions (see Section 3.2.1; Smith & Queller, 2001). This was followed by an outline of the role memory plays in decision-making processes (see Section 3.2.2), after which knowledge accessibility and information pervasiveness were discussed within this context (see Section 3.2.3). In attending to a better understanding of *why* consumers make decisions, the role of motivation and persuasion was subsequently highlighted (see Section 3.2.4). Additionally, the conversion of environmental and social cues to behaviour was conceptualised as being facilitated by two distinct cognitive mechanisms: deliberate and automatic evaluative processes. To better explain this distinction, these

mechanisms were delineated through the application of DPT, with the interplay between the two also explained (see Section 3.2.5; Bargh *et al.*,, 2012).

This study has argued that attitudes may manifest as two distinct forms of evaluation: implicit and explicit attitudes, where DPT was used as the theoretical lens through which these distinct attitudinal manifestations could be understood. The difference between each form of attitude was described as their distinct interplay with other dispositions, such that one's behaviour is influenced (see Section 3.3.1; Greenwald *et al.*, 1998). To further conceptualise the distinct nature of these attitudinal manifestations, implicit attitudes were defined as those evaluative associations between concepts elicited from memory, and in the absence of conscious awareness (cf. Wilson, Lindsey & Schooler, 2000; Carruthers, 2018, 2020), whereas explicit attitudes were defined as self-reported evaluative judgements formed through reasoning and conscious deliberation (cf. Petty & Briñol, 2006; Gawronski & Bodenhausen, 2011)⁼With the distinction made between implicit and explicit attitudes, the gap in knowledge between what one intends to do, as measured through explicit self-report methods, and how an individual behaves was outlined (cf. Fazio, 1990; Greenwald & Banaji, 2017; Maison & Gregg, 2017).

In further investigating the discrepancy between implicit and explicit attitudes, and to better understand how they may guide behaviour (see Prestwich *et al.*, 2018), the Associative-Propositional Evaluation (APE) model was introduced (see Section 3.3.2; Gawronski & Bodenhausen, 2006). Thus, implicit attitudinal measures were described as reflections of associative processes and propositional processes reflected in explicit attitudinal measures (Gawronski & De Houwer, 2014, 2017). Pursuant to the APE model's predicted outcomes of exposure to an external factor (ie, an anti-sugar PHC), this study sought to examine whether such an intervention had a significant influence on consumers' implicit and explicit attitudes toward SSBs, and whether any corresponding (ie, indirect) effects could be observed. Specifically, the APE model posits that a change in either implicit or explicit attitudes, or in both, may be observed, with the potential for said change to mediate corresponding changes in the alternate attitudinal manifestation (Gawronski & Bodenhausen, 2006). As such, the primary objective of this study was to determine whether an anti-sugar PHC significantly influences consumers' implicit and explicit attitudes toward SSBs; the secondary objectives were to determine whether changes in explicit attitudes mediate changes in implicit attitudes toward SSBs following exposure to an anti-sugar PHC, and vice versa.

To address these research objectives, Chapter 4 described the methodological approaches and techniques which this study adopted. This study was conclusive in nature, where the aim was to establish cause-and-effect relationships between exposure to an anti-sugar PHC and changes in implicit and explicit attitudes toward SSBs. Thus, quantitative research was employed (see Bryman *et al.*, 2016).

The methodology detailed the true-experimental research design used in this study to obtain the findings. A pre- and post-test control group research design was adopted, with two adaptations to the design made: (1) each observation comprised two attitudinal measures, implicit attitudes using EPTs and self-report online surveys to assess explicit attitudes; and (2) two experimental groups and two control groups were specified to account for any possible testing effects arising from completing one measurement prior to the other, and vice versa (see Section 4.3.1; Nosek & Smyth, 2007). To obtain a representative sample of young adults in South Africa, quota sampling was used in this study, where quotas were placed on participants' age and gender to ensure an equitable distribution of data from male and female young adults. To this end, a sample size of N=400 was sought to ensure sufficient statistical sensitivity regarding the data analysis conducted. On this note, SEM approaches to hypothesis testing were adopted, namely, PP-LGM and SO-MG-LCM (see Section 4.7). Chapter 5 presented the findings pertaining to the research objectives, finding that an anti-sugar PHC influenced both consumers' implicit and explicit attitudes toward SSBs, in addition to mediation by explicit attitudinal change on implicit attitudinal change, and vice versa. Finally, a latent 'attitude' variable was constructed and designated to capture one's overall attitude toward SSBs, which was used to assess the overall efficacy of the anti-sugar PHC.

This study's hypotheses are revisited in this chapter, where each corresponding finding and the conclusions subsequently drawn are discussed in detail (see Section 6.2). In addition, this chapter discusses the theoretical and managerial implications of this study's findings (see Sections 6.3-6.4). Thereafter, the limitations (see Section 6.5) faced by this study are outlined, which are followed by recommendations for future research (see Section 6.6).

6.2. DISCUSSION AND CONCLUSIONS

This section provides an overview of the findings of the five hypotheses that were tested in this study, with the outcome of each test indicated and the conclusions drawn from each detailed (see sections 6.2.2–6.2.3). To begin, the hypothesis test results are summarised in Table 6.1.

Table 6.1: Summary of Hypothesis Tests

	Description	Test	Critical	p	Outcome
H_1	Influence of anti-sugar PHC on the explicit attitudes of consumers toward SSBs.	*t-test*	t = 23.302	0.000	Reject H0
H_2	Influence of anti-sugar PHC on the implicit attitudes of consumers toward SSBs.	*t-test*	t = 27.980	0.000	Reject H0
H_3	Implicit attitudinal changes mediate changes in explicit attitudes toward SSBs.	SEM*	z = -2.740	0.003	Reject H0
H_4	Implicit attitudinal changes mediate changes in explicit attitudes toward SSBs.	SEM*	z = 2.430	0.008	Reject H0
H_5	Influence of an anti-sugar PHC on the implicit and explicit attitudes of consumer toward SSBs.	SEM**	S = -27.110 SE = 0.880	0.000	Reject H0

Note. This table provides a description of each of this study's five hypotheses, the tests used to examine them, the critical test values (critical), associated *p*-values (*p*), and the outcome of the test. S = slope co-efficient of latent growth factor. SE = standard error of S.

SEM* = parallel process latent growth model (PP-LGM)

SEM** = second-order multiple group latent curve modelling (SO-MG-LCM)

The anti-sugar PHC was found to have a significant influence on consumers' explicit attitudes toward SSBs, with the same finding reached regarding the influence of implicit attitudes, in support of H_1 and H_2. Implicit attitudinal changes were found to mediate the relationship between exposure to the anti-sugar PHC and changes in consumers' explicit attitudes toward SSBs, with the reverse found regarding mediation by explicit attitudinal changes, providing support for H_3 and H_4. Finally, the efficacy of the anti-sugar PHC was shown to have a significant influence on the latent attitude variable, designated as a combination of implicit and explicit attitudes toward SSBs, in support of H_5.

The following section discusses the conclusions drawn from the findings outlined in Table 6.1, with the theoretical and managerial implications detailed thereafter (see Sections 6.3-6.4). Further, the research hypotheses have been allocated to the relevant research objectives that they sought to address: H_1, H_2, and H_5 aimed to address the primary objectives of this study, whereas H_3 and H_4 sought to address the

secondary objectives. Therefore, the conclusions of the primary objectives are now discussed.

6.2.2. Conclusions of the Primary Objectives

This study's primary objectives were to determine whether an anti-sugar PHC influences consumers' explicit and implicit attitudes toward SSBs, in addition to an influence of both forms simultaneously.

6.2.2.1. Hypothesis One

H_1: Anti-sugar PHCs significantly influence consumers' explicit attitudes toward SSBs.

The first hypothesis sought to examine whether exposure to an anti-sugar PHC significantly influenced consumers' explicit attitudes toward SSBs. Despite prior research advocating the use of PHCs in anti-alcohol and anti-smoking contexts (see Chapter 2), the need for further research into the efficacy of PHCs in influencing consumer attitudes has been conveyed by several authors (Farley *et al.*, 2017; Murukutla *et al.*, 2020). Furthermore, the influence on consumer attitudes within an SSB context remains relatively unclear (Morley *et al.*, 2018; Von Philipsborn *et al.*, 2019, 2020). As such, this hypothesis sought to address the apparent uncertainty regarding the influence of an anti-sugar PHC on explicit attitudes toward SSBs.

The findings of the hypothesis testing supported those reported in prior literature: Farley *et al.* (2017) found that an anti-sugar PHC was effective in significantly influencing consumer beliefs, knowledge and attitudes toward SSBs; Morley *et al.* (2018) provided evidence supporting the notion that Australia's "LiveLighter" anti-sugar PHC was effective in self-reported attitudinal and perception changes, and Murukutla *et al.* (2020) found that South Africa's "Are You Drinking Yourself Sick?" anti-sugar PHC significantly influenced consumers' attitudes toward SSB consumption. To this end, Gawronski and De Houwer (2014) suggest that researchers exercise caution in drawing conclusions from self-reported, explicit attitudinal measures, citing social desirability bias concerns as a possible barrier to measuring an accurate and truthful response. Further, explicit attitudes are of limited value in isolation, particularly where the underlying evaluative associations are non-conscious or introspectively inaccessible (ie, outside of conscious awareness; Moors, Spruyt & De Houwer, 2010; Gawronski & De Houwer, 2014). However, evidence indeed suggests that explicit attitudes are correlated with behaviours of interest, conveying the usefulness of such measures in consumer behaviour research (cf. Greenwald & Banaji, 2017; Maison & Gregg, 2017; Kurdi *et al.*, 2019).

Gawronski and Bodenhausen (2006) indicate that changes in explicit attitudes may be observed owing to three potential mechanisms: (1) changes in associative evaluation; (2) changes in the set of propositions considered; and (3) changes aimed at ensuring

cognitive consistency. While the third mechanism relates to H_3 and H_4, the first two mechanisms are of importance within the context of the findings of H_1.

First, changes in associative evaluation refer to one's inclination to base decisions on one's gut response (Gawronski & Bodenhausen, 2006, 2014a), that is, an automatic evaluation (Tversky & Kahneman, 1974; Kahneman, 2011, 2018), implying that changes in the structure or activation patterns of such associations lead to a change in explicit attitudes. For example, evidence has demonstrated that the mere exposure of certain social group members can influence the explicit attitudes held towards such a group in general (cf. Bless, Schwarz, Bodenhausen & Thiel, 2001; Gawronski, Bodenhausen & Banse, 2005). In other words, recently encountering a negatively valenced (ie, unfavourable) pairing of an evaluation (ie, anxious, sad, unhealthy) with the attitude object (ie, SSBs) has been shown to produce unfavourable explicit attitudinal evaluations (Dasgupta & Greenwald, 2001; Gawronski & Bodenhausen, 2006).

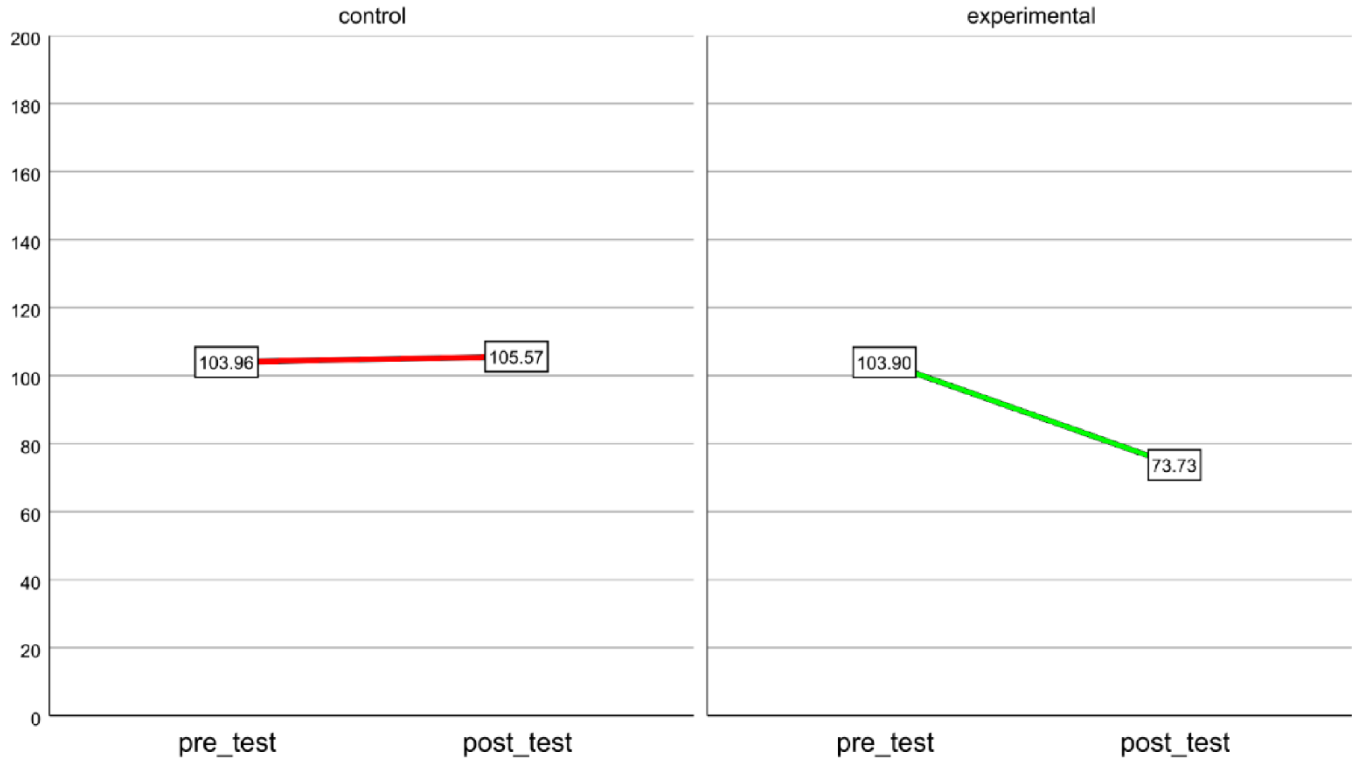
Thus, it is concluded that the treatment groups' exposure to the anti-sugar PHC influenced the structure of their explicit evaluative associations of SSBs; framing SSBs in a way that highlights the risks of their consumption, leading to less favourable explicit attitudinal evaluations being observed post-test.

Second, sets of propositions, or reasons/facts, are considered each time one reaches a decision. Chapter 3 detailed how consumers retrieve information relevant to a decision (see Section 3.2.3; Camilleri & Newell, 2013; Wyer, 2017), such that any contextual information stored in surrounding memory nodes is also activated (see Baumgartner & Pieters, 2010; Anderson & Bower, 2014/1973). Changes in the set of considerations may be the result of new knowledge acquisition or reconsidering already-known propositions (Gawronski & Bodenhausen, 2006). New knowledge is commonly acquired through exposure to persuasive messages containing arguments or statements which are (un)favourable with respect to the attitude object (Chen & Chaiken, 1999; Petty & Wegener, 1999). Thus, exposure to persuasive messages (ie, an anti-sugar PHC highlighting the risks of excessive SSB consumption) will lead to new propositions being considered in evaluations. However, as Gawronski and Bodenhausen (2006) note, if said propositions are consistent with those already existing in cognitive structures, then no change in explicit attitudes is to be expected. Conversely, if the new information contradicts the already existing propositions, then there is a chance that explicit attitudes will change (Gawronski & Bodenhausen, 2011). Reconsidering already known propositions may lead to a 'change of heart' as far as evaluative judgement is concerned, whereby propositions are argued to be stronger or weaker due to prolonged deliberation (Tesser, 1978) or introspection (Wilson, Dunn, Kraft & Lisle, 1989), resulting in changes in explicit attitudes.

The control groups' pre- and post-test explicit attitude mean scores were 103.96 (σ_{c1} = 21.94) and 105.57 (σ_{c2} = 23.82), and for the experimental group, 103.90 (σ_{e1} = 19.86)

and 73.73 (σ_{e2} = 17.51). This demonstrated a significant decrease in SSB-associated self-reported explicit attitudinal favourability among the experimental group (t = 23.302, p < 0.001). As such, following their exposure to the anti-sugar PHC, experimental group participants' explicit attitudinal evaluations of SSBs were self-reported less favourably than at pre-test. The explicit attitude group mean scores at the pre- and post-test stages are presented in Figure 6.1.

Figure 6.1: Trajectories of Explicit Attitudes



Note. This figure illustrates the average change in respondents' self-reported explicit attitudes toward SSBs at the pre- and post-test stages. The control groups' scores seemed to be marginally higher during the post-test phase than at pre-test, though a noticeable decrease in the experimental groups' explicit attitude scores was observed from pre- to post-test.

Thus, it is concluded that the changes observed in consumers' explicit attitudes toward SSBs are, in part, due to the persuasive nature of the anti-sugar PHC intervention, whereby treatment group participants either became aware of the risks associated with excessive SSB consumption or reconsidered how these risks may affect them.

The following section discusses the conclusions drawn from the findings of H_2.

6.2.2.2. Hypothesis Two

H_2: Anti-sugar PHCs significantly influence consumers' implicit attitudes toward SSBs.

The second hypothesis sought to examine the influence of the intervention on consumers' implicit attitudes toward SSBs. Implicit attitudes are deemed to be more accurate predictors of certain behaviours as opposed to or in combination with explicit attitudes (Wänke *et al.*, 2002; Friese *et al.*, 2006). However, despite the adoption of explicit-natured, self-report measures in anti-sugar PHC research (cf. Farley *et al.*, 2017; Morley *et al.*, 2018; Murukutla *et al.*, 2020), evaluating the influence of an external motivation (ie, PHC) on one's implicit association is deemed to be a robust indication of the persuasiveness of this motivation (Bargh *et al.*, 2012; Falk *et al.*, 2015).

Within the context of the APE model (Gawronski & Bodenhausen, 2006, 2011), changes in implicit attitudes may be due to (1) changes in the associative structure and (2) changes in the patterns of associative network activation (Smith, 1996). For example, new evaluative knowledge or information would constitute a change in associative structure, whereas the reactivation of already-existing associative evaluations constitutes changes in associative evaluation activation patterns (Gawronski & Bodenhausen, 2006).

First, changes in associative structure are the prototypical products of evaluative conditioning (EC; cf. De Houwer, Baeyens & Field, 2005; Walther & Langer, 2008). Put simply, EC entails the brief presentation of stimuli with positive or negative (ie, favourable or unfavourable) semantic or symbolic attributes, following which the response latencies recorded in implicit attitudinal tasks (for example, IATs and EPTs) are used to assess the influence of repeated pairings of the stimuli with favourable or unfavourable attributes (see Olson & Fazio, 2002; Petty, Tormala, Briñol & Jarvis, 2006). For example, Gibson (2008) demonstrated that the mere exposure to unfavourable SSB-attribute pairings (for example, Coca-Cola and 'horrible') influences the implicit attitudes of viewers toward brands and products. Further, Yun and Berry (2018) demonstrated similar influences, whereby exposure to a community-based physical exercise PHC significantly influenced the implicit attitudes of respondents toward the Canadian "UWALK"-led physical activity campaign.

Thus, it is concluded that the changes observed in consumers' implicit attitudes toward SSBs are, in part, due to the somewhat EC-like effect (see De Houwer, Thomas & Baeyens, 2001; De Houwer *et al.*, 2005, 2011) had from exposure to the anti-sugar PHC, such that the negative framing of SSBs within the treatment variable led to changes in automatic, implicit attitudinal evaluations of SSBs as less favourable. Further, the deliberate use of negatively valenced semantics and symbols in the intervention material itself led to changes in associative structure among the

experimental group, such that their subsequent implicit attitudes toward SSBs were less favourable.

Changes in associative network activation patterns may occur in cases where the already-existing attitude object is multifaceted in its nature (ie, it is represented within several associative networks) and the presence of specific environmental or social cues leads to an activation of different associative networks to which the attitude object belongs (Gawronski & Bodenhausen, 2006, 2018). Thus, one's implicit evaluation of the attitude object is subject to the context in which it is portrayed in its relevant associative networks (Wittenbrink & Schwarz, 2007; Devos, 2008). For example, determining whether Michael Jordan and Tom Cruise are famous taps into different associative networks, when compared with categorising their ethnicity as Black or White (Dasgupta & Greenwald, 2001; Greenwald *et al.*, 2020).

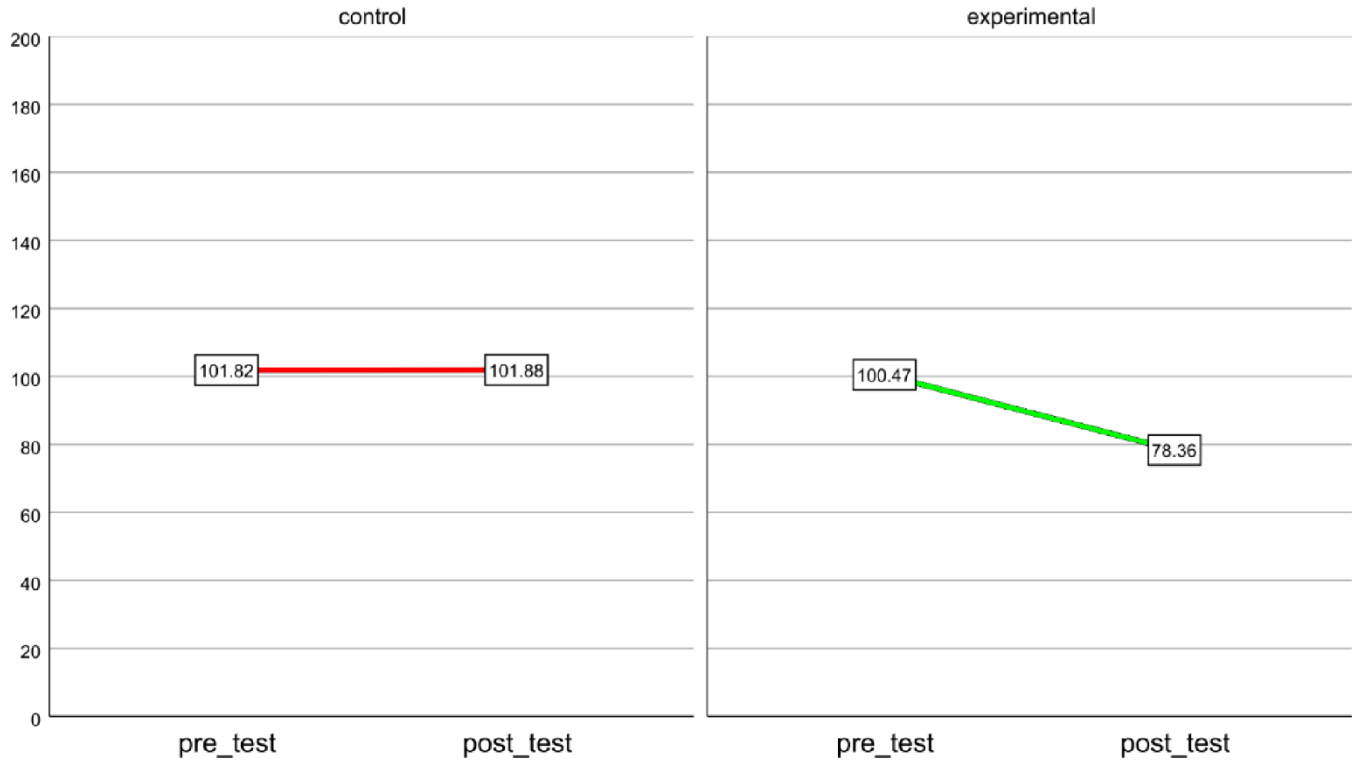
Further, the presence of certain contextual cues within the environment may activate different patterns of associative networks, such that different subsets of an attitude object's representation are activated and used to reach decisions (Gawronski & Bodenhausen, 2006, 2018). For example, presentations of Black people at a family gathering vis-à-vis at a gang-induced crime scene has demonstrated that the implicit attitudes of Black respondents were effected in such a way that corresponds to the context of each presentation: depictions of Black people at family gatherings lead to more favourable implicit attitudinal evaluations, whereas the opposite was found (ie, less favourable implicit attitudes) following the presentation of Black people at a crime scene (Wittenbrink, Judd & Park, 2001).

Barden, Maddux, Petty and Brewer (2004) demonstrated that it is more the social context within which the attitude object is encountered that leads to implicit attitudinal evaluation change. Specifically, they found that by presenting a Black person in a prison and dressed as either a prisoner or lawyer, that the social role in which the attitude object was depicted lead to unfavourable/negative or favourable/positive implicit attitudinal evaluations of the subject matter (Barden *et al.*, 2004; see also Maddux, Barden, Brewer & Petty, 2005). To this end, while one may associate Black people with various positive or negative social characteristics, which of these characteristics are activated depends on the context within which the attitude object is encountered (Gawronski & Bodenhausen, 2006, 2011, 2018).

Specifically, the control groups' pre- and post-test implicit attitude mean scores were 101.82 (σ_{c1} = 11.84) and 101.88 (σ_{c2} = 11.77); and for the experimental group, 100.47 (σ_{e1} = 11.86) and 78.36 (σ_{e2} = 8.95). This demonstrates a significant decrease in SSB-associated automatic implicit attitudinal favourability within the experimental group (t = 27.980, p = <0.001). Thus, following their exposure to the anti-sugar PHC, experimental group participants' automatic, implicit attitudinal evaluations of SSBs were less favourable than at pre-test, suggesting that the anti-sugar PHC was effective

in influencing consumers' implicit attitudes toward SSBs. The implicit attitude group mean scores at the pre- and post-test stages are presented in Figure 6.2.

Figure 6.2: Trajectories of Implicit Attitudes



Note. This figure illustrates the average change in respondents' automatic, implicit attitudes toward SSBs at the pre- and post-test stages. The control groups' scores were almost equivalent at pre- and post-test stages, though a noticeable decrease in the experimental groups' automatic, implicit attitude scores was observed from pre- to post-test.

Thus, it is concluded that changes in the patterns of associative activation owing to exposure to the treatment variable resulted in less favourable implicit attitudinal evaluations being observed post-test. Thus, instead of framing SSBs in a positive/favourable light (as is commonly demonstrated in commercial SSB advertising), the risk-related context of excessive SSB consumption gave rise to a change in the automatic evaluations thereof, such that the 'health-conscious' subset of implicit SSB associations was activated in lieu of the presence of traditionally positively valenced evaluations presented to consumers.

The following section discusses the conclusions drawn from the findings of H_5.

6.2.2.3. Hypothesis Five

H_5: Anti-sugar PHCs significantly influence consumers' explicit and implicit attitudes toward SSBs.

The fifth hypothesis sought to examine whether an anti-sugar PHC influenced consumers' explicit and implicit attitudes toward SSBs simultaneously, where a latent variable representing overall attitudes was designated by explicit and implicit attitudes as measured at the pre- and post-test stages. Gawronski and Bodenhausen (2006) note that an intervention can influence either explicit or implicit attitudes, though direct influences on both are possible. Furthermore, the extent to which a persuasive message effects one's implicit and explicit associations simultaneously is of interest, particularly within the fields of social psychology and implicit cognition (Bargh *et al.*, 2012; Sheeran *et al.*, 2013).

Specifically, the APE model (see Case 8) posits that complex sequences of change in both implicit and explicit attitudes may be observed in cases where (1) changes in pattern activation and the structure of associations are observed; (2) implicit attitudinal evaluations are consistent with the momentarily considered set of propositional information; and (3) a basis is provided for new propositions, consistent with the valence of the implicit attitudinal evaluations (Gawronski & Bodenhausen, 2011). For example, Castelli, Zogmaister, Smith and Arcuri (2004) found, after presenting respondents with pictures of a man described as either a molester or counsellor, that respondents' implicit attitudinal evaluations of the man described as a molester were less favourable (ie, negatively-valenced) than of the man described as a counsellor. Thus, the repeated priming of one man with the label of a molester lead to negative implicit attitudinal evaluations via EC effects (see Section 6.2.2.2; Castelli *et al.*, 2004; Gawronski & Bodenhausen, 2006). Additionally, one is likely to use the molester description to infer an unfavourable explicit attitudinal evaluation of the man via propositional processes of reasoning, whereby a deliberate effort is made to retrieve supporting information of relevance to this explicit evaluation (Gawronski & Bodenhausen, 2006, 2014a).

First, a change in pattern activation has been highlighted as a potential explanation for the observed change in implicit attitudes (see Section 6.2.2.2). Furthermore, the priming of SSBs with negatively valenced attributes in the anti-sugar PHC resulted in less favourable implicit attitudinal evaluations being observed post-test. In becoming aware of, or simply reconsidering the risks associated with excessive SSB consumption, the mere framing of SSBs as negative within the anti-sugar PHC, in addition to its overall persuasive nature, was found to lead to changes in explicit attitudinal evaluations and changes in the set of momentarily considered propositional information (see Section 6.2.2.1).

Second, and despite the potential of social desirability biases effecting responses to explicit attitudinal measures, the clear description and framing of excessive SSB consumption as harmful and unhealthy in the anti-sugar PHC might have been used by respondents to infer that SSBs indeed are harmful and unhealthy, thus leading to explicit attitudinal evaluations of a less favourable nature being observed post-test.

Therefore, it is likely that the influence of the anti-sugar PHC on consumers' implicit and explicit attitudes toward SSBs was consistent across forms, following exposure.

Third, whereas some respondents may not have been aware of the risks of excessive SSB consumption prior to their participation in the study, the anti-sugar PHC sought to inform and reinforce such risks. Thus, a basis for new propositions was provided following exposure to the anti-sugar PHC.

Thus, it is concluded that exposure to the anti-sugar PHC leads to changes in the patterns of association activation (ie, implicit attitudes), changes in explicit associative structure (ie, explicit attitudes), and reinforcement of the risks associated with excessive SSB consumption. Insofar as Case 8 of the APE model is concerned (Gawronski & Bodenhausen, 2006:708-709), exposure to persuasive messages may lead to effects of an EC nature and effecting changes in implicit attitudes (as demonstrated in H_2) with corresponding changes in explicit attitudes observed because of influencing propositional evaluations (as demonstrated in H_1).

To this end, Case 8 of the APE model stipulates that mutual mediation by implicit and explicit attitudes should be observed (Gawronski & Bodenhausen, 2006). As such, the forthcoming section addresses the conclusions of the secondary objectives, where H_3 and H_4 sought to examine the mediation by implicit and explicit attitudinal changes.

6.2.3. Conclusions of Secondary Objectives

In attending to this study's secondary objectives, to determine whether changes in implicit attitudes mediate changes in explicit attitudes toward SSBs following exposure to an anti-sugar PHC, and vice versa, the conclusions are drawn from the findings of H_3 (ie, implicit attitudinal mediation) are discussed next, with the conclusions of H_4 (ie, explicit attitudinal mediation) detailed thereafter.

6.2.3.1. Hypothesis Three

H_3: Explicit attitudinal change is mediated by implicit attitudinal changes.

As noted by Gawronski and Bodenhausen (2006), an external factor can lead to changes in both associative activation (ie, implicit attitudes) and propositional reasoning (ie, explicit attitudes). To this end, the third hypothesis sought to examine whether changes in explicit attitudes toward SSBs were indirectly influenced by changes in implicit attitudes toward SSBs. Earlier (see Section 6.2.2.1), changes in explicit attitudes were deemed to be observed in cases where cognitive consistency is sought (Gawronski & Bodenhausen, 2006). Gawronski and Strack (2004) argue that cognitive dissonance, that is, where two cognitions are conflicting, is an inherently explicit attitudinal-natured phenomenon. Thus, cognitive dissonance can be resolved either by rejecting one of the conflicting arguments (ie, propositions) or by seeking a

new or different proposition which is consistent with the other explicit attitudinal evaluation (Gawronski & Strack, 2004; Strack & Deutsch, 2005, 2006).

Accordingly, once exposed to the new or different propositions presented in the anti-sugar PHC treatment condition, respondents might have experienced a sense of cognitive dissonance. That is, they may or may not have been aware of the risks associated with excessive SSB consumption prior to exposure, but their liking of SSBs, be it the for the taste or the memories associated with their consumption, leads to an inconsistency in their explicit attitudinal evaluation. Thus, one possible explicit evaluation might propose that an individual consume SSBs because they like the taste and have memories of consuming SSBs with friends and family; the conflicting explicit evaluation proposes that SSBs be avoided, as the health risks of excessive consumption are clearly non-beneficial.

However, cognitive inconsistencies might also be due to the propositions implied by automatic, implicit attitudinal evaluations, such that those propositions are subsequently rejected or considered false (Gawronski & Bodenhausen, 2006). Thus, it is likely that exposure to the intervention leads to changes in implicit attitudinal evaluation activation patterns, such that, instead of the taste of SSBs being automatically activated, the potential health consequences thereof were activated automatically (see Section 6.2.2.2; Michael Jordan and Tom Cruise example). Considering that such implicit attitudinal evaluations are outside of an individual's conscious awareness, it is likely that these associative evaluations serve as the basis for individuals' explicit attitudinal evaluations of the attitude object (ie, SSBs) (Gawronski & Bodenhausen, 2011). Thus, it can be said that the change from pre- to post-test in the experimental group respondents' implicit attitudes mediated changes in their explicit attitudes toward SSBs.

Specifically, the model estimates pertaining to H_3 indicated a significant influence of exposure to the anti-sugar PHC on respondents' implicit attitudinal evaluations of SSBs (α = -218.29, SE = 22.56, p<0.001), where exposure led to a significant decrease (ie, SSBs were subsequently implicitly evaluated as less favourable). The observed changes in these implicit attitudinal evaluations led to a significant rate of change in explicit attitudinal evaluations of SSBs (β = 0.62, SE = 0.05, p<0.001), where a one-unit decrease in implicit attitudes would lead to a 0.62-unit decrease in explicit attitudes toward SSBs. Thus, it can be concluded that respondents seemed to experience some level of cognitive consistency regarding their implicit and explicit attitudinal evaluations of SSBs (ie, a positive relationship).

Furthermore, significance was found for H_3 ($Z_{\alpha\beta}$ = -2.74, p = 0.003), providing evidence for the presence of a significant mediational effect, such that changes in explicit attitudes were explained by changes in implicit attitudes when controlling for group membership (ie, exposure or non-exposure to the intervention). Thus, it can be concluded that the changes observed in consumers' implicit attitudes brought on by

exposure to the anti-sugar PHC, mediated changes in their explicit attitudes toward SSBs.

The following section discusses the conclusions drawn from the findings of H_4.

6.2.3.2. Hypothesis Four

H_4: Implicit attitudinal change is mediated by explicit attitudinal changes.

As alluded to earlier, the APE model (Gawronski & Bodenhausen, 2011) posits that changes in propositional processes (ie, explicit attitudes) are caused by exposure to some external factor (for example, an anti-sugar PHC), which, in turn, may indirectly affect associative processes (ie, implicit attitudes). Considering this, the fourth hypothesis sought to examine whether changes in implicit attitudes toward SSBs were indirectly influenced by changes in explicit attitudes toward SSBs.

Bar-Anan and Moran (2018) conceptualise information either as linking or relational in nature; linkage information simply implies that *Bob is good*, whereas relational information refers to the nature of the link (ie, the type of relation) between *Bob* and positively valenced attributes (ie, *good*). According to the authors, linkage information is easier to encode to memory than is relational information, owing to the more basic nature of the information itself. Moreover, in making an inference based on linkage information (ie, *Bob prevented war*), implicit attitudinal evaluations of *Bob* might automatically activate associations with *war*, implying a link between *Bob* and *negative* (assuming *war* is perceived as negatively valenced), where, in fact, explicit attitudinal evaluations of *Bob* may more accurately associate *Bob* and *positive* (Bar-Anan & Moran, 2018). Thus, individuals are likely to automatically reinforce the seemingly more accurate implicit attitudinal evaluation of *Bob* as *positive*, due to the influence of the explicit inferences made (ie, reached through propositional reasoning).

Furthermore, the APE model stipulates that by effecting processes of propositional validation (ie, deliberate, conscious reasoning in favour of an argument), the implicit attitudinal associations activated through these processes are retrieved in line with the outcome of the relevant valid propositions (Gawronski & Bodenhausen, 2014b). As propositional validation processes require the retrieval of implicit attitudinal evaluations, it is suggested that recently acquired information (for example, *Bob prevented war*) leads to changes in both implicit and explicit attitudes, where implicit attitudinal changes mediate changes in explicit attitudes (Gawronski & Bodenhausen, 2006, 2014b).

Whitfield and Jordan (2009) posit that recently encountered propositions contribute to the proactive construction or reinforcement of automatic, implicit attitudinal associations in memory. Thus, as demonstrated by Petty *et al.* (2006) and Gawronski and Walther (2008), propositional validation leads to changes in implicit attitudinal associations through the explicit attitudinal evaluations deliberately inferred. For

example, the authors demonstrated that individuals who “deliberately infer that people who like others are themselves likeable” whereas the opposite is true for those people who dislike their peers (Gawronski & Walther, 2008:1284). As such, explicit attitudinal evaluation inferences can lead to changes in the implicit attitudinal association between attitude objects and attributes (Gawronski & Bodenhausen, 2006, 2011). Moreover, indirect effects on implicit attitudinal evaluations are likely to be observed when explicit, deliberate inferences are made in such a way to affirm the given evaluation (for example, SSBs are unhealthy; cf. Gawronski, Deutsch, Mbirkou, Seibt & Strack, 2008a; Gawronski & Walther, 2008).

Specifically, the model estimates pertaining to H_4 indicated a significant influence of exposure to the anti-sugar PHC on respondents’ explicit attitudinal evaluations of SSBs ($\alpha = -86.14$, SE = 4.31, $p<0.001$), where exposure led to a significant decrease (ie, SSBs were subsequently self-reported as less favourable). The observed changes in these explicit attitudinal evaluations led to a significant rate of change in implicit attitudinal evaluations of SSBs ($\beta = -0.77$, SE = 0.10, $p<0.001$), where a one-unit decrease in explicit attitudes would lead to a 0.77 unit increase in implicit attitudes toward SSBs. Thus, it can be concluded that respondents seemed to experience some level of cognitive inconsistency regarding their explicit and implicit attitudinal evaluations of SSBs (ie, a negative relationship).

Furthermore, significance was found for H_4 ($Z_{\alpha\beta} = 2.43$, $p = 0.008$), providing evidence for the presence of a significant mediational effect, such that changes in implicit attitudes were explained by changes in explicit attitudes when controlling for group membership (ie, exposure or non-exposure to the intervention).

As addressed earlier (see Section 6.2.3.1), the fact that cognitive inconsistencies may lead to a rejection of the associative and propositional processes underlying evaluative responses (see Gawronski & Bodenhausen, 2011) provides a possible explanation for this inconsistency in mediational effects for explicit and implicit attitudes as demonstrated in the preceding two hypotheses. For example, if propositions (ie, explicit attitudes) are produced through the activation of associative processes (ie, implicit attitudes) that are inconsistent, people may reject such propositions as false or find a new proposition which will resolve the apparent cognitive inconsistency (Gawronski & Strack, 2004). Conversely, the acceptance of automatically activated associations (ie, implicit attitudes) depends on their consistency, or ‘level of agreement’, with salient propositions (ie, explicit attitudes) at the time of decision-making (Gawronski *et al.*, 2008b). Thus, it can be concluded that the changes observed in explicit attitudes brought on by exposure to the anti-sugar PHC mediated changes in consumers’ implicit attitudes toward SSBs.

With the conclusions drawn from the findings of each hypothesis in mind, the forthcoming sections offer the theoretical and managerial implications thereof.

6.3. THEORETICAL CONTRIBUTIONS

Research can offer a theoretical contribution by bridging the gap between what is known and what is needed to be known; theories require construction and persistent validation (Webster & Watson, 2002). This research addressed the uncertainty surrounding the efficacy of anti-sugar PHCs in influencing consumers' implicit and explicit attitudes toward SSBs, by adopting DPT as the theoretical lens through which the APE model was tested. As such, the following sections discuss the contributions to theory, where each of this study's key tenets is addressed, namely, social marketing, PHCs, obesity, SSBs, cognition, and attitudes.

6.3.1. Social Marketing

Viewed as a framework from which social change may be guided (Stead *et al.*, 2007b; French & Gordon, 2020), the ever-developing field of social marketing seeks to better understand how the wellbeing of consumers can be prioritised (Brychkov & Domegan, 2017; Pirouz, 2017). Further, to encourage enhanced levels of wellbeing among individuals and society alike (Cerf *et al.*, 2017; Basil, 2019; French & Gordon, 2020), social marketing commonly focuses on elements of persuasion in communicating with consumers (Rahman *et al.*, 2014; Andreasen, 2018). Thus, through the examination of an anti-sugar PHC, this research contributes to the broad understanding of social marketing by providing evidence that persuasive communication can influence the determinants of health-related consumer behaviours.

Marketing communications are deemed to be accepted merely at face value, with consumers failing to contemplate the ramifications highlighted therein (Mickey, 2003). Moreover, it has been suggested that effecting the beliefs, awareness, and consumer attitudes towards a concept is the first step in catalysing changes in consumer behaviour (Ha *et al.*, 2014), with Walls *et al.* (2011) highlighting the importance of clearly communicating the benefits and consequences of food and beverage consumption, to ensure that the attitudes and beliefs related to this consumption are reinforced via psychological means. With respect to psychological processing, St Quinton and Brunton (2017) note the importance of understanding the roles of attitudes in behaviour, suggesting that by identifying which attitudinal associations are central to decision-making, that avenues for interventions can be created. Thus, this study contributes to social marketing by examining the 'first step' towards effecting behavioural changes among consumers, finding that the psychological processes underlying consumer behaviour can be significantly influenced through exposure to a persuasive form of health communication (ie, anti-sugar PHCs). Further, this research contributes to social marketing by providing insights into *how* consumers' implicit and explicit attitudes toward SSBs are affected by anti-sugar PHCs, thereby offering understanding into the nature of consumers and their potential response to social-marketing campaign material.

To satisfy both individual and societal welfare needs (Leo, 2013), there have been calls for research to better understand consumers at the individual level (Evans & French, 2019; French & Gordon, 2020), particularly where the determinants of behaviour are concerned. Additionally, social marketers need to carefully consider the nature of a target population to better understand their behaviour and the influences thereof (Andreasen, 2002; Saunders *et al.*, 2015). Thus, this study offers a contribution to social-marketing theory by assessing PHC efficacy among a sample of young adults in South Africa, providing insight into how this cohort interprets health-related communication.

The effectiveness of social marketing can be enhanced by using relevant theory (David & Rundle-Thiele, 2018), assisting in both explaining and predicting findings (Royne, 2016). Furthermore, Glanz and Rimer (2005) maintain that the use of appropriate and relevant theory can provide the bedrock for successful interventions, facilitating the development and implementation of campaigns by identifying behavioural determinants (Luca & Suggs, 2013). Research has identified the Transtheoretical Model (see Prochaska & DiClemente, 1983) and Theory of Planned Behaviour (see Ajzen, 1985, 1991) as being frequently adopted theories in social-marketing-related literature (Luca & Suggs, 2013). Thus, by adopting the APE model as the theoretical framework for this study to evaluate the effectiveness of health-related communication on consumers' implicit and explicit attitudes toward SSBs, this research contributes to the social-marketing literature by providing evidence for the appropriateness and relevance of the APE model in the field.

6.3.2. Public Health Campaigns

PHCs are used to compel consumers to alter their behaviour, thereby preventing undesirable outcomes from occurring (Robinson *et al.*, 2014; Mayén *et al.*, 2016). As such, PHCs are of interest (Pendleton, 2013). Further, PHCs can be implemented to make consumers aware of the risks of health-related behaviours (Luca & Suggs, 2013; Chin & Mansori, 2018). Due to political and economic factors hindering the potential efficacy of PHCs (Thow *et al.*, 2018) and commercial advertising deemed to be undoing the good of PHCs (Choi & Reid, 2015; Dunstone *et al.*, 2017), particularly in South Africa (Delobelle *et al.*, 2016), the effectiveness of consumption-related PHCs remains largely unknown (Hoek & Jones, 2011; Thow *et al.*, 2018). Consumers typically make their consumption decisions based purely on emotion (Just, Mancino & Wansink, 2007; Kite *et al.*, 2018), where successful PHCs have sought to invoke emotional and cognitive responses among consumers, to affect behaviour change (Wakefield *et al.*, 2010; Dunstone *et al.*, 2017). Thus, this study contributes to the literature by demonstrating the potential efficacy of anti-sugar PHCs within the context of South Africa, to respond to the commercial advertising efforts of industry in creating an apparent asymmetry of information among consumers (ie, the benefits versus risks of consumption). In addition, this study contributes to the literature by evaluating consumer responses to the PHC material from a cognitive perspective (ie, neural

processing of information, memory, and implicit attitudes), providing insight into the emotional and cognitive responses of young adults following their exposure to the intervention.

Much like alcohol and tobacco, food consumption can be addictive and habitual, with calls for research to better understand the drivers underlying health-related consumer behaviour in the literature (Delobelle *et al.*, 2016; Pirouz, 2017). Further, the force of one's motivation elicited by anti-sugar PHCs can affect changes in attitudes and behaviour through persuasion (Gordon *et al.*, 2016; Bristow *et al.*, 2020). Thus, this study contributes to PHC research by evaluating the extent to which anti-sugar PHCs can affect the drivers of SSB consumption (ie, consumers' attitudes toward SSBs), providing new evidence in support of the notion that anti-sugar PHCs can persuade consumers to reconsider the implications of SSB consumption.

Notwithstanding literature advocating for PHC implementation in alcohol consumption (cf. Crawford-Williams *et al.*, 2015; Young *et al.*, 2018) and tobacco consumption contexts (cf. Hoffman & Tan, 2015; Grigaliunaite & Pileliene, 2017; Durkin *et al.*, 2020), there have been recent calls for research to elucidate the efficacy of anti-sugar PHCs (Von Philipsborn *et al.*, 2019; Murukutla *et al.*, 2020). Despite no behavioural data being collected in this study, substantial evidence for immediate-term changes in consumption due to PHCs has not yet been established (Allamani *et al.*, 2017; Young *et al.*, 2018). However, Dunstone *et al.* (2017) posit that, by effecting consumer attitudes toward the health behaviour of interest, PHCs can provide the basis for long-term behaviour change. Thus, this research contributes to the study of PHCs by examining the efficacy within this anti-sugar context, and contributes to PHC research by providing evidence of attitudinal change, which might have the potential to affect the consumption of SSBs in the long term.

6.3.3. Obesity and Sugar-Sweetened Beverages

Reeve and Gostin (2019) and Casswell (2019) posit that the uptake of PHCs and broad public policies has been curtailed by aggressive industry interference, which has further exacerbated the obesity epidemic and prevalence of NCDs (Farley *et al.*, 2017). Failings by governments to curb obesity (Mchiza *et al.*, 2016), in addition to the burden of NCDs, convey the need for research to identify potentially successful PHCs to be implemented (Delobelle, 2019; Reeve & Gostin, 2019). Further, the obesity prevalence in South Africa has been attributed to dietary changes (Ronquest-Ross *et al.*, 2015), with the increasing consumption of SSBs identified as a "major" factor underlying this prevalence (Murukutla *et al.*, 2020:2). Further, some scholars have cited SSB consumption as the leading driver of NCD prevalence (see Kaltenbrun *et al.*, 2020; Wrottesley *et al.*, 2020). Despite interest in regulating unhealthy product promotion (Department for Digital, Culture, Media and Sport & Department of Health and Social Care, 2019), there is a lack of evidence to suggest that public policy alone can address the obesity problem, with calls for research into the efficacy of SSB-

related PHCs (Delobelle, 2019; Forde *et al.*, 2019). Thus, this study contributes to the obesity literature by providing novel insights into the potential success of anti-sugar PHCs within a SSB context, in South Africa and potentially beyond.

Farley *et al.* (2017) conclude that anti-sugar PHCs are effective insofar as the recall of the campaign and the knowledge and beliefs relating to SSB consumption are concerned. Further, the authors recommend that future research applies robust and rigorous experimental paradigms to anti-sugar PHC evaluations (Farley *et al.*, 2017). Thus, this study contributes to the SSB consumption literature by adopting a true-experimental research design, and what are arguably complex inferential statistical analyses in SO-MG-LCM and PP-LGM, allowing for the causal relationship between exposure to anti-sugar PHCs and subsequent changes in implicit and explicit attitudes towards SSBs to be inferred.

6.3.4. Cognition

The importance of understanding why and how consumers behave as they do has been highlighted (Jansson-Boyd & Zawisza, 2017; Jansson-Boyd, 2019), specifically within the health-related-behaviour context (Conner & Norman, 2015). Thus, this study contributes to the theory of cognition by assessing the extent to which the intervention effects consumer attitudes (ie, the *why*), with a particular focus on the mechanisms underlying differential changes in implicit and explicit attitudes (ie, the *how*). Calls have been made to better understand human cognition through unpacking behavioural drivers (Jansson-Boyd, 2019), with a particular focus on how consumers interpret information and are subsequently influenced by this (Levine, Resnick & Higgins, 1993; Jansson-Boyd & Marlow, 2017; Spiteri-Cornish, 2017). Thus, this study contributes to cognition research by providing insight into how the information relayed by anti-sugar PHCs amounts to influences of implicit and explicit attitudes, with novel evidence provided as to how the information was received by consumers.

Environmental cues are deemed to affect the success of PHCs (Dunstone *et al.*, 2017; Yom-Tov *et al.*, 2018), thereby highlighting the importance of better understanding how the accessibility of knowledge plays a role in attitude formation. Thus, this study contributes to the cognition literature by examining the effect of an intervention on consumers' implicit attitudes toward SSBs, to determine the degree to which the intervention's message was interpreted and encoded in memory and the ease with which the information was retrieved. Motivational or persuasive communication can affect consumer behaviour (Locke, 2015), with Conner and Norman (2015) highlighting the value in understanding and identifying the drivers of behaviour. Therefore, motivation is an important concept for researchers to consider (Bagozzi & Dholakia, 1999; Vohs *et al.*, 2008), particularly within the context of health-related behaviour (Conner & Norman, 2015; Norman & Conner, 2015; Conner & Norman, 2017). Thus, this study contributes to the motivation literature by providing insight into how anti-sugar PHCs can affect consumers' implicit and explicit attitudes.

Understanding and identifying the discrepancies underlying various consumer evaluations is important for cognition research (Tormala & Briñol, 2015; De Houwer *et al.*, 2020), where further insight into behavioural influences can be established (Moran *et al.*, 2017; Grayot, 2020). Thus, this study contributes to the cognition research by providing evidence for the differential effects of an intervention on consumers' implicit and explicit attitudes toward SSBs, whilst demonstrating the interplay between the two attitudinal manifestations in support of DPT (Kahneman, 2011) and the APE model (Gawronski & Bodenhausen, 2006).

6.3.5. Attitudes

Attitudes are important determinants underlying consumer behaviour (Fishbein *et al.*, 2001), particularly within the field of health-related behaviour (Hollands *et al.*, 2011; Prestwich *et al.*, 2018; Asbridge *et al.*, 2021). As over 90% of the information that one is exposed to is processed subconsciously (Zurawicki, 2010), one's explicit attitudes may not reflect one's implicit attitudes towards an object (Peters & Gawronski, 2011; De Houwer *et al.*, 2020). However, once identified, one's implicit attitudes are deemed to be useful in predicting one's behaviour (Hollands *et al.*, 2011; Asbridge *et al.*, 2021). To this end, the stronger the influence on one's subconscious processing, the more challenging it is for one to ignore this at the conscious level (Kakoschke *et al.*, 2017; Payne *et al.*, 2017). In allowing for the association of an object with an emotion or feeling, captured in memory (Friese *et al.*, 2006; Friese & Hofmann, 2009), attitudes shape one's disposition toward objects, concepts, and people in the environment (Albarracín *et al.*, 2008). Accordingly, attitudinal dispositions imply the likelihood that one will exhibit favourable or unfavourable behaviour toward the object of interest (Fishbein & Ajzen, 1975; Eagly & Chaiken, 1993). Thus, this study contributes to research on attitudes by providing evidence that both implicit and explicit attitudes can be influenced by motivational forms of communication, demonstrating a strong and positive correlation between the two attitudinal manifestations within the sparsely populated context of anti-sugar PHCs and obesity-inducing SSBs.

Self-reported explicit attitudes have been shown to correlate with behaviours of interest; however, a gap in understanding exists between self-reported behavioural intention and explicit attitudes, and actual behaviour (Greenwald & Banaji, 2017; Maison & Gregg, 2017; Kurdi *et al.*, 2019). Wänke *et al.* (2002) note that implicit attitudes are useful in assessing persuasive communication effectiveness, suggesting that implicit attitudes are 'precursors' for brand choice. Therefore, implicit attitudes are deemed to be more accurate predictors of actual behaviour, with implicit cognitive processing and responses being assessed (Moorman, 2010; Dimofte, 2017; Greenwald & Banaji, 2017). Thus, this study contributes to the field of attitude research by focusing on implicit attitudinal evaluation measures, providing evidence to support the notion that implicit attitudes are not necessarily robust to change.

Considering the above, the forthcoming section addresses the managerial implications offered by this study.

6.4. MANAGERIAL IMPLICATIONS

Considering the conclusions and theoretical contributions of this study addressed above, this section provides the managerial implications for marketers and practitioners to consider when developing, implementing, and evaluating the efficacy of anti-sugar PHCs, and marketing campaigns in general. Indeed, these managerial implications can be noted by individuals who wish to study intervention-based behavioural changes, particularly within the field of public health.

6.4.1. Individual Wellbeing and Societal Welfare

Contrary to traditional marketing, social marketing typically does not provide direct rewards to consumers (Basil, 2019; French & Gordon, 2020). For example, incentives for healthy behaviours can be provided, whereas the risks of unhealthy behaviours can be communicated and reinforced (Kotler, 2017; Andreasen, 2018); encouragement and discouragement are thus the name of the proverbial social-marketing 'game' (Goldberg *et al.*, 2018; French & Gordon, 2020). Thus, this study says that the determinants of unhealthy dietary consumption can be influenced by PHCs (Basil, 2019; French & Gordon, 2020). Marketers should not overlook the benefits offered by social-marketing campaigns, as successful campaigns may indeed lead to changes in behavioural drivers and an improved sense of wellbeing and overall health.

The direct influences of marketing campaigns on behaviour are difficult to establish and claims are often made tentatively regarding social-marketing campaign success (Hornik, 2009/2002; French & Gordon, 2020). However, Walls *et al.* (2011) suggest that, if campaigns are clearly communicated, information can be reinforced and lead to changes in awareness and attitudes; the first step toward behaviour change can be taken. To this end, if a marketing campaign is shown to affect the determinants of the targeted behaviour, then it is likely that such changes in awareness and attitudes will lead to increases in adoption of these behaviours (see Andreasen, 2018; Goldberg *et al.*, 2018; Diaz-Meneses & Basil, 2019). Thus, marketers should ensure that the information being communicated to consumers is clear enough to enhance consumers' understanding of consumption benefits and risks and to reinforce these concepts at a psychological level (ie, conditioning).

Understanding the role of attitudes in behaviour change can better inform marketing-campaign implementation, such that pertinent attitudinal associations are identified and used as the basis for campaign development and targeting (St. Quinton & Brunton, 2017; French & Gordon, 2020). Thus, this study says that increased emphasis on understanding the potential motivations underlying behaviour is to be

made by marketers, as better understanding these aspects of consumer behaviour can enhance the efficacy of campaigns. Furthermore, to affect changes in health-related behaviour (Basil, 2019; French & Gordon, 2020), marketers should ensure that their marketing material is persuasive and motivational, akin to the anti-sugar PHC material used in this research.

Prior to developing social-marketing campaigns, practitioners consider the nature of their target population to understand how this cohort may best be encouraged to change their behaviour (Andreasen, 2002; Saunders *et al.*, 2015). Notwithstanding the evidence provided for anti-sugar PHC efficacy in this study with respect to young adults in South Africa, marketers should ensure that they understand their target population at an individual level, such that avenues for campaign development and implementation are enhanced (Grier & Bryant, 2005; Evans & French, 2019; French & Gordon, 2020). Thus, this study says that young adult consumers' implicit and explicit attitudes toward SSBs are not robust to change, and implementing the anti-sugar PHC in South Africa has the potential to affect attitudinal changes among these consumers.

Adopting theories relevant to the behaviours targeted by social-marketing campaigns can assist in developing effective programmes (David & Rundle-Thiele, 2018), providing insight into how consumers may interpret and react to the campaign (Royne, 2016). Additionally, selecting an appropriate theory for each campaign can enhance the communication to consumers (Glanz & Rimer, 2005) by identifying relevant behavioural drivers (Luca & Suggs, 2013). Thus, to provide practitioners with the appropriate tools to affect change, marketers are encouraged to carefully select theories that provide insights into the factors influencing the targeted behaviour (Akbar *et al.*, 2019; French & Gordon, 2020). Furthermore, marketers are encouraged to apply the APE model (Gawronski & Bodenhausen, 2006) through the lens of DPT (Kahneman, 2011) in assessing the efficacy of anti-sugar PHCs on consumers' implicit and explicit attitudes toward SSBs, as these theories provide insights into how successfully the PHC can affect implicit and explicit attitudes. Thus, marketers ought to ensure that the adopted theory accounts for the mechanisms underlying PHC efficacy, which can facilitate improvements in campaign reliability, development, and implementation.

6.4.2. Overcoming Obesity through Public Health Campaigns

A common element of social-marketing campaigns, PHCs seek to create consumer awareness of health-related consumption benefits, risk, and consequences (Luca & Suggs, 2013; Chin & Mansori, 2018), where policymakers aim to affect behaviour change through communication with the public (Kreps, 2002a; Luca & Suggs, 2013). To overcome complex health challenges, PHCs have been identified as an effective tool with which population-level changes in behaviour can be affected (Robinson *et al.*, 2014; Mayén *et al.*, 2016). Thus, policymakers should consider implementing

PHCs to encourage consumers to practice healthy behaviours, thereby preventing undesirable health outcomes from occurring. Further, there is an urgent requirement for action by policymakers in South Africa owing to the high prevalence of obesity and NCDs (Spires *et al.*, 2016; Delobelle, 2019). Bosire *et al.* (2020) note that while evidence has found that SSB taxation reduces the consumption thereof in South Africa (see Stacey *et al.*, 2021), they suggest that the tax be complemented by a comprehensive behaviour-change strategy to further reduce the consumption of SSBs. Thus, this study says that, if anti-sugar PHCs are effective insofar as changing consumers' implicit and explicit attitudes toward SSBs are concerned, that policymakers in South Africa consider implementing this or similar anti-sugar PHCs to affect attitudinal and potential behavioural changes.

Political and economic barriers often hinder the efficacy of PHCs (Dunstone *et al.*, 2017; Thow *et al.*, 2018), particularly in South Africa (Delobelle *et al.*, 2016). Moreover, despite the South African government imposing a tax on SSBs in 2018 (*Rates and Monetary Amounts and Amendment Revenue Laws Act, No. 14 of 2017,* 2017:s17, 2017), Daniel (2021) indicates that, of the R7.9 billion collected since this imposition, only R38 million has been spent by the national Department of Health on SSB-related health promotion. Thus, this study encourages the South African government and policymakers to allocate funding to the development and implementation of anti-sugar PHCs, which may supplement the efficacy of the SSB tax (Redondo *et al.*, 2018; Daniel, 2021). Furthermore, these PHCs should be implemented by practitioners on a national scale to ensure that the reach thereof is large (Randolph & Viswanath, 2004; Robinson *et al.*, 2014; Morley *et al.*, 2018). Notwithstanding the lack of evidence in support of PHCs effecting immediate-term behaviour change (Allamani *et al.*, 2017; Young *et al.*, 2018), the importance of assessing consumer attitudes towards targeted behaviours has been highlighted (Dunstone *et al.*, 2017), where influencing attitudes is considered a first step toward behaviour change (Goldberg *et al.*, 2018; Diaz-Meneses & Basil, 2019). Thus, marketers should ensure that their campaigns successfully tap into consumer attitudes; once this has been established, the behavioural outcomes are likely to follow (cf. Farley *et al.*, 2017; Murukutla *et al.*, 2020).

Gordon *et al.* (2016) note that consideration is to be given to the potential 'contamination' effects of campaigns; targeting one consumer group (for example, tobacco-smokers) might lead to an overall decrease in tobacco consumption, though this targeted group may feel stigmatised and question its right to free choice. Thus, marketers should ensure that, in developing their campaigns, be it for profit or societal welfare, they consider the potential psychological and socio-economic consequences which certain consumer groups may encounter. With reference to Gordon *et al.* (2016), the anti-sugar PHC used in this study may lead to obese individuals feeling despondent and stigmatised. The importance of considering discrepancies in the various evaluations underlying behavioural drivers has been highlighted (Gawronski & Bodenhausen, 2006; Tormala & Briñol, 2015; De Houwer *et al.*, 2020), where the

behaviour prediction capability of respective evaluations provides insight into the usefulness of each (Moran *et al.*, 2017; Bar-Anan & Moran, 2018; Grayot, 2020). To this end, implicit and explicit attitudes are important for researchers to understand (Greenwald & Banaji, 2017; Maison & Gregg, 2017; Charlesworth & Banaji, 2019), with implicit attitudes deemed to be useful in predicting behaviour (Balconi *et al.*, 2017; Dimofte, 2017; Greenwald & Banaji, 2017). Thus, this study encourages marketers to consider both implicit and explicit attitudinal measures as indicators of future consumer behaviour, with evidence suggesting that they are valid predictors of food and drink consumption (Gallucci, Del Mauro, Pisoni, Lauro & Mattavelli, 2021). Furthermore, implicit attitudinal measures (for example, IAT and EPT) should form part of researchers' arsenal, as the discrepancies observed between consumers' implicit and explicit attitudes toward SSBs demonstrate the void left in outcomes by limiting studies to self-reported, explicit attitudinal measures.

This study faced certain limitations, which are all acknowledged and are detailed in the next section.

6.5. LIMITATIONS OF THE STUDY

The limitations faced in conducting this study are now presented.

First, the lack of behavioural data limits the conclusions which were drawn from the implicit and explicit attitudinal scores. As this study sought to determine the influence of an anti-sugar PHC on consumer attitudes, no behavioural data were collected, and thus no direct behavioural implications were possible.

Second, the evaluation of the influence of PHCs on consumer attitudes does not constitute a social-marketing campaign (Smith, 2018; Stead & Hastings, 2018). Further, the aim of this study was geared more towards understanding the influence of PHCs, as opposed to evaluating a fully-fledged social-marketing campaign.

Third, the use of student samples has been criticised for its lack of external validity (ie, generalisability; Lamb Jr & Stem Jr, 1980; Liefeld, 2003). Moreover, selecting students from only certain faculties or departments may lead to reduced validity, owing to the homogenous nature of the sample (Liefeld, 2003). However, the use of a sample of young adults has been used in similar research (Becker *et al.*, 2015; Glock *et al.*, 2015; Sato *et al.*, 2016; Genschow *et al.*, 2017; Sato *et al.*, 2017), thereby justifying its adoption in this study. Despite this, future researchers are encouraged to replicate this study with samples extending to other tertiary-education institutions and beyond, which could improve the generalizability of findings to the broader young-adult population in South Africa.

Fourth, whereas prior research obtained sample sizes exceeding N=1000 (see Farley *et al.*, 2017; Morley *et al.*, 2018; Murukutla *et al.*, 2020), this study was conducted

without the support of external funding, which each of the prior studies was provided with. To this end, *N*=770 was deemed sufficient for the purposes of this study, though a sample closer in size to those obtained in the literature might provide different findings, particularly among different target populations.

Considering the above limitations, the following section provides recommendations for future researchers who wish to build upon this study or evaluate whether the conclusions drawn are consistent across various target populations, countries, or contexts.

6.6. RECOMMENDATIONS FOR FUTURE RESEARCH

This section addresses what future research should consider in enlarging this study's findings.

In addition to the usefulness of PHC material and taxation policies, nutritional labelling has been used in alcohol and smoking contexts. For example, authors have demonstrated that alcohol labelling can lead to the recall of the information presented by a label (Kaskutas & Greenfield, 1992; Manyiwa & Brennan, 2012), though significant changes in consumption behaviour have been difficult to attribute directly to the labelling used (Mayer *et al.*, 1991). Further, Grigaliunaite and Pileliene (2017) demonstrated the effectiveness of using graphic health warnings on cigarette packaging, while Hoffman and Tan (2015) observed an increase in smoking quitting attempts and associated reductions in smoking prevalence. Accordingly, future researchers should assess whether similar health warnings on SSBs have an influence on consumers' attitudes and consumption behaviour. This may offer policymakers and practitioners additional approaches to curbing obesity, through reductions in SSB consumption.

As mentioned, this study did not collect any behavioural data. However, the gap in understanding between attitudes and actual behaviour has been highlighted in prior studies (Jones & Fazio, 2008; Maison & Gregg, 2017; Kurdi *et al.*, 2019). To this end, future researchers are encouraged to assess whether this study's findings still hold in the presence of behavioural data; the influence of anti-sugar PHCs on actual SSB consumption is likely to provide deeper insight into the interplay between implicit and explicit attitudes.

Further, assessing the extent to which mediation occurs in an attitude-behaviour model may provide additional understanding as to how each attitudinal manifestation is correlated with behaviour. Future researchers are encouraged to adopt implicit attitudinal measures of various forms (for example, IAT, EPT, Go-No Go, SC-IAT, EC) to further validate the use of such methods in marketing research. Additionally, calls have been made to assess the differential prediction capabilities of implicit and explicit attitudes, such that a variety of tools are adopted to enhance the understanding of

social cognition (Balconi *et al.*, 2017; Dimofte, 2017; St. Quinton & Brunton, 2017). Thus, the application of implicit measures to future research is encouraged, particularly where product advertising is concerned.

Another recommendation is that future research should expand this study's findings by conducting similar research, but in different contexts. For example, different age groups may respond differently to the anti-sugar PHC used in this study. Thus, in addition to conducting research into different target populations, further insight can be generated by considering the impact of demographic characteristics, such as race, socio-economic background, and level of education, as there is a possibility that these characteristics may have a bearing on how an anti-sugar PHC is received by consumers.

Owing to the collection of data at only two time points, future researchers are encouraged to collect data at multiple time points and with repeated exposure to the intervention material, to enhance the understanding of the efficacy of anti-sugar PHCs by evaluating whether changes in implicit/explicit attitudes and behaviour (ie, SSB consumption) varies over time, or if any notable patterns of change can be observed.

Neuromarketing offers researchers the tools with which a deeper understanding into consumer behaviour can be generated (Hsu, 2017). Thus, in addition to adopting implicit attitudinal measures, future researchers are encouraged to apply electroencephalography (EEG), galvanic skin response (GSR), eye-tracking technology (ETT), and facial coding to research, which have the capability of revealing a more accurate sense of reality and traditional, self-reported explicit measures (Falk *et al.*, 2015; Plassmann & Karmarkar, 2015; Cerf *et al.*, 2017). Further, researchers are encouraged to apply consumer neuroscience methods to research, as the implications of such measures can shape new models and theories of consumer behaviour (Shiv & Yoon, 2012; Agarwal & Dutta, 2015; Cerf *et al.*, 2017).

The forthcoming section constitutes the conclusion of this study, where a synthesis of this final chapter is provided.

6.7. CONCLUSION

The aim of this study was to evaluate the influence of anti-sugar PHCs on consumers' attitudes toward SSBs. This chapter began with the conclusions drawn from conducting self-report surveys and EPTs, where each conclusion was designated by the objective it sought to address. In conclusion, the anti-sugar PHC was found to significantly affect consumers' implicit and explicit attitudes toward SSBs, with significant mutual mediation by implicit changes on explicit changes demonstrated and vice versa. Considering these conclusions, the theoretical contributions of this study were detailed, providing an indication of how this study fills gaps in the literature regarding anti-sugar PHCs. Thereafter, the implications of this study's conclusions for

marketers and people in general were offered, highlighting how this study's findings can be applied to marketing practice and in strategic decision-making. The limitations faced by this study were subsequently identified, with recommendations for future researchers offered to allow for a deeper understanding of consumer behaviour, PHCs and SSBs, and implicit and explicit attitudes.

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APPENDIX A:
QUESTIONNAIRE ITEMS

	NUMBER OF ITEMS	QUESTION NUMBERS
Filter Questions	2	2.1 – 2.2
Practice Item	1	3.1
Coca-Cola	3	4.1 – 4.3
Fanta	3	5.1 – 5.3
Pepsi	3	6.1 – 6.3
Sprite	3	7.1 – 7.3
Red Bull	3	8.1 – 8.3
Appletizer	3	9.1 – 9.3
Liquifruit	3	10.1 – 10.3
Still Water	3	11.1 – 11.3
Full Cream Milk	3	12.1 – 12.3
Coke Zero	3	13.1 – 13.3
Pepsi Zero	3	14.1 – 14.3
Fanta Zero	3	15.1 – 15.3
Sprite Zero	3	16.1 – 16.3
Red Bull Sugar Free	3	17.1 – 17.3

Question 2.1 [Filter Question]: Are you between the ages of 18-24?

Yes

No

Question 2.2 [Filter Question]: With which gender do you identify?

Male

Female

Prefer not to answer

Other (please specify)

Question 3.1 [Practice Question]: For the following questions, please score the beverage depicted on the scale provided based on your association between the beverage and emotions.

For example, if you associate Coca-Cola with being "Happy", move the slider (▉) towards "Happy", or if you associate Coca-Cola with being "Sad", move the slider (▉) towards "Sad". Please note that the following scale is continuous, meaning that you are not required to rate the beverage at either of the absolute maxima/minima and that you may score the beverage at ANY POINT on the scale.

	Sad	Neutral	Happy
	▉		

Questions 4.1–4.3 [Coca-Cola]: Please score the beverage depicted on the scale provided based on your association between the beverage and emotions.

Unhealthy	Neutral	Healthy
Sad	Neutral	Happy
Anxious	Neutral	Content

Questions 5.1–5.3 [Fanta]: Please score the beverage depicted on the scale provided based on your association between the beverage and emotions.

Unhealthy	Neutral	Healthy
Sad	Neutral	Happy
Anxious	Neutral	Content

Questions 6.1–6.3 [Pepsi]: Please score the beverage depicted on the scale provided based on your association between the beverage and emotions.

Unhealthy	Neutral	Healthy
Sad	Neutral	Happy
Anxious	Neutral	Content

Questions 7.1–7.3 [Sprite]: Please score the beverage depicted on the scale provided based on your association between the beverage and emotions.

Unhealthy	Neutral	Healthy
Sad	Neutral	Happy
Anxious	Neutral	Content

Questions 8.1–8.3 [Red Bull]: Please score the beverage depicted on the scale provided based on your association between the beverage and emotions.

Unhealthy	Neutral	Healthy
Sad	Neutral	Happy
Anxious	Neutral	Content

Questions 9.1–9.3 [Appletizer]: Please score the beverage depicted on the scale provided based on your association between the beverage and emotions.

Unhealthy	Neutral	Healthy
Sad	Neutral	Happy
Anxious	Neutral	Content

Questions 10.1–10.3 [Liquifruit]: Please score the beverage depicted on the scale provided based on your association between the beverage and emotions.

Unhealthy	Neutral	Healthy
Sad	Neutral	Happy
Anxious	Neutral	Content

Questions 11.1–11.3 [Still Water]: Please score the beverage depicted on the scale provided based on your association between the beverage and emotions.

Unhealthy	Neutral	Healthy
Sad	Neutral	Happy
Anxious	Neutral	Content

Questions 12.1–12.3 [Full-Cream Milk]: Please score the beverage depicted on the scale provided based on your association between the beverage and emotions.

	Unhealthy	Neutral	Healthy
	Sad	Neutral	Happy
	Anxious	Neutral	Content

Questions 13.1–13.3 [Coca-Cola Zero]: Please score the beverage depicted on the scale provided based on your association between the beverage and emotions.

	Unhealthy	Neutral	Healthy
	Sad	Neutral	Happy
	Anxious	Neutral	Content

Questions 14.1–14.3 [Pepsi Zero]: Please score the beverage depicted on the scale provided based on your association between the beverage and emotions.

	Unhealthy	Neutral	Healthy
	Sad	Neutral	Happy
	Anxious	Neutral	Content

Questions 15.1–15.3 [Fanta Zero]: Please score the beverage depicted on the scale provided based on your association between the beverage and emotions.

	Unhealthy	Neutral	Healthy
	Sad	Neutral	Happy
	Anxious	Neutral	Content

Questions 16.1–16.3 [Sprite Zero]: Please score the beverage depicted on the scale provided based on your association between the beverage and emotions.

Unhealthy	Neutral	Healthy
Sad	Neutral	Happy
Anxious	Neutral	Content

Questions 17.1–17.3 [Red Bull Sugar Free]: Please score the beverage depicted on the scale provided based on your association between the beverage and emotions.

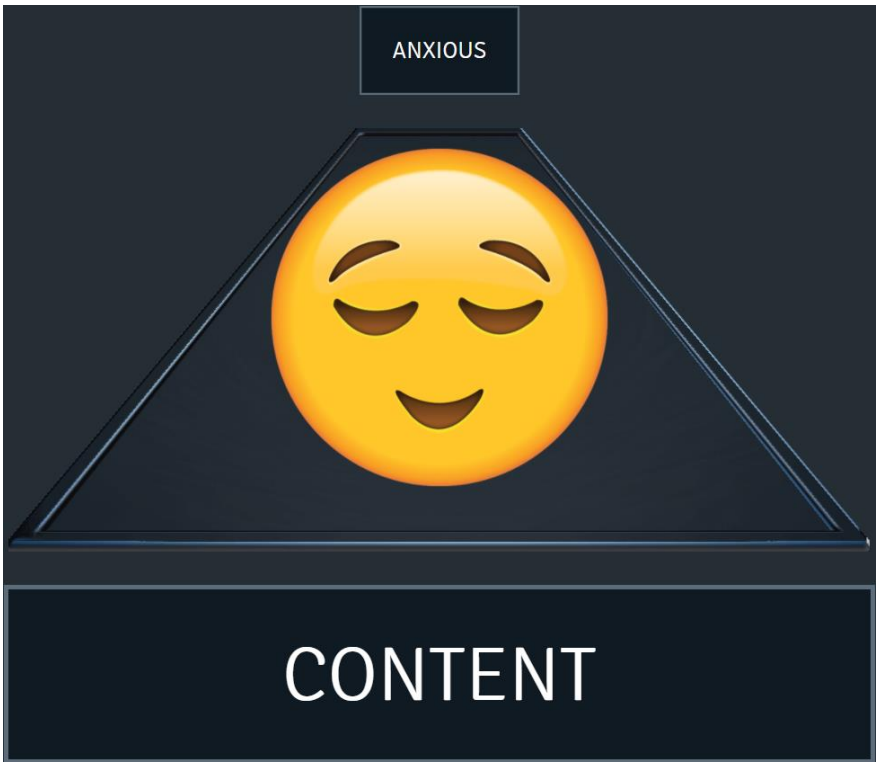
Unhealthy	Neutral	Healthy
Sad	Neutral	Happy
Anxious	Neutral	Content

APPENDIX B:
EVALUATIVE PRIMING TASKS [PRIME]

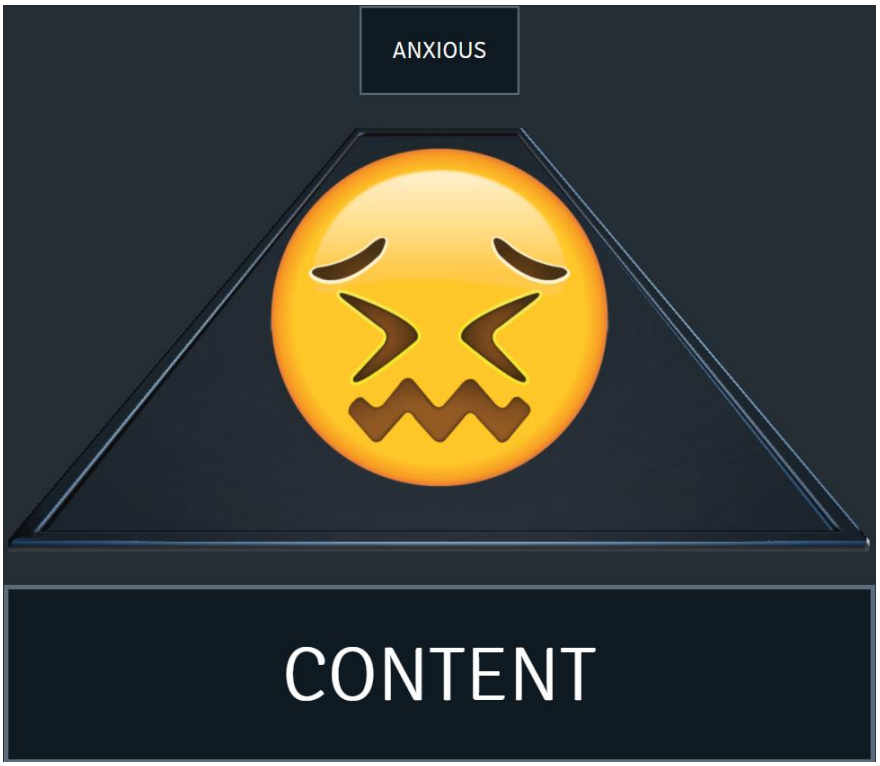

YOU ARE TESTING
SENTIENT PRIME
IMPLICIT RESEARCH TECHNOLOGY
28%
Coca-Cola
140
12 oz
HEALTHY

APPENDIX C:
EVALUATIVE PRIMING TASKS [TARGETS]

Appendix C1a: Content

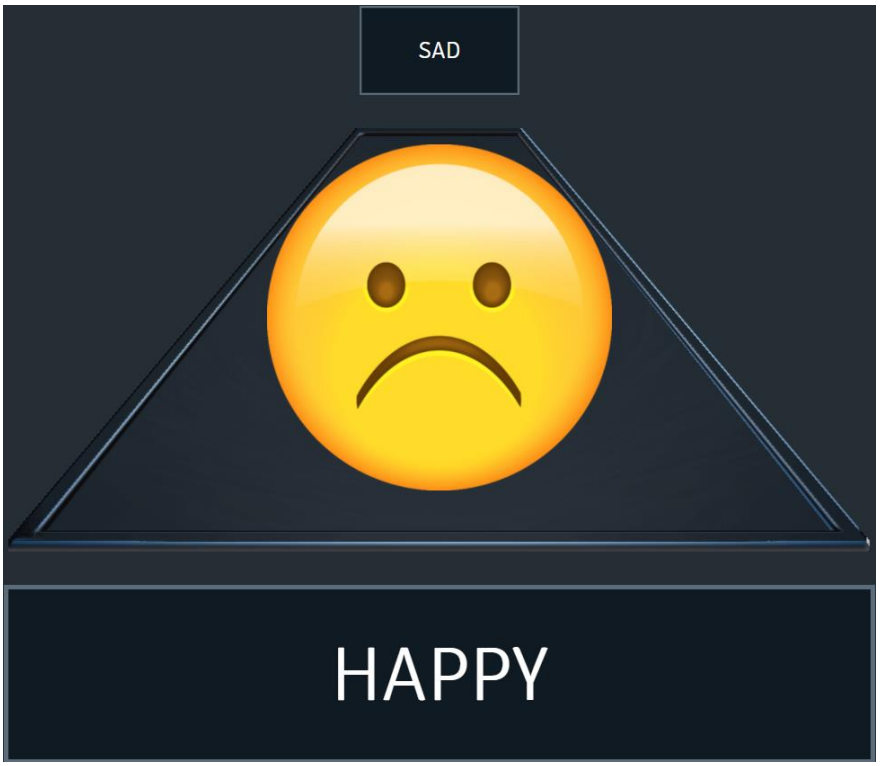


Appendix C1b: Anxious

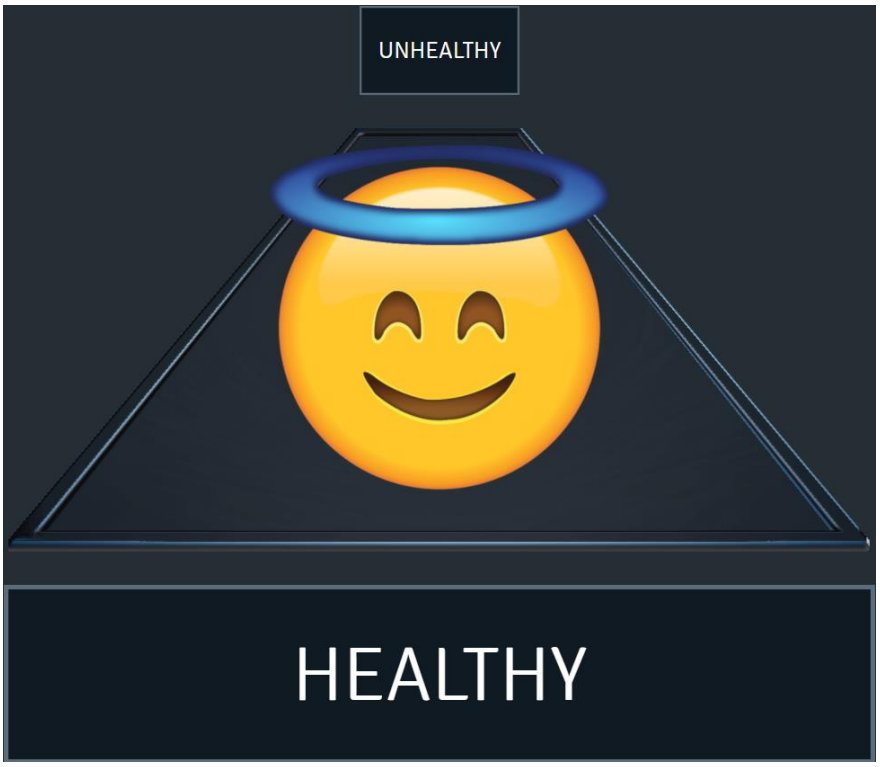


Appendix C2a: Happy

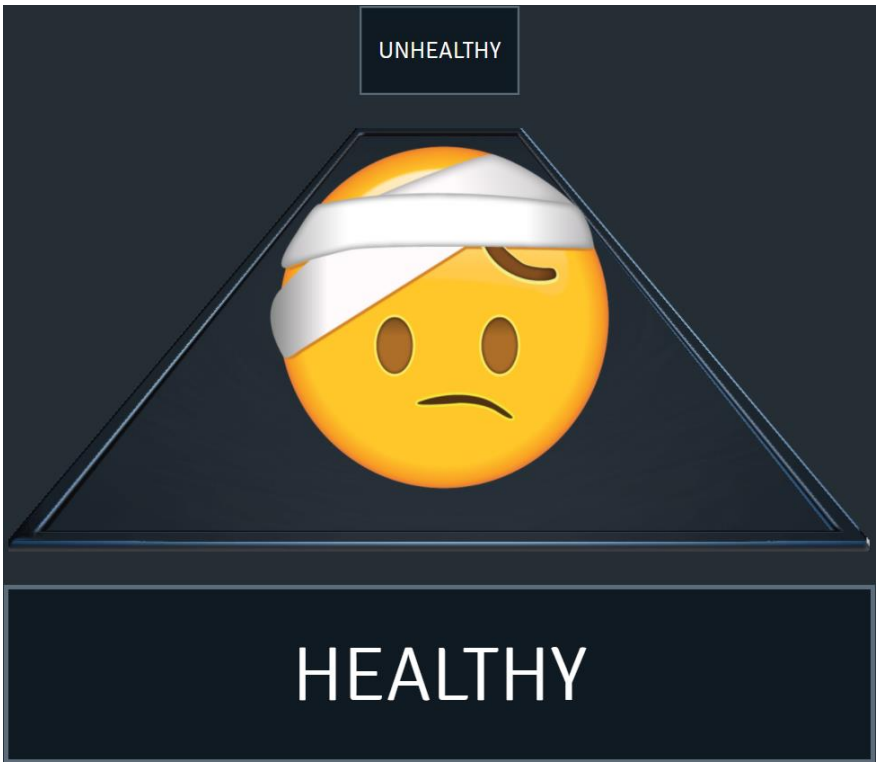
Appendix C2b: Sad



Appendix C3a: Healthy

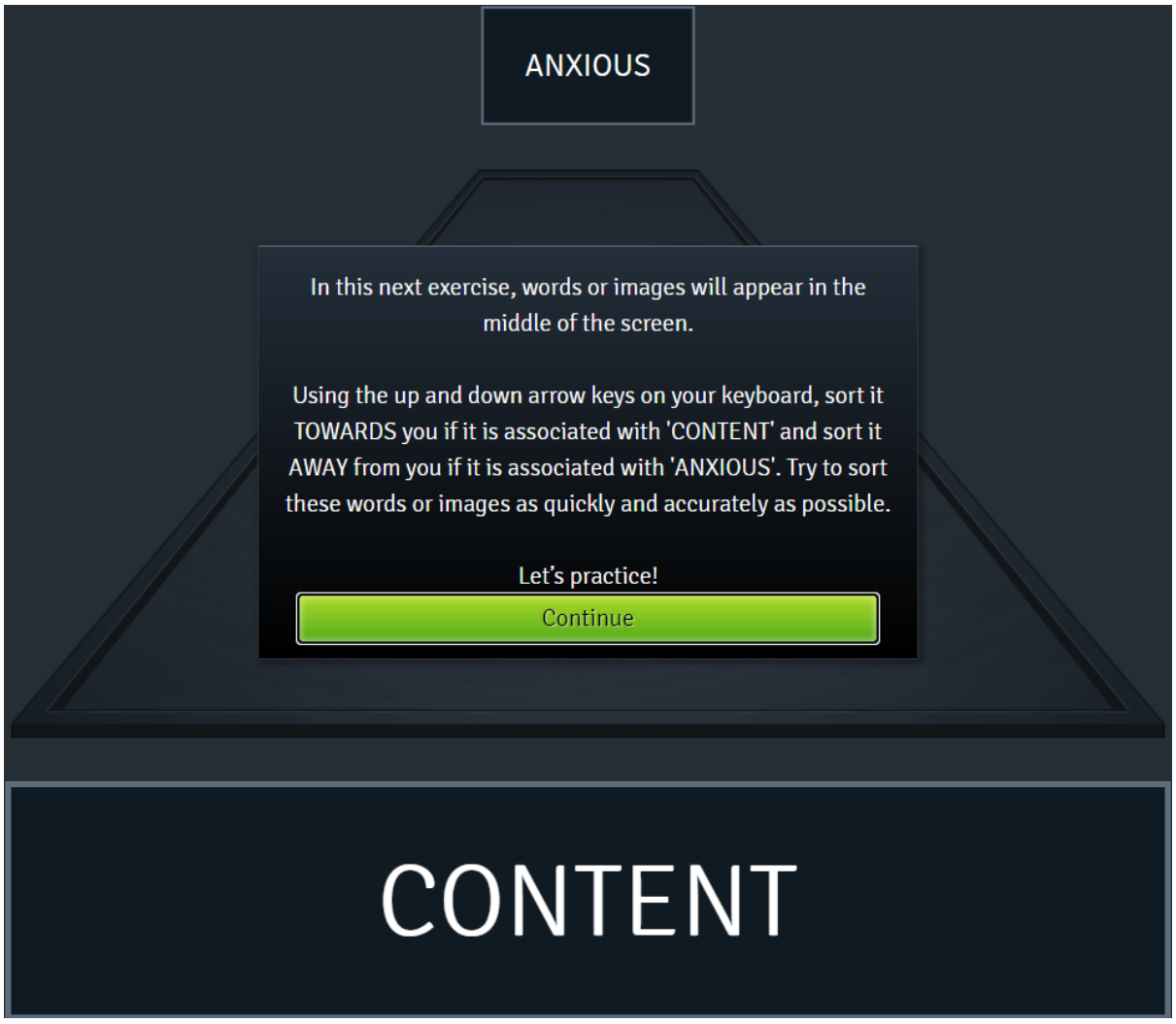


Appendix C3b: Unhealthy

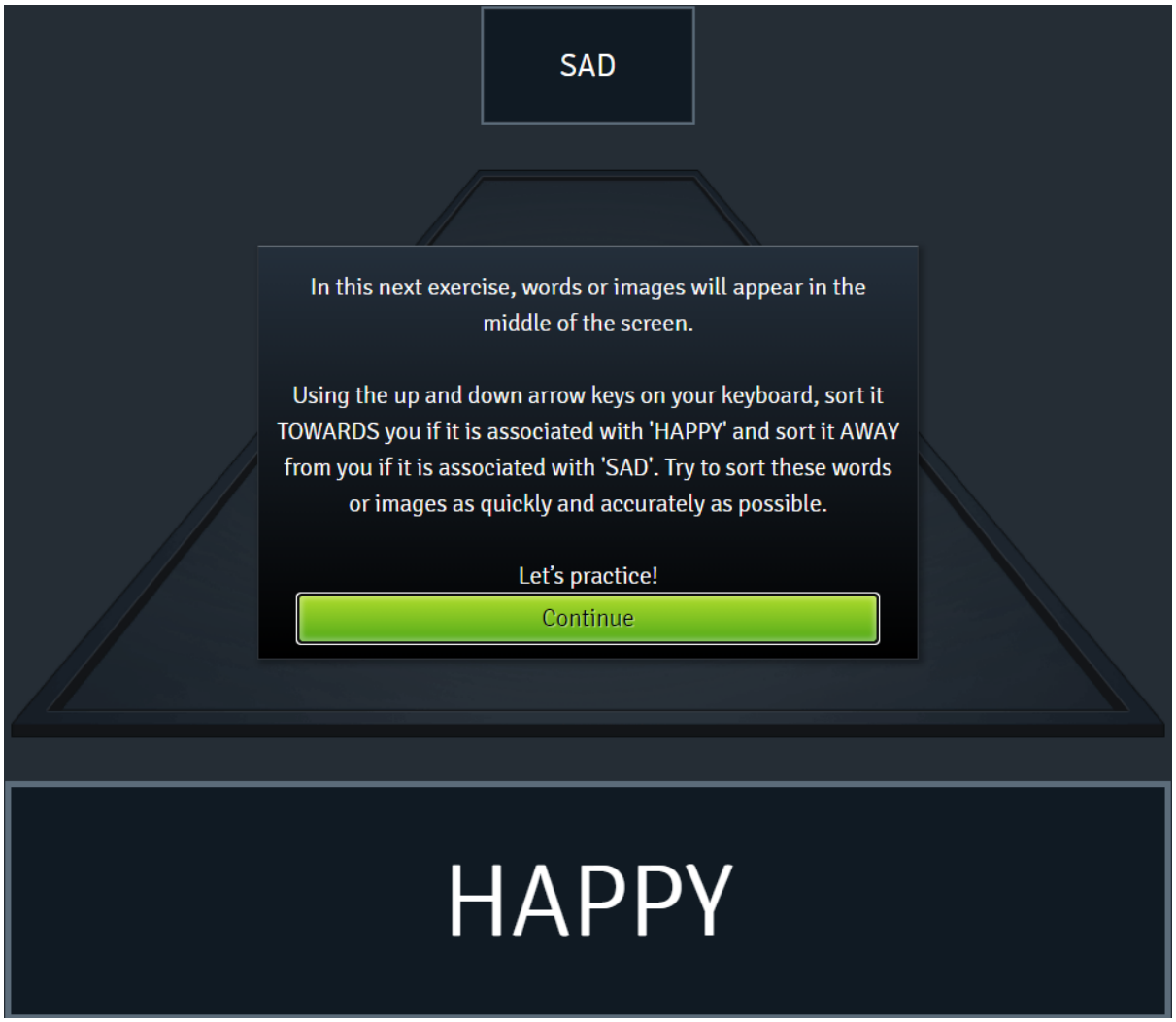


APPENDIX D:
EVALUATIVE PRIMING TASKS [INSTRUCTIONS]

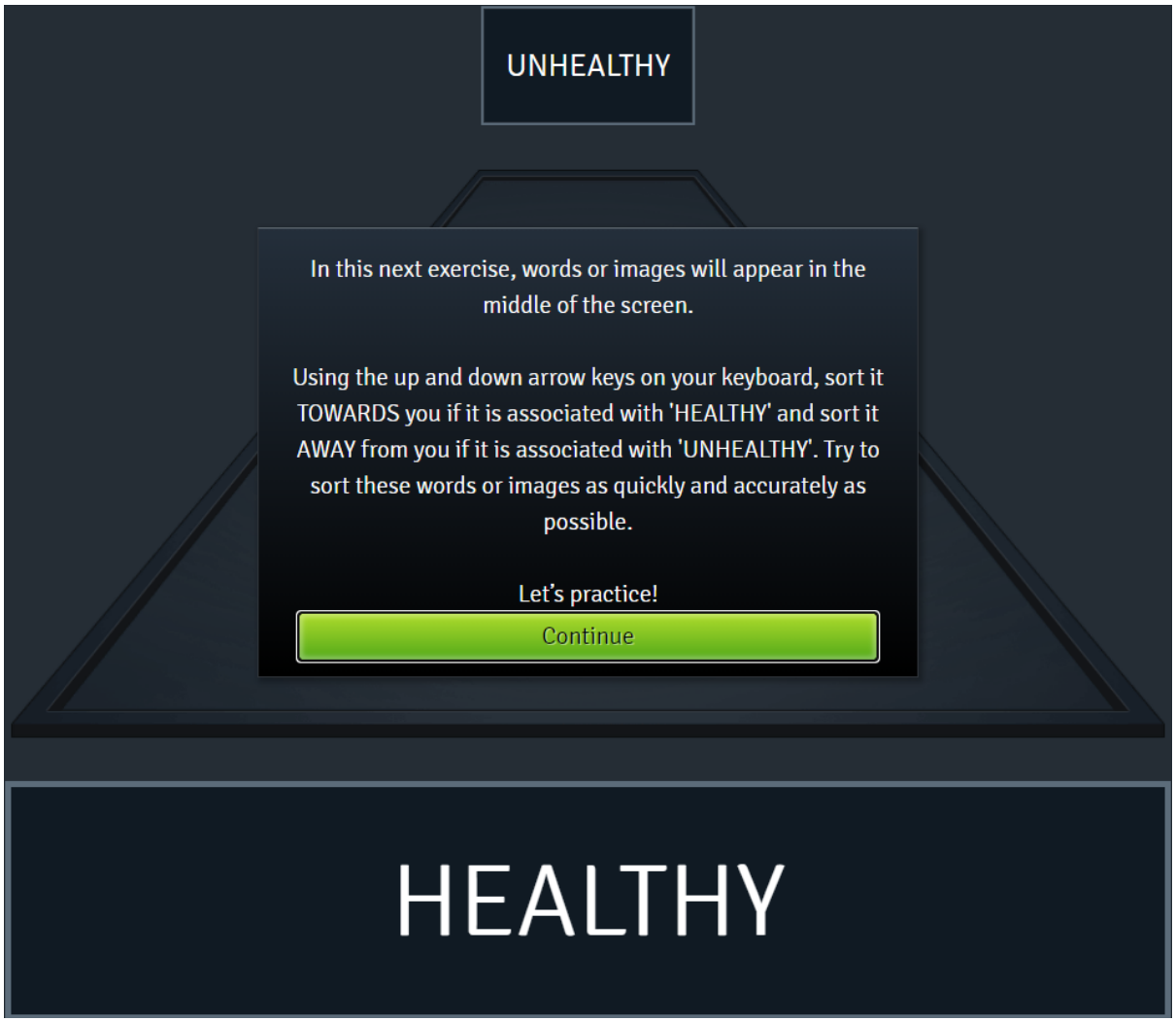
Appendix D1: Content-Anxious EPT practice instructions



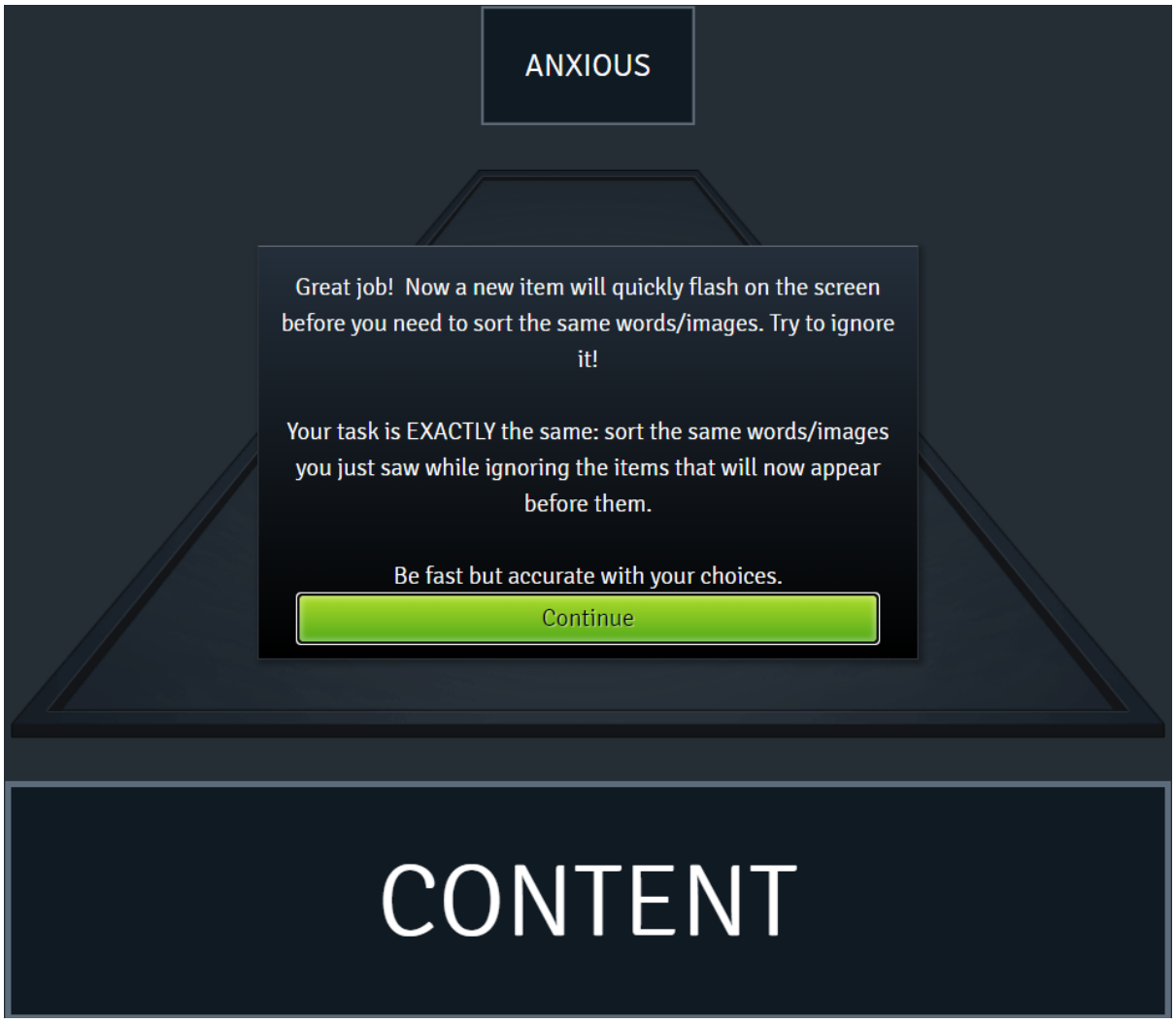
Appendix D2: Happy-Sad EPT practice instructions



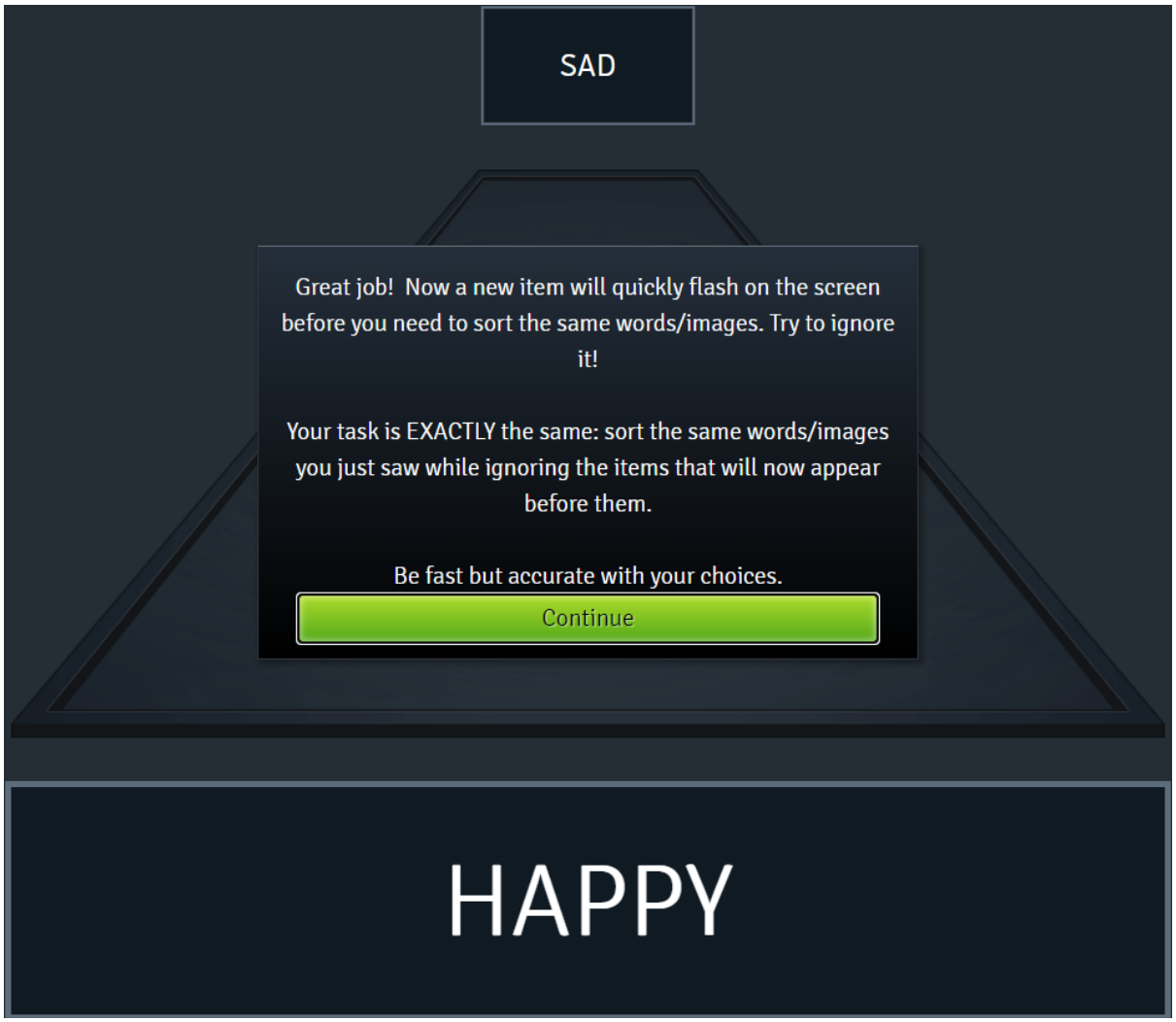
Appendix D3: Healthy-Unhealthy EPT practice instructions



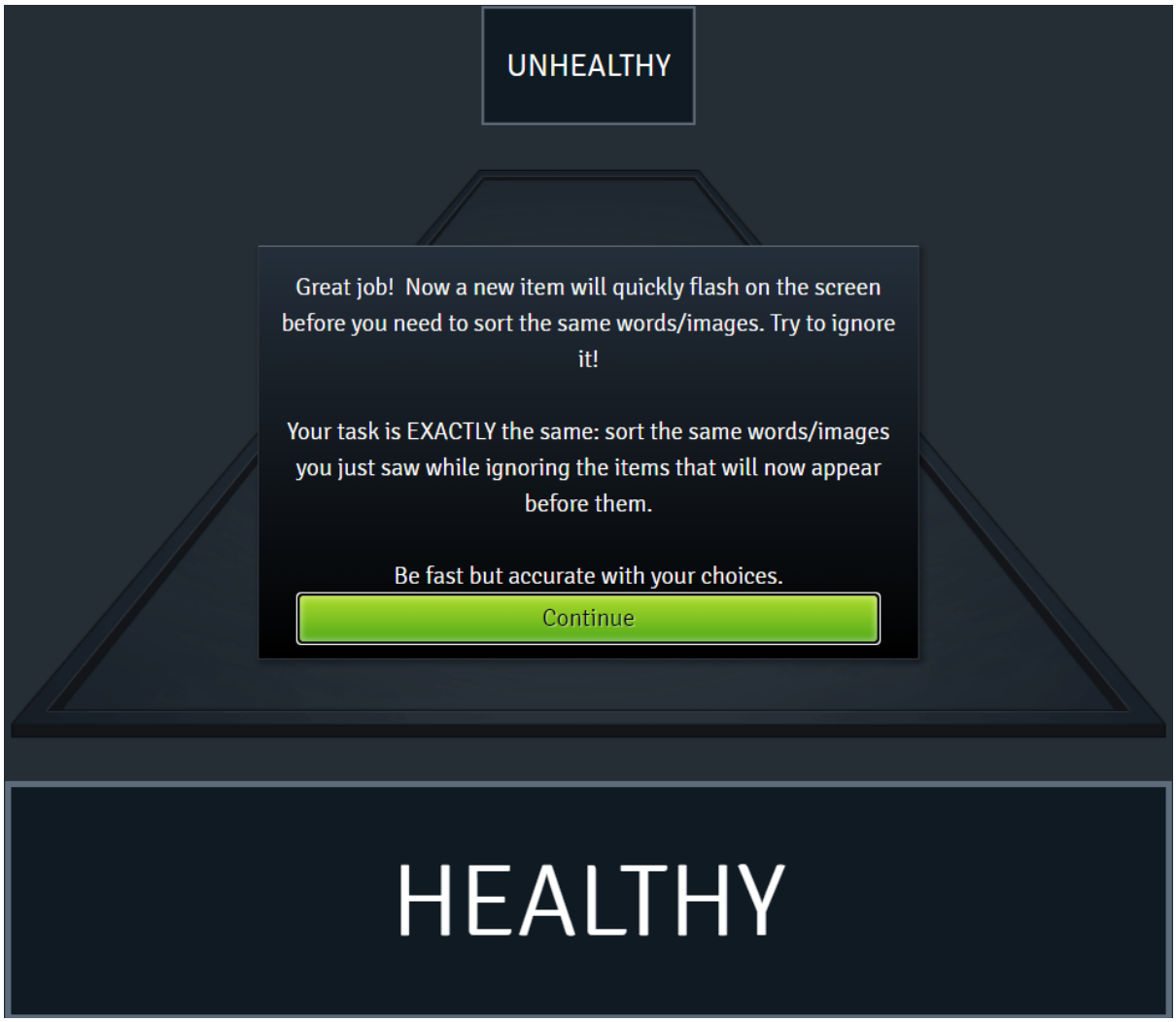
Appendix D4: Content-Anxious EPT test instructions



Appendix D5: Happy-Sad EPT test instructions



Appendix D6: Healthy-Unhealthy EPT test instructions



APPENDIX E:
ETHICS APPROVAL 2019

Faculty of Commerce

Private Bag X3, Rondebosch, 7701
2.26 Leslie Commerce Building, Upper Campus
Tel: +27 (0) 21 650 4375/ 5748 Fax: +27 (0) 21 650 4369
E-mail: com-faculty@uct.ac.za
Internet: www.uct.ac.za
@Commerce UCT **UCT Commerce Faculty Office**

30 January 2019

Mr Michael Kaplan School
of Management Studies
University of Cape Town

Dear Michael Kaplan,

REF: REC 2018/012/172

IMPLICIT AND EXPLICIT ATTITUDES: AN EXAMINATION OF THE EFFICACY OF ANTI-SUGAR PUBLIC HEALTH CAMPAIGNS

We are pleased to inform you that your ethics application has been approved. Unless otherwise specified this ethical clearance is valid for 1 year and may be renewed upon application.

Please be aware that you need to notify the Ethics Committee immediately should any aspect of your study regarding the engagement with participants as approved in this application, change. This may include aspects such as changes to the research design, questionnaires, or choice of participants.

The ongoing ethical conduct throughout the duration of the study remains the responsibility of the principal investigator.

We wish you well for your research.

Shandre Swain
Administrative Assistant University
of Cape Town Commerce Faculty
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Room 2.26 | Leslie Commerce Building

Office Telephone: +27 (0)21 650 2695 / 4375
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E-mail: sl.swain@uct.ac.za
Website: www.commerce.uct.ac.za<http://www.commerce.uct.ac.za/

APPENDIX F:
DIRECTOR OF STUDENT AFFAIRS APPROVAL 2019

RESEARCH ACCESS TO STUDENTS

DSA 100

NOTES

1. This form must be **FULLY** completed by all applicants who want to access UCT students for the purpose of research or surveys.
2. Return the fully completed **(a) DSA 100** application form **by email**, in **the same word format**, together with **your: (b) research proposal inclusive of your survey, (c) copy of your ethics approval letter / proof (d) informed consent letter** to: Moonira.Khan@uct.ac.za. You application will be attended to by the Executive Director, Department of Student Affairs (DSA), UCT.
3. The turnaround time for a reply is **approximately 10 working days**.
4. NB: It is the responsibility of the researcher/s to apply for and to obtain **ethics approval and to comply with amendments that may be requested;** as well as **to obtain** approval to access UCT staff and/or UCT students, from the following, at UCT, respectively: (a) **Ethics**: Chairperson, Faculty Research Ethics Committee' (FREC) for ethics approval, (b) **Staff access:** Executive Director: HR for approval to access UCT staff, and (c) **Student access:** Executive Director: Student Affairs for approval to access UCT students.
5. **Note:** UCT Senate Research Protocols requires compliance to the above, **even if prior approval has been obtained from any other institution/agency. UCT's research protocol requirements applies to *all* persons, institutions and agencies from UCT and external to UCT who want to conduct research on human subjects for academic, marketing or service related reasons at UCT.**
6. **Should approval be granted to access UCT students for this research study, such approval is effective for a period of one year from the date of approval (as stated in Section D of this form), and the approval expires automatically on the last day.**
7. **The approving authority reserves the right to revoke an approval based on reasonable grounds and/or new information.**

SECTION A: RESEARCH APPLICANT/S DETAILS

Position	Staff / Student No	Title and Name	Contact Details (Email / Cell / land line)
A.1 Student Number	KPLMIC002	Mr. Michael Kaplan	[redacted]
A.2 Academic / PASS Staff No.			
A.3 Visitor/ Researcher ID No.			
A.4 University at which a student or employee	University of Cape Town	Address if *not* UCT:	
A.5 Faculty/ Department/School	Commerce Faculty / Department of Management Studies / School of Marketing		
A.6 APPLICANTS DETAILS If different from above	Title and Name	Tel.	Email

SECTION B: RESEARCHER/S SUPERVISOR/S DETAILS

Position	Title and Name	Tel.	Email
B.1 Supervisor	Mrs. Raeesah Chohan	[redacted]	
B.2 Co-Supervisor/s	Mr. Mark Drummond Dr. David Rosenstein		

SECTION C: APPLICANT'S RESEARCH STUDY FIELD AND APPROVAL STATUS

C.1 Degree – if applicable	Master of Business Science (Marketing): BUS5000W
C.2 Research Project Title	Implicit and Explicit Attitudes: An Examination of the Efficacy of Anti-Sugar Public Health Campaigns
C.3 Research Proposal	Attached: Yes [redacted] No ☐
C.4 Target population	Young adults aged 18-24 years whom are enrolled at UCT
C.5 Lead Researcher details	If different from applicant:
C6. Will use research assistant/s	Yes ☐ No [redacted] If yes- provide a list of names, contact details :
C.7 Research Methodology and Informed consent	**Research methodology**: Survey (Qualtrics-based) and evaluative priming tasks (psychological, implicit association test of valence) **Informed consent:** Yes, advised to participants
C.8 Ethics clearance status from UCT's Faculty Ethics in Research Committee /Chair (EiRC)	Approved by the UCT EiRC: Yes [redacted] With amendments: Yes ☐ No [redacted] (a) Attach copy of your UCT ethics approval. Attached: Yes [redacted] No ☐ (b) State date / Ref. No / Faculty of your UCT ethics approval: 30/01/2019 Ref. /Faculty.: REC 2018/012/172

SECTION D: APPLICANT/S APPROVAL STATUS FOR ACCESS TO STUDENTS FOR RESEARCH PURPOSE

(To be completed by the UCT - ED, DSA or Nominee)

	Approved / With Terms / Not	* Conditional approval with terms	Applicant/s Ref. No.:
D.1 APPROVAL STATUS	(i) Approved [redacted] ~~(ii) With terms~~ ~~(iii) Not approved~~	a) Access to students for this research study must only be undertaken after written ethics approval has been obtained. *b)* In event any ethics conditions are attached, these must be complied with before access to students.	KPLMIC002 / Mr. Michael Kaplan

	Designation	Name	Signature	Date of Approval
D.2 APPROVED BY:	Executive Director Department of Student Affairs	*Dr Moonira Khan*	[redacted]	*4 February 2019*

APPENDIX G:
ETHICS APPROVAL 2020

Faculty of Commerce

Private Bag X3, Rondebosch, 7701
2.26 Leslie Commerce Building, Upper Campus
Tel: +27 (0) 21 650 4375/ 5748 Fax: +27 (0) 21 650 4369
E-mail: com-faculty@uct.ac.za
Internet: www.uct.ac.za
@Commerce UCT **UCT Commerce Faculty Office**

25 February 2020

Mr Michael Kaplan School
of Management Studies
University of Cape Town

Dear Michael Kaplan,

REF: REC 2018/012/172

IMPLICIT AND EXPLICIT ATTITUDES: AN EXAMINATION OF THE EFFICACY OF ANTI-SUGAR PUBLIC HEALTH CAMPAIGNS

We are pleased to inform you that your ethics application has been approved. Unless otherwise specified this ethical clearance is valid for 1 year and may be renewed upon application.

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The ongoing ethical conduct throughout the duration of the study remains the responsibility of the principal investigator.

We wish you well for your research.

Shandre Swain
Administrative Assistant University
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APPENDIX H:
DIRECTOR OF STUDENT AFFAIRS APPROVAL 2020

RESEARCH ACCESS TO STUDENTS

DSA 100

NOTES

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3. The turnaround time for a reply is **approximately 10 working days.**
4. NB: It is the responsibility of the researcher/s to apply for and to obtain **ethics approval and to comply with amendments that may be requested;** as well as **to obtain** approval to access UCT staff and/or UCT students, from the following, at UCT, respectively: (a) **Ethics:** Chairperson, Faculty Research Ethics Committee' (FREC) for ethics approval, (b) **Staff access:** Executive Director: HR for approval to access UCT staff, and (c) **Student access:** Executive Director: Student Affairs for approval to access UCT students.
5. **Note:** UCT Senate Research Protocols requires compliance to the above, **even if prior approval has been obtained from any other institution/agency. UCT's research protocol requirements applies to *all* persons, institutions and agencies from UCT and external to UCT who want to conduct research on human subjects for academic, marketing or service related reasons at UCT.**
6. **Should approval be granted to access UCT students for this research study, such approval is effective for a period of one year from the date of approval (as stated in Section D of this form), and the approval expires automatically on the last day.**
7. **The approving authority reserves the right to revoke an approval based on reasonable grounds and/or new information.**

SECTION A: RESEARCH APPLICANT/S DETAILS

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A.1 Student Number	KPLMIC002	Mr. Michael Kaplan	[redacted]
A.2 Academic / PASS Staff No.			
A.3 Visitor/ Researcher ID No.			
A.4 University at which a student or employee	University of Cape Town	Address if *not* UCT:	
A.5 Faculty/ Department/School	Commerce Faculty / Department of Management Studies / School of Marketing		
A.6 APPLICANTS DETAILS If different from above	Title and Name	Tel.	Email

SECTION B: RESEARCHER/S SUPERVISOR/S DETAILS

Position	Title and Name	Tel.	Email
B.1 Supervisor	Mrs. Raeesah Chohan	[redacted]	
B.2 Co-Supervisor/s	Mr. Mark Drummond Dr. David Rosenstein		

SECTION C: APPLICANT'S RESEARCH STUDY FIELD AND APPROVAL STATUS

C.1 Degree – if applicable	Master of Business Science (Marketing): BUS5000W
C.2 Research Project Title	Implicit and Explicit Attitudes: An Examination of the Efficacy of Anti-Sugar Public Health Campaigns
C.3 Research Proposal	Attached: Yes [■] No [ ]
C.4 Target population	Young adults aged 18-24 years whom are enrolled at UCT
C.5 Lead Researcher details	If different from applicant:
C6. Will use research assistant/s	Yes [ ] No [■] If yes- provide a list of names, contact details :
C.7 Research Methodology and Informed consent	**Research methodology:** Quantitative Survey (Qualtrics-based) and evaluative priming tasks (psychological, implicit association test of valence) **Informed consent:** Advised to participants on online survey
C.8 Ethics clearance status from UCT's Faculty Ethics in Research Committee /Chair (EiRC)	Approved by the UCT EiRC: Yes [■] With amendments: Yes [ ] No [■] (a) Attach copy of your UCT ethics approval. Attached: Yes [■] No [ ] (b) State date / Ref. No / Faculty of your UCT ethics approval: 25/02/2020 Ref. / Faculty: REC 2018/012/172

SECTION D: APPLICANT/S APPROVAL STATUS FOR ACCESS TO STUDENTS FOR RESEARCH PURPOSE

(To be completed by the UCT - ED, DSA or Nominee)

	Approved / With Terms / Not	* Conditional approval with terms	Applicant/s Ref. No.:	
D.1 APPROVAL STATUS	(i) Approved [■] ~~(ii) With terms~~ ~~(iii) Not approved~~	a) Access to students for this research study must only be undertaken after written ethics approval has been obtained. *b)* In event any ethics conditions are attached, these must be complied with before access to students.	KPLMIC002 / Mr Michael Kaplan	
D.2 APPROVED BY:	Designation	Name	Signature	Date of Approval
	Executive Director Department of Student Affairs	*Dr Moonira Khan*	[redacted]	*24 March 2020*

APPENDIX I:
NORMALITY STATISTICS

Appendix I1: Normality Statistics for Summated Scales

CONSTRUCT		CG1			CG2		
		p	s	k	p	s	k
Explicit	T1	0.20	0.36	1.35	0.07	-0.22	1.58
	T2	0.09	0.04	0.31	0.20	-0.08	1.65
Implicit	T1	0.20	0.18	-0.18	0.20	-0.08	0.03
	T2	0.02**	0.15	0.24	0.06	-0.05	0.67
CONSTRUCT		**EG1**			**EG2**		
		p	**s**	**k**	**p**	**s**	**k**
Explicit	T1	0.01**	0.04	1.27	0.20	0.14	0.39
	T2	0.00**	-0.15	1.95	0.00**	-0.89	3.34
Implicit	T1	0.20	0.27	0.19	0.06	-0.34	0.79
	T2	0.20	-0.43	1.04	0.20	0.08	0.74

Note. This table describes the Kolmogorov-Smirnov test for normality p-values (p), skewness (s), and kurtosis values (k) for the summated explicit and implicit attitude scales, of each groups' scores (CG1 = control group 1, CG2 = control group 2, EG1 = experimental group 1, EG2 = experimental group 2) at the pre-test (T1) and post-test (T2) stages.

** = significant at the 5% level.

Appendix I2: Pooled-Group Normality Statistics for Summated Scales

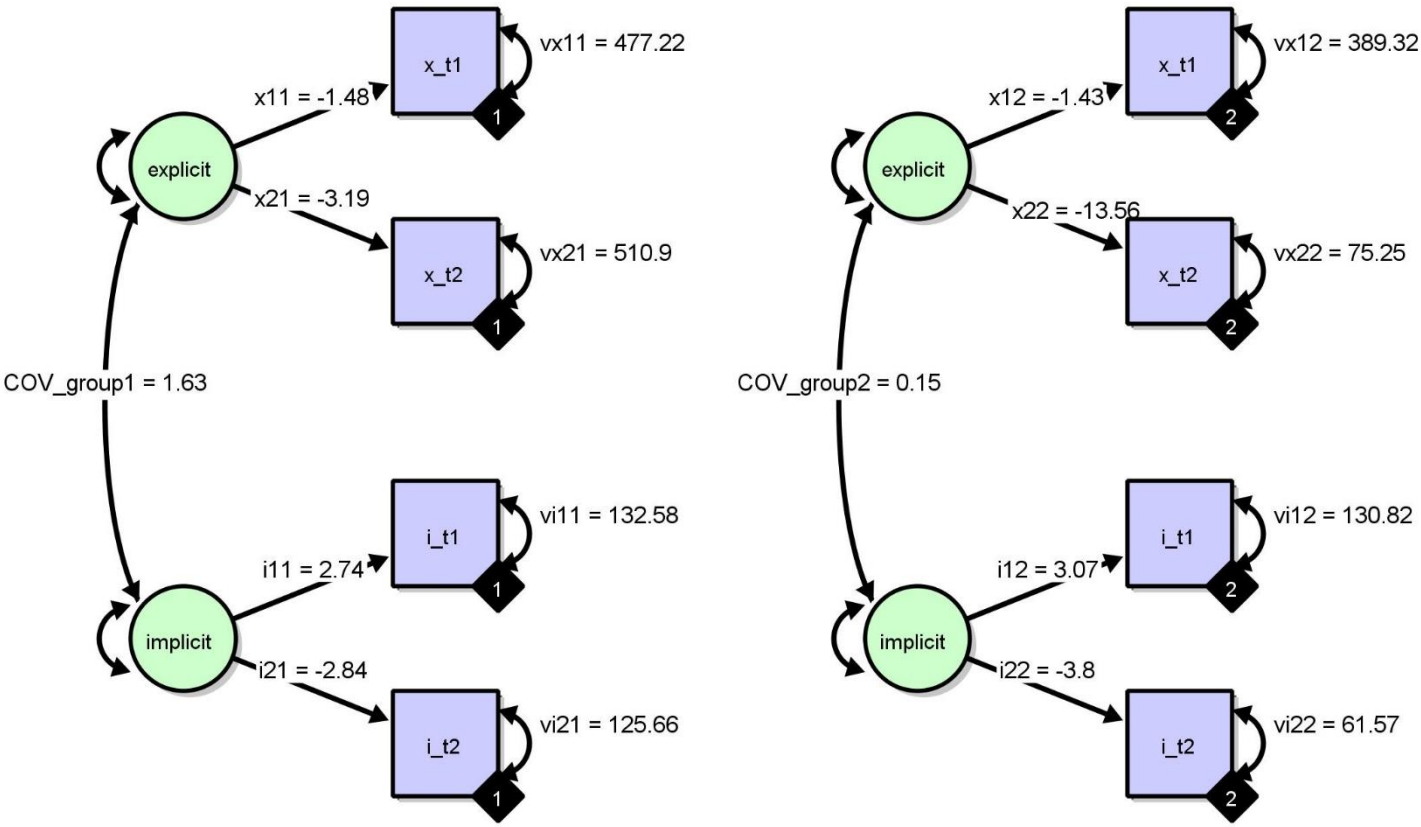
CONSTRUCT		CG			EG		
		p	s	k	p	s	k
Explicit	T1	0.02**	0.75	1.46	0.00**	0.09	0.79
	T2	0.02**	-0.04	1.11	0.00**	-0.57	2.79
Implicit	T1	0.20	0.04	-0.04	0.16	-0.04	0.36
	T2	0.02**	0.04	0.53	0.03**	-0.14	0.84

Note. This table describes the Kolmogorov-Smirnov test for normality p-values (p), skewness (s), and kurtosis values (k) for the summated explicit and implicit attitude scales, of the pooled groups' scores (CG = pooled control groups 1 and 2, EG = pooled experimental groups 1 and 2) at the pre-test (T1) and post-test (T2) stages.

** = significant at the 5% level.

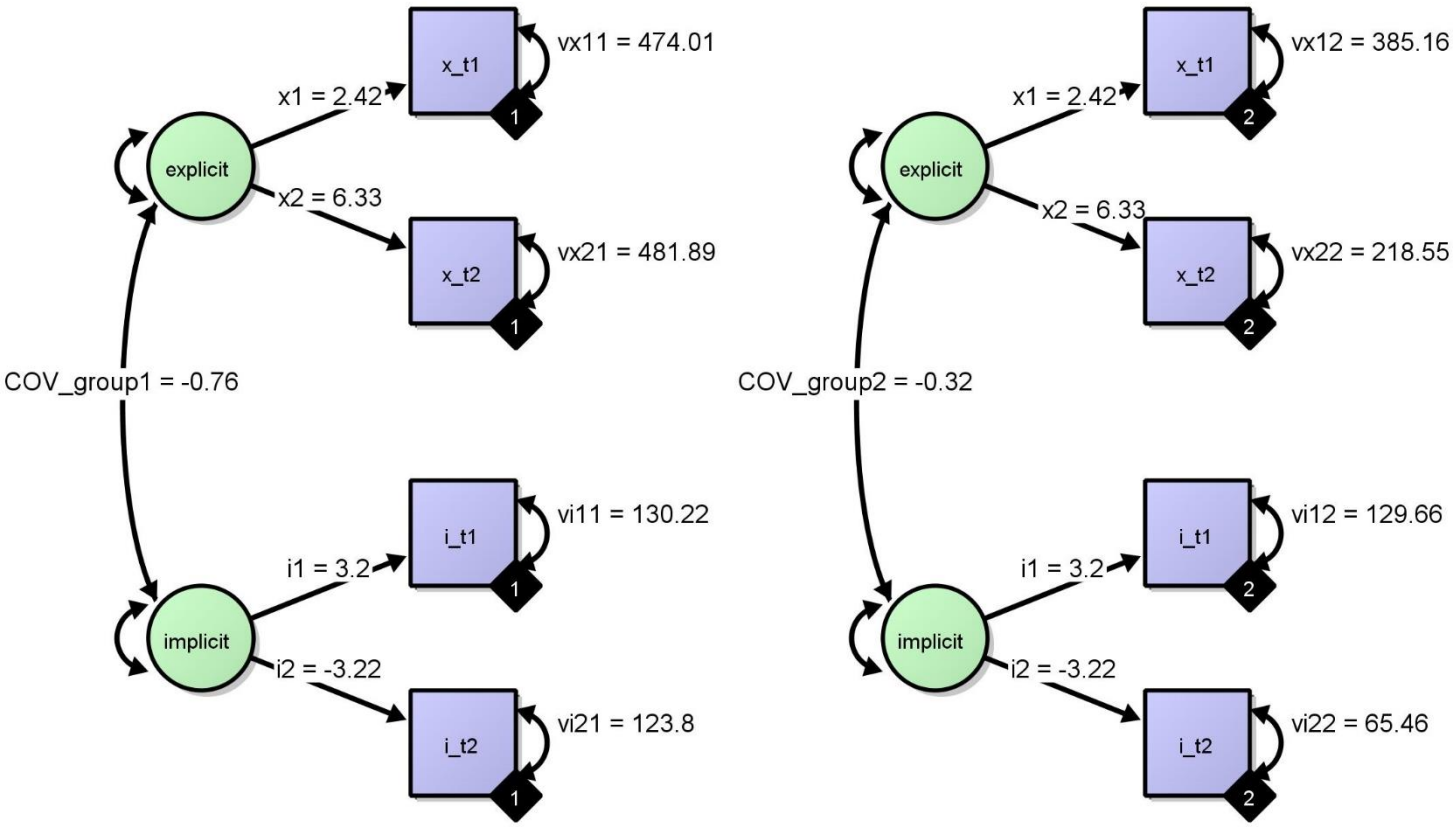
APPENDIX J:
MEASUREMENT INVARIANCE MODELS

Appendix J1: Configural Measurement Invariance Model



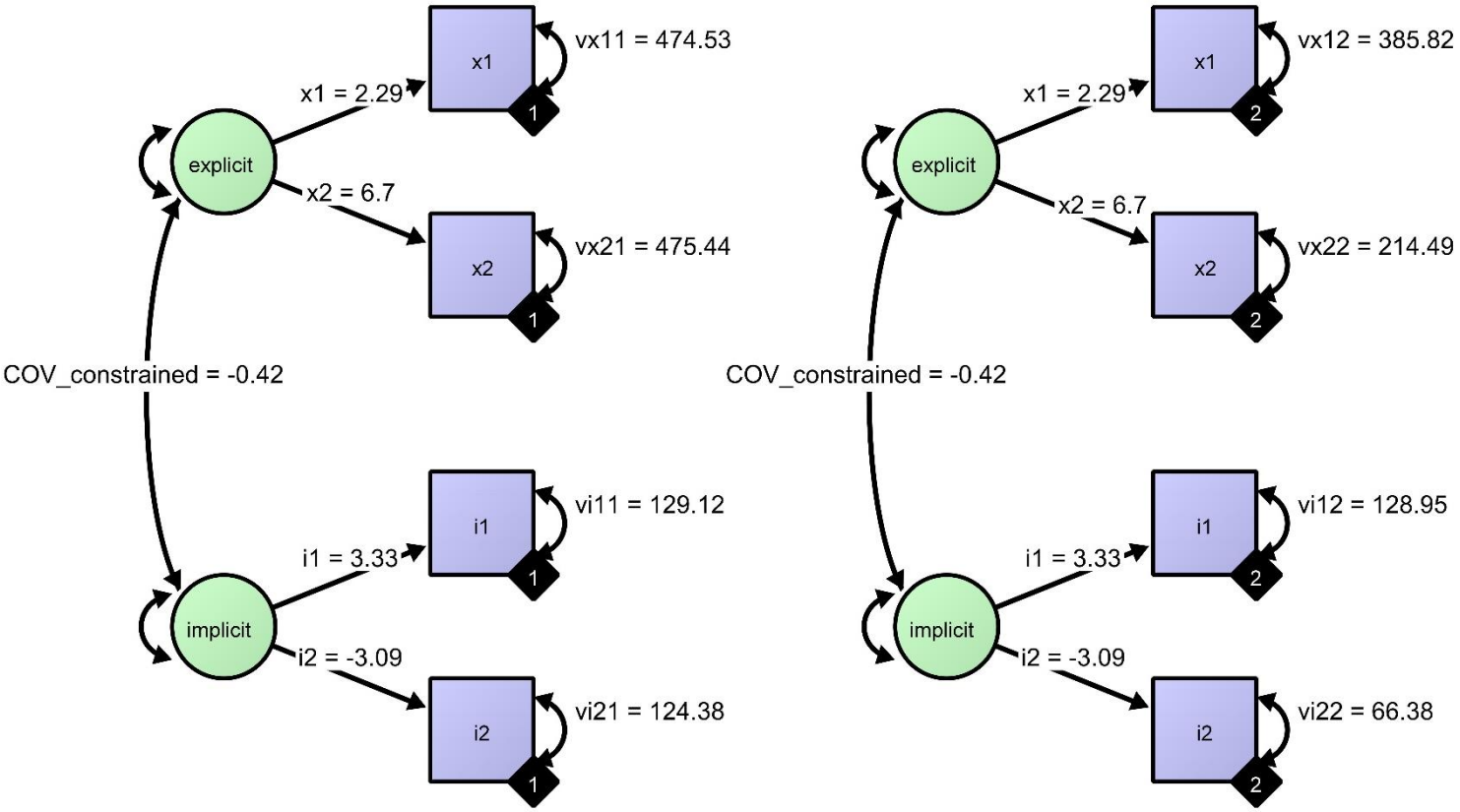
Note. This figure specifies the model used to test for configural measurement invariance, where each treatment condition is estimated independently (Group; 1 = control group, 2 = experimental group), with the pre- (t1) and post-test (t2) item scores loaded on the explicit (x_) and implicit (i_) attitudinal latent factors. Importantly, all factor loadings are freely estimated in this model (see x11 – i22).

Appendix J2: Metric Measurement Invariance Model



Note. This figure specifies the model used to test for metric measurement invariance, where each treatment condition is estimated independently (Group; 1 = control group, 2 = experimental group), with the pre- (t1) and post-test (t2) item scores loaded on the explicit (x_) and implicit (i_) attitudinal latent factors. Importantly, factor loadings (x1 – i2) are constrained to equality across groups in this model.

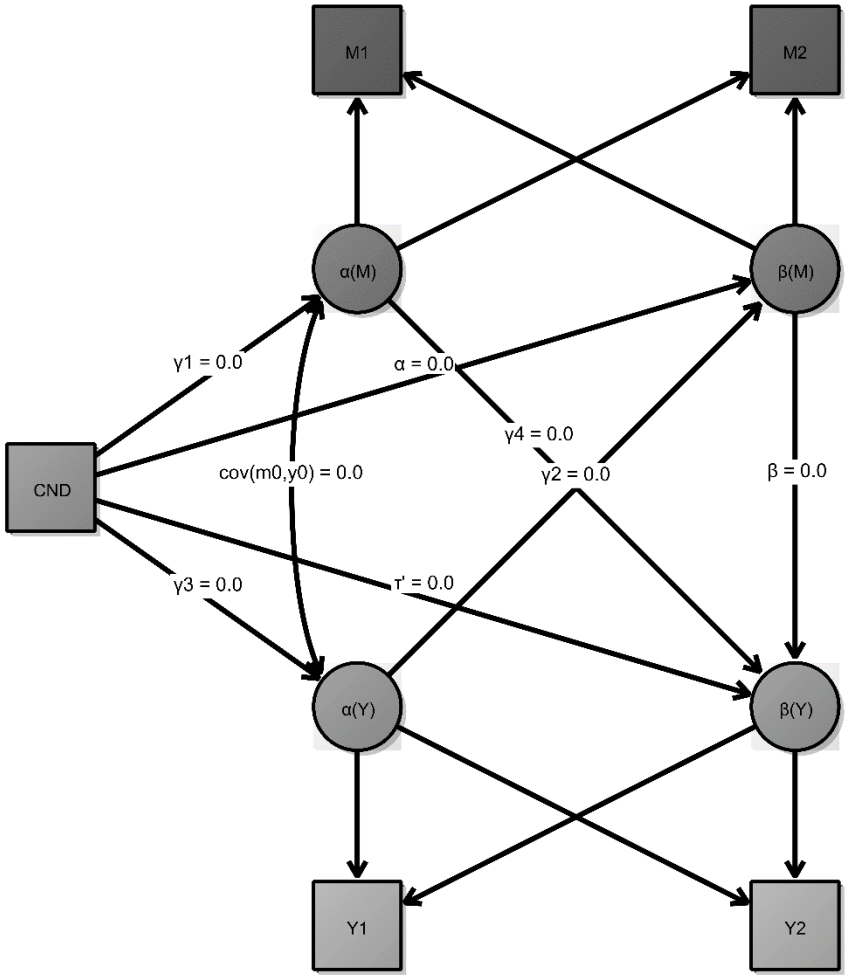
Appendix J3: Scalar Measurement Invariance Model



Note. This figure specifies the model used to test for scalar measurement invariance, where each treatment condition is estimated independently (Group; 1 = control group, 2 = experimental group), with the pre- (t1) and post-test (t2) item scores loaded on the explicit (x_) and implicit (i_) attitudinal latent factors. Importantly, all factor loadings (x1 – i2) are constrained to equality across groups, and the shared variance of all items (ie, covariance between constructs; see COV_constrained) is sufficiently captured across groups in this model.

APPENDIX K:
PP-LGM MEASUREMENT MODEL

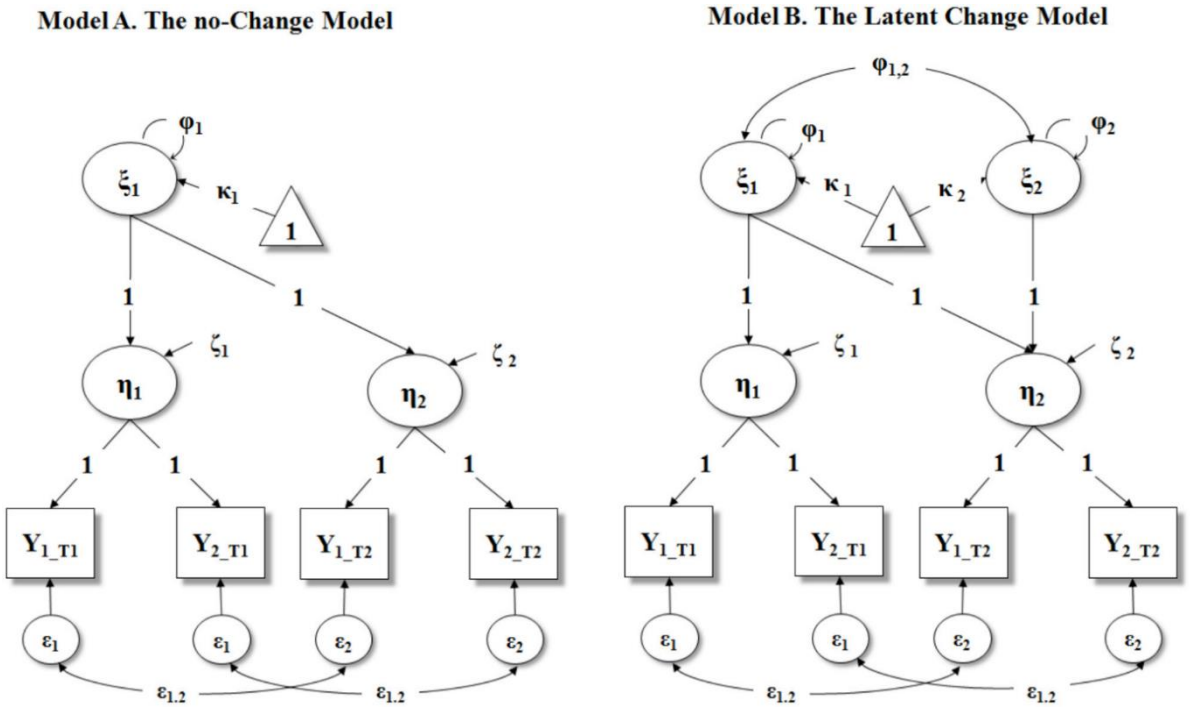
Appendix K: Parallel Process Latent Growth Measurement Model



Note. This measurement model specifies the PP-LGM approach used in this study, where the treatment condition (CND; 0 = control group, 1 = experimental group) is the IV, the proposed mediator (M) at pre-test (M1) and at post-test (M2), and the DV (Y) at pre-test (Y1) and post-test (Y2). α(M) = initial level of mediator, β(M) = growth rate of mediator, α(Y) = initial level of DV, β(Y) = growth rate of DV. γ1,γ3 = differences in α(M),α(Y) between treatment conditions, γ2,γ4 = effects of the initial level of the mediator, M1, and DV, Y1, on the growth rates of the mediator, β(M), and the DV, β(Y). α = mean difference in growth rate, β(M), between treatment conditions, β = association between the growth rates in the mediator, β(M), and the growth rates in the DV, β(Y).

APPENDIX L:
BEST-FITTING SO-MG-LCM MEASUREMENT MODELS

Appendix L: Second-Order Multiple Group Latent Change Measurement Models

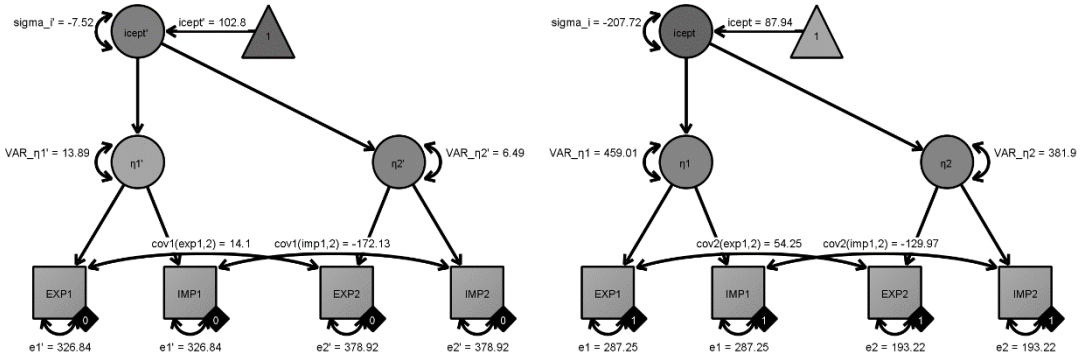


SOURCE: Alessandri *et al.* (2017)

Note. SO-MG-LCMs with observed indicators (squares): explicit (Y1) and implicit attitudes (Y2), at pre- (T1) and post-test (T2). Residual variances (ε1 and ε2) of these indicators are constrained to equality within each latent variable for attitudes (η1 at pre-test, and η2 at post-test, respectively). Intercepts of all indicators (Y1 and Y2) and latent variables (η1 and η2) are constrained to zero. Residual variances (ζ1 and ζ2) of the latent variables for attitudes are freely estimated in Model A, whereas in Model B these are fixed to zero. ξ1, intercept estimate; ξ2, slope estimate; κ1, estimated mean of intercept; κ2, estimated mean of slope; φ1, estimated variance of intercept; φ2, estimated variance of slope; φ12, estimated covariance between intercept and slope; η1, latent variable for attitudes at pre-test; η2, latent variable for attitudes at post-test; Y, observed indicators (explicit and implicit attitudes) of latent variable for attitudes (η); ε, residual variance of observed indicators.

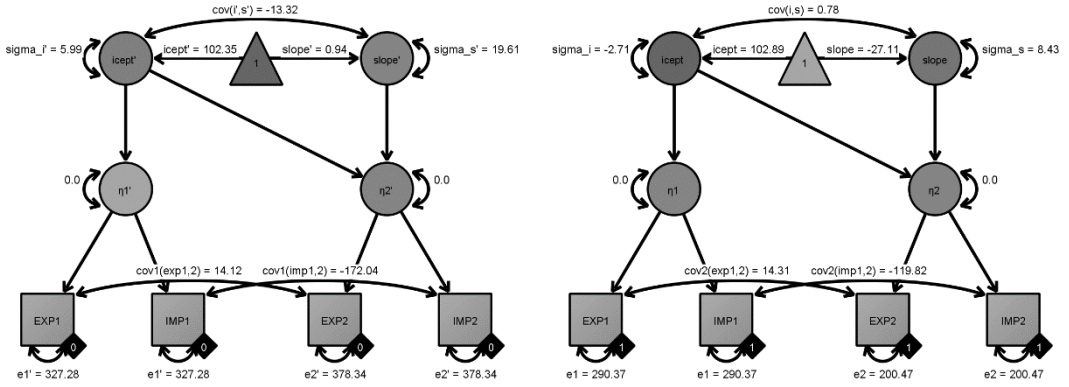
APPENDIX M:
SO-MG-LCM MODELS

Appendix M1: Second-Order Multiple Group Latent Change Model 1



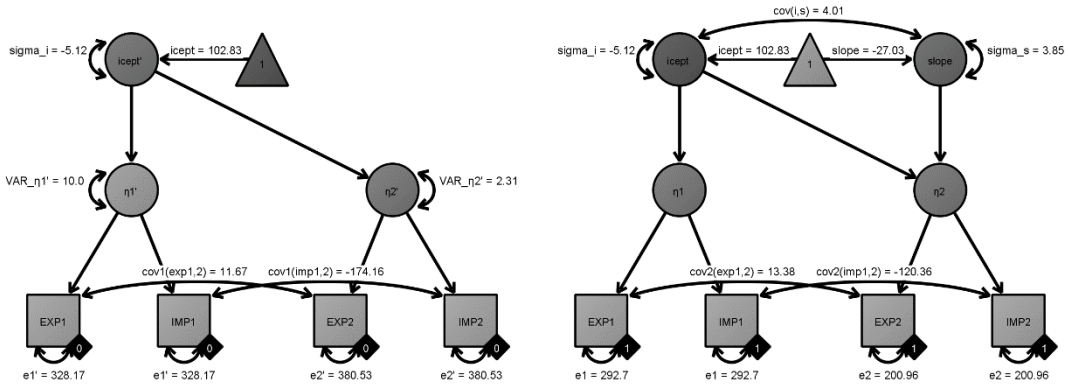
Note. This figure illustrates the estimates of Model 1 for the control group (no-change model on left; see subscript 0 on observed variables) and experimental group (no-change model on right; see subscript 1 on observed variables). EXP1,2 = explicit attitudes at pre-test, post-test; IMP1,2 = implicit attitudes at pre-test, post-test; η1,2 = latent variable for attitudes at pre-test, post-test; e1,2 = residual variances of observed variables.

Appendix M2: Second-Order Multiple Group Latent Change Model 3



Note. This figure illustrates the estimates of Model 3 for the control group (change model on left; see subscript 0 on observed variables) and experimental group (change model on right; see subscript 1 on observed variables). EXP1,2 = explicit attitudes at pre-test, post-test; IMP1,2 = implicit attitudes at pre-test, post-test; η1,2 = latent variable for attitudes at pre-test, post-test; e1,2 = residual variances of observed variables.

Appendix M3: Second-Order Multiple Group Latent Change Model 4



Note. This figure illustrates the estimates of Model 4 for the control group (change model on left; see subscript 0 on observed variables) and experimental group (change model on right; see subscript 1 on observed variables), with intercept means and variances constrained to equality across groups. EXP1,2 = explicit attitudes at pre-test, post-test; IMP1,2 = implicit attitudes at pre-test, post-test; η1,2 = latent variable for attitudes at pre-test, post-test; e1,2 = residual variances of observed variables.