



MINDTHESALT: An Intervention to Reduce Salt Intake in People of African Descent

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MINDTHESALT: An Intervention to Reduce Salt Intake in People of African Descent

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ABSTRACT

Background

Excessive salt consumption remains a major modifiable risk factor in the development of hypertension and cardiovascular diseases (CVDs). People of African Descent (PoAD) bear a disproportionately high burden of hypertension due to factors such as salt sensitivity, cultural dietary patterns, and broader structural inequalities. Although national salt-reduction initiatives in the United Kingdom (UK) have reduced overall intake, evidence suggests that this progress has not been equitably realised across all ethnic groups. This thesis explored the potential of culturally tailored digital initiatives to bridge this gap, culminating in the development and primary testing of MINDTHESALT - a gamified, user-centred web application designed to improve dietary salt literacy and promote behaviour change among PoAD.

Aims and Methods

The thesis utilised a multiphase mixed-methods design, combining qualitative and quantitative approaches to facilitate a comprehensive understanding of the target population and the preliminary impact of MINDTHESALT. Four main aims drove the research: (1) to conduct a systematic review of internet-based interventions (IbIs) for CVD prevention and management, (2) to explore online health-seeking behaviours and barriers to the adoption of digital health resources among PoAD, (3) to investigate the knowledge, attitudes, and practices that shape salt intake within this population, and (4) to develop and conduct primary testing of MINDTHESALT, using a co-design approach informed by the extended Unified Theory of Acceptance and Use of Technology 2 (UTAUT2).

Findings

The findings indicate that despite the high internet usage among PoAD, engagement with mainstream salt reduction efforts was minimal. Challenges in accessing culturally tailored health information and dietary habits, such as the prevalent use of added salt during cooking, contribute to the limited engagement. MINDTHESALT was developed to address these issues by offering culturally relevant content, incorporating tailored recipes, gamification, self-monitoring tools, and behaviour change strategies. Primary testing indicated potential improvement in salt literacy and high engagement. However, concerns regarding privacy and digital accessibility were identified as potential barriers to broader implementation.

Contributions and Future Research

This thesis demonstrates the potential of culturally tailored digital health interventions in promoting dietary behaviour change among ethnic minority populations. The findings underscore the need to complement top-down, industry-led salt reduction strategies with bottom-up, consumer-focused initiatives to achieve equitable health outcomes. Future research should focus on evaluating the long-term efficacy, scalability, and cost-effectiveness of interventions such as MINDTHESALT, particularly in addressing health inequalities.

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I would also like to thank all the participants in this research. Your willingness to share your experiences made this work possible. I hope this thesis accurately captures your voices and contributes to meaningful improvements in public health.

To my wife, Mary, and children, Joanna and Jemima, thank you for your love, patience, and understanding. Through the ups and downs of this journey, you have been my steady support, and I could not have achieved this without you. To my siblings, Helen, Hilda, Peninnah, Blessing, Monday, and Abigail, and to my father, James, thank you for always believing in me and encouraging me to persevere. My heartfelt thanks also go to my friends Ameh, Monday, Sulieman, Collins, and Hamza; I appreciate your support and the much-needed distractions during tough times.

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Thank you all.

DEDICATION

This thesis is dedicated to my late mother, Ruth, whose struggle with hypertension inspired my research journey. Her experience intensified my resolve to raise awareness, improve health, and create solutions that empower underserved communities. Through this work, I aspire to honour her memory by contributing to a future where knowledge, prevention, and culturally relevant healthcare solutions safeguard more lives.

TABLE OF CONTENTS

TITLE PAGE	
ABSTRACT	i
ACKNOWLEDGEMENTS	ii
DEDICATION	iii
TABLE OF CONTENTS	iv
ABBREVIATIONS	x
LIST OF TABLES	xi
LIST OF FIGURES	xii
SCHOLARLY OUTPUT	xiii
THESIS GOLDEN THREAD	xv
CHAPTER ONE	1
Introduction	1
1.1 Background	1
1.1.1 The Central Role of Dietary Salt	3
1.1.2 Socio-Cultural Dynamics and Salt Use	4
1.1.3 Salt Sensitivity and PoAD	5
1.1.4 Dietary Salt Literacy and Public Health Campaigns	6
1.1.5 Digital Interventions for Salt Literacy	7
1.2 Rationale	8
1.2.1 MINDTHESALT: A Tailored Online Intervention	9
1.3 Thesis Aims and Objectives	11
1.4 The Scope of the Thesis	13
1.4.1 Development of MINDTHESALT using the MRC Framework	14
1.4.2 Primary Testing	15
1.5 Delimitations of the Thesis	16
1.6 Research Questions	16
1.7 Research Democratisation and Stakeholder Engagement	19
1.7.1 Accessibility and Inclusivity in Digital Health Interventions	20
1.7.2 Community Ownership and Empowerment	20
1.8 Structure of the Thesis	21

CHAPTER TWO	25
Literature Review	25
2.1 Introduction	25
2.2 Search Strategy	26
2.2.1 Databases and Search Terms	26
2.2.2 Inclusion and Exclusion Criteria	27
2.2.3 Data Extraction and Synthesis	27
2.2.4 Search Results	28
2.3 Thematic Analysis of the Literature	30
2.3.1 Current Salt Reduction Efforts and Policy Context	30
2.3.2 Cultural Adaptations and Socio-Economic Factors	33
2.3.3 Gamification in Dietary Interventions	37
2.3.4 Cost-Effectiveness of Salt Reduction Interventions	39
2.3.5 Addressing Health Equity and Structural Factors	42
2.3.6 Specific Vulnerability of PoAD	44
2.3.7 Research Gaps in Salt Reduction	46
2.3.8 Chapter Conclusion	48
CHAPTER THREE	49
Methodological and Theoretical Framework	49
3.0 Overview	49
3.1 Research Paradigm and Underlying Philosophy	49
3.1.1 The Research Paradigm: Pragmatism with an Interpretive Lens	50
3.1.2 Philosophical Foundations: Ontology, Epistemology, and Methodology	50
3.1.3 Balancing Positivist and Relativist Extremes	52
3.2 Research Design	53
3.2.1 Rationale for a Mixed-Methods Approach	53
3.2.2 Overall Study Design	54
3.3 The Unified Theory of Acceptance and Use of Technology 2 (UTAUT2)	58
3.3.1 Overview and Evolution of UTAUT	58
3.3.2 Key Constructs in UTAUT2 and Application to MINDTHESALT	59
3.4 Co-Creation in Healthcare	63
3.4.1 Defining Co-Creation	63

3.4.2 Strategies for Co-Creation	63
3.5 The MRC Framework	65
3.5.1 Overview of MRC Phases	65
3.6 Ethical Considerations	68
3.6.1 Informed Consent Procedures	68
3.6.2 Data Privacy and Security	69
3.6.3 Cultural Sensitivity and Respect	70
3.6.4 Ethical Approval	70
3.6.5 Researcher’s Positionality and Reflexivity.....	71
3.7 Integrating the MRC Framework, UTAUT2, and Co-Creation	72
3.7.1 Conceptual Synergy	72
3.8 Chapter Conclusion	73
CHAPTER FOUR.....	74
Empirical Studies Informing MINDTHESALT	74
4.0 Overview	74
4.1 Study One.....	75
4.1.1 Context and Rationale	75
4.1.2 Study Aims and Review Framework	75
4.1.3 Methodology.....	77
4.1.4 Key Findings	78
4.1.5 Implications for MINDTHESALT.....	80
4.2 Study Two	81
4.2.1 Introduction and Rationale	81
4.2.2 Study Aim.....	81
4.2.3 Methodology.....	82
4.2.4 Key Findings	83
4.2.5 Implications for MINDTHESALT.....	85
4.3 Study Three.....	86
4.3.1 Introduction and Rationale	86
4.3.2 Study Objectives and Theoretical Underpinnings.....	87
4.3.3 Methodology.....	87
4.3.4 Key Findings	88

4.3.5 Implications for MINDTHESALT	90
4.4 Integrative Analysis: Synthesising Insights from the Three Studies	91
4.5 Chapter Conclusion	93
CHAPTER FIVE	94
Development of MINDTHESALT	94
5.0 Introduction.....	94
5.1 Appropriateness of a Digital Intervention	94
5.2 Rationale for Cultural Tailoring	95
5.3 Preliminary Intervention Components	96
5.4 The Co-Design Approach	97
5.4.1 Rationale for Co-Design in MINDTHESALT	97
5.5 The Pre-Development Focus Group	98
5.5.1 Recruitment and Consenting	99
5.5.2 Rationale for Focus Group Over Surveys	99
5.5.3 Demographic Characteristics of Focus Group Participants	100
5.5.4 Analytical Approach to Focus Group Data	102
5.5.5 Focus Group Findings	103
5.5.6 Interplay of the Focus Group with the Review Panel	110
5.5.7 Design Considerations for the MINDTHESALT Web App	112
5.6 Prototyping and Testing of MINDTHESALT	114
5.6.1 Components of the Final Intervention	115
5.7 Ethical Considerations	124
5.8 Future Directions and Improvements	127
5.9 Chapter Conclusion	127
CHAPTER SIX	128
Primary Testing of MINDTHESALT	128
6.0 Introduction.....	128
6.1 Background and Rationale	128
6.2 Methods	129
6.2.1 Study Design and Rationale	129
6.2.2 Participant Recruitment and Inclusion Criteria	130
6.2.3 Data Collection Procedures	131

6.2.4 Ethical Considerations.....	131
6.2.5 Data Analysis Strategies	132
6.3 Results.....	133
6.3.1 Pre-Post Salt 101 Knowledge Scores	134
6.4 UTAUT2 Survey Findings.....	141
6.4.1 Descriptive Statistics.....	141
6.4.2 Construct-Level Averages	143
6.4.3 Reliability Analysis.....	144
6.5 Focus Group Findings	146
6.5.1 Data Analysis Method.....	147
6.5.2 Key Themes	147
6.6 Discussion.....	151
6.6.1 Strengths and Limitations	153
6.6.2 Future Implementation Strategy	153
6.7 Chapter Conclusion	154
CHAPTER SEVEN	155
Conclusion and Future Directions.....	155
7.0 Overview	155
7.1 Summary of the Research and Key Findings	155
7.1.1 Recap of Aims and Objectives	156
7.1.2 Key Lessons	157
7.2 Implications of Findings for Public Health Practice	159
7.2.1 Contribution to Public Health.....	159
7.2.2 Practical Applications.....	160
7.2.3 Role of Digital Health Interventions	161
7.3 Recommendations for Future Research.....	161
7.3.1 Building on the Thesis Findings	161
7.3.2 Implementing Longitudinal or Larger-Scale Studies	163
7.3.3 Expansion to Other Populations.....	164
7.4 Plans for Implementation and Evaluation Under the MRC Framework	164
7.4.1 Implementation Plans.....	164
7.4.2 Evaluation Plans	165

7.5 Policy Implications	165
7.5.1 Informing Public Health Policy	165
7.5.2 Recommendations for Policymakers	166
7.6 Concluding Remarks	168
REFERENCES.....	170
APPENDICES.....	192
Appendix A: Study Types, Key Findings, Population, Methods, and Implications. ...	192
Appendix B: Study One Ethical Approval.....	202
Appendix C: Study Two and Three Ethical Review Approval	204
Appendix D: MINDTHESALT’s Development and Primary Testing Ethical Review Approval	206
Appendix E: Participant Information Sheet (PIS)	208
Appendix F: Consent Form for All Studies	209
Appendix G: Socio-Demographic Questionnaires	211
Appendix H: MINDTHESALT UTAUT2 Questionnaire	212
Appendix I: Interview Guides	213
Appendix J: Salt 101 Educational Module	214
Appendix K: Salt 101 Assessment	218

ABBREVIATIONS

BP - Blood Pressure

CINAHL - Cumulative Index to Nursing and Allied Health Literature

CVD - Cardiovascular Disease

ER - Ethical Review

HbA1c - Glycated Haemoglobin

HC - Health Coins (Gamification Component of MINDTHESALT)

IHD - Ischemic Heart Disease

Ibl - Internet-based Intervention

mHealth - Mobile Health

MRC - Medical Research Council

ONS - Office for National Statistics

PICOS - Population, Intervention, Comparator, Outcomes, Study Design

PoAD - People of African Descent

PRISMA - Preferred Reporting Items for Systematic Reviews and Meta-Analyses

PROSPERO - International Prospective Register of Systematic Reviews

RAAS - Renin-Angiotensin-Aldosterone System

RCT - Randomised Controlled Trial

SD - Standard Deviation

SPSS - Statistical Package for the Social Sciences

UK - United Kingdom

UTAUT2 - Unified Theory of Acceptance and Use of Technology 2

WHO - World Health Organisation

LIST OF TABLES

Table 3.1. Mapping Research Questions to Data Sources and Chapters	57
Table 5.1. Participant Demographic Characteristics.....	101
Table 5.2. Summary of Emerging Themes, Illustrations from Focus Groups, and Implications for MINDTHESALT	104
Table 6.1. Demographic characteristics of the participants	133
Table 6.2: Descriptive Statistics for Pre–Post Salt Knowledge (n = 25)	135
Table 6.3. Selected Descriptive Statistics for UTAUT2 Items (n = 22)	142
Table 6.4. UTAUT2 Construct-Level Descriptive Statistics	143
Table 6.5: Cronbach’s Alpha by UTAUT2 Construct.....	145
Table 6.6: Focus Group Demographics	146

LIST OF FIGURES

Figure 1.1: The MRC Framework for Developing and Evaluating Complex Interventions outlining the key stages of the thesis.....	14
Figure 1.2: The thesis structure outlining conceptualisation and development of MINDTHESALT.....	21
Figure 2.1: Adapted PRISMA flowchart illustrating the selection process of the studies included in the literature review.....	29
Figure 3.1: Applying UTAUT2 to MINDTHESALT.....	60
Figure 3.2: Applying the MRC framework to MINDTHESALT.....	67
Figure 5.1: A screenshot showcasing the homepage of the MINDTHESALT web application.....	118
Figure 5.2: A screenshot showcasing selected features of the MINDTHESALT web application.....	119
Figure 5.3: A screenshot showcasing selected features of the MINDTHESALT dashboard.....	120
Figure 5.4: A screenshot showcasing the 20 low-salt recipes and the navigation structure of MINDTHESALT.....	121
Figure 5.5: A screenshot showcasing the homepage of the MINDTHESALT game.....	123
Figure 5.6: A screenshot showcasing the leaderboard of the MINDTHESALT game.....	124
Figure 5.7: A screenshot showcasing the disclaimer prior to using the blood pressure log and chart feature of MINDTHESALT.....	126
Figure 6.1: Mean total scores pre- and post-intervention.....	137
Figure 6.2: Frequency graph illustrating the non-parametric distribution of pre-test scores.....	138
Figure 6.3: Frequency graph illustrating the non-parametric distribution of post-test scores.....	139

SCHOLARLY OUTPUT

Publications:

- Usman, J.E. *et al.* (2022) 'A systematic review of internet-based interventions for the prevention and self-management of cardiovascular diseases among people of African descent', *International Journal of Environmental Research and Public Health*, 19(14), p. 8872. doi:10.3390/ijerph19148872.
- Usman, J.E., Childs, C., *et al.* (2024) 'Online health information-seeking behaviour among people of African descent in the United Kingdom: A qualitative study', *Healthcare*, 12(9), p. 897. doi:10.3390/healthcare12090897.
- Usman, J.E., Morley, A., *et al.* (2024) 'Exploring dietary salt knowledge, attitude, and practices among people of African descent in the United Kingdom: A qualitative study', *Healthcare*, 12(19), p. 1969. doi:10.3390/healthcare12191969.

Conference Presentations:

- Canadian Doctoral Nursing Network Conference (June 2024) - *Beyond Access: Understanding Online Health Information Seeking Behaviour among People of African Descent in the UK*. [jesse-usman_cdnnc2024.pdf](#)
- NorQual Event, UCLan (May 2024) - *Enhancing Mental Health Support for People of African Descent: Insights from an Online Health Information Seeking Behaviour Study*.

- Canadian Doctoral Nursing Network Conference (June 2023) - *Exploring the Dietary Salt Knowledge, Attitude, and Practices (KAP) among People of African Descent in the United Kingdom: A Qualitative Review.* [jesse-usman.pdf](#).
- University of Salford: Mental Health and Neurodiversity Research Theme - *MINDTHESALT: An Online Intervention to Reduce Dietary Salt Intake Among People of African Descent.*

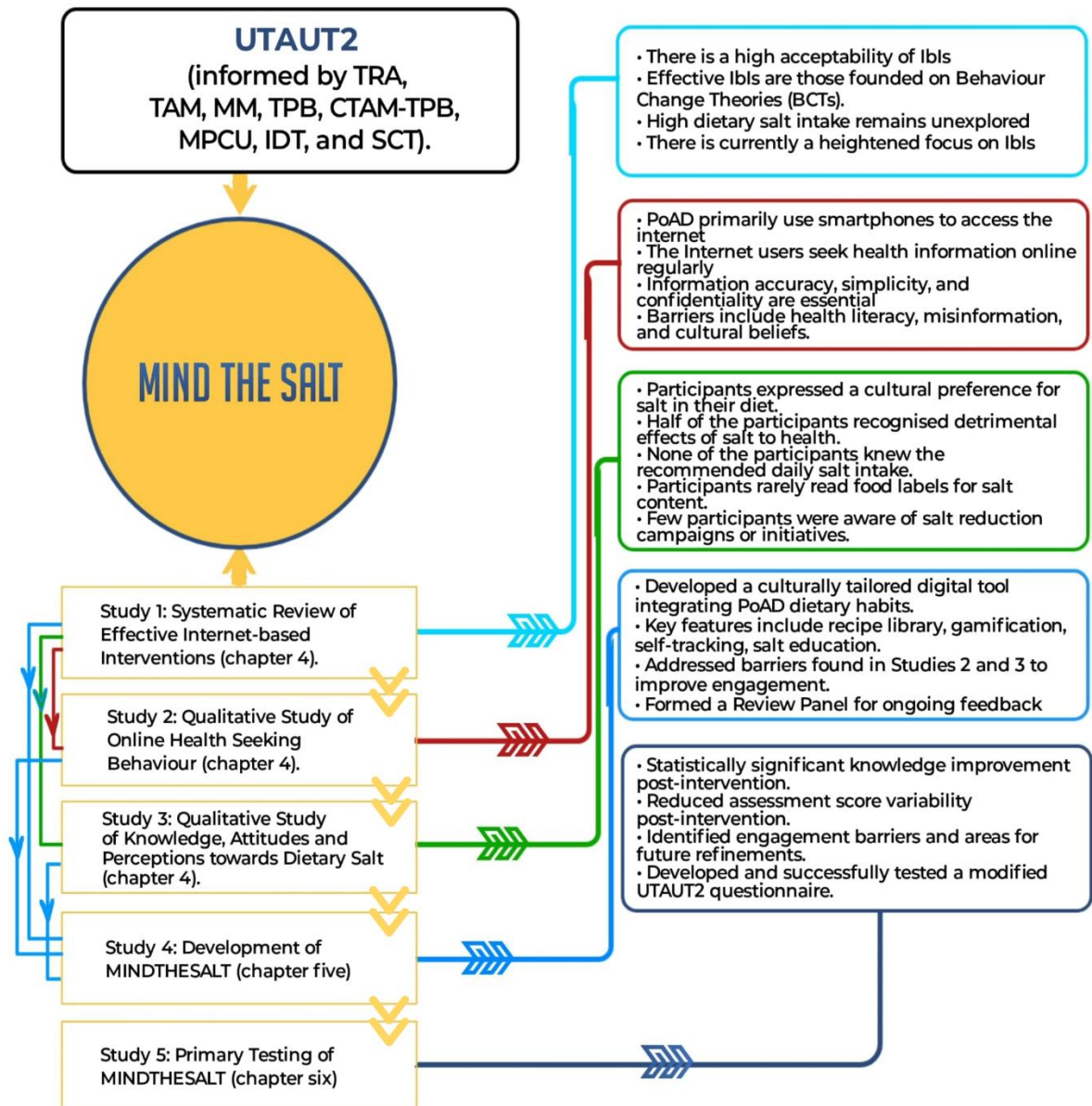
Poster Presentation:

- Sheffield Hallam University: MINDTHESALT: An Online Intervention to Reduce Dietary Salt Intake Among People of African Descent.

The poster won the Best Poster Award and was recognised with a handshake from the Vice Chancellor, Professor Liz Mossop.

THESIS GOLDEN THREAD

THESIS GOLDEN THREAD



CHAPTER ONE

Introduction

1.1 Background

The population of people of African descent (PoAD) in the United Kingdom (UK) is primarily comprised of two main groups: Black Africans and Afro-Caribbeans. According to the 2021 Census, the population of PoAD in the UK was about 2.4 million, representing around 4% of the total population. The largest concentrations of the population were found in cities such as London, Birmingham, and Manchester (Office for National Statistics [ONS], 2021). Historical migration patterns coupled with economic factors have shaped not only the demographic distribution of PoAD but also influenced their dietary habits (Daley, 1998; Johnston et al., 2015).

Globally, salt consumption varies widely, often influenced by cultural practices, the availability of processed foods, and socio-economic factors. The World Health Organisation (WHO) recommends that adults limit their salt intake to no more than 5 grams (approximately 2 grams of sodium) per day to reduce the risk of hypertension and cardiovascular issues (WHO, 2021). However, most adults worldwide regularly exceed this limit, with average consumption estimated to be around 10.78 grams per day (WHO, 2025).

A substantial portion of sodium consumption in high-income countries comes from processed foods, with bread, cheese, and processed meats as the major contributors (He et al., 2013a). Cooking and table salt often account for the bulk of sodium intake in low- and middle-income countries (Kerry et al., 2005). Understanding these differences is essential when developing

public health interventions, as effective strategies must align with the dietary habits of the target population. In the UK, salt reduction efforts that began in the early 2000s have significantly reduced the average daily salt intake, from approximately 9.5 grams per day in 2003/2004 to around 8.1 grams per day by 2011 (He et al., 2013a). According to Song et al. (2023), between 2003 and 2014, salt consumption in the UK decreased by 19%, from 9.38 grams to 7.58 grams daily, which helped lower blood pressure and reduce cardiovascular disease (CVD) mortality. Also, during this timeframe, stroke-related mortality fell by 33%, and deaths from ischemic heart disease (IHD) dropped by 37%. However, after 2014, salt consumption in the UK began to rise again, reaching 8.39 grams per day by 2018, while blood pressure levels and CVD death rates plateaued (Song et al., 2023). These findings underscore the need to reinforce the UK's efforts to reduce salt intake, as current consumption exceeds the WHO's recommended daily limit of 5 grams.

Dietary acculturation among PoAD in the UK has contributed to changes in dietary salt consumption patterns. Traditional African and Afro-Caribbean diets typically feature nutrient-dense foods, including yams, plantains, corn, rice, and leafy greens. The shift towards Westernised diets, which are often rich in salty sauces, seasoning powders, and pre-packaged snacks, further worsens the risk of diet-related chronic diseases (Goff et al., 2014).

Socio-economic inequalities introduce another layer of complexity to the dietary salt consumption patterns (Ji & Cappuccio, 2014). PoAD frequently reside in urban areas where fresh produce is relatively expensive, while inexpensive, fast food and unhealthy pre-packaged meals are readily available (Aspinall & Chinouya, 2016; Briazu et al., 2024). Such structural conditions make it difficult for individuals with limited financial resources to make lower-sodium choices. Moreover, systemic barriers, such as racism and distrust in healthcare

systems, can be a deterrent to seeking preventive advice or nutritional support, further worsening health inequalities (Nazroo et al., 2019; Wallace et al., 2016). Research indicates that socio-economic issues not only elevate the risk of consuming excessive amounts of sodium but also could affect participation in dietary programmes aiming to reduce sodium intake (de Mestral et al., 2017; Ji & Cappuccio, 2014).

1.1.1 The Central Role of Dietary Salt

Excessive dietary salt is widely considered a leading modifiable risk factor for hypertension and CVDs. Despite the WHO's recommendation that individuals limit their salt consumption, the global average daily salt intake remains approximately 10.78 grams, more than twice the recommended limit (WHO, 2025). This indicates a substantial gap between public health guidelines and eating habits.

Epidemiological investigations provide robust evidence of a dose-response relationship between sodium consumption and blood pressure, highlighting dietary salt reduction as a public health priority (Mozaffarian et al., 2015). According to He and MacGregor (2011), reducing dietary salt consumption by a modest 2 to 2.3 grams per day can yield clinically significant benefits in both systolic and diastolic blood pressure. The benefits of reducing dietary salt intake extend beyond cardiovascular health, as normal blood pressure is associated with lower risks of heart attack, stroke, and heart failure (Mozaffarian et al., 2015). Some countries have demonstrated how implementing comprehensive national-level salt reduction measures can substantially reduce the incidence and prevalence of hypertension and mortality from stroke, showcasing the potential of population-wide efforts to achieve sustained health improvements (Nie et al., 2024).

The consequences of excessive salt intake are not confined to cardiovascular issues. High salt consumption is also linked to chronic kidney disease, as elevated sodium levels can intensify renal workload and lead to fluid retention (Farquhar et al., 2015). Likewise, studies suggest that excessive sodium intake could increase the risk of gastric cancer and osteoporosis (D’Elia et al., 2014). These findings indicate that while CVD morbidity and mortality remain significant concerns, excessive salt consumption also affects multiple organs and systems, reinforcing the importance of sustained efforts to reduce salt intake at both individual and national levels.

1.1.2 Socio-Cultural Dynamics and Salt Use

Salt consumption patterns are influenced by more than just individual preferences; they emerge from a complex interplay of cultural factors, socio-economic circumstances, and historical practices. In many communities of PoAD, foods such as salted fish, preserved meats, and seasoning powders have long been essential in everyday cooking (Charlton et al., 2005; Usman et al., 2024b). These food items play practical roles, such as enhancing flavour, preserving food, and fulfilling cultural expectations regarding taste and texture. The tradition of washing vegetables with salt often reflects these longstanding culinary practices (Usman et al., 2024b). However, with the rapid pace of globalisation and urbanisation, migration-related dietary changes can further increase salt consumption among PoAD.

Looking at the bigger picture, the barriers to affordable, nutritious food are not equally distributed. Lower-income neighbourhoods often have fewer supermarkets offering fresh produce and a greater density of convenience stores that provide processed snacks and fast food (Vilar-Compte et al., 2021). For PoAD, systemic issues such as limited job opportunities and social mobility often contribute to economic constraints (Wallace et al., 2016), leading to a reliance on high salt, processed foods due to their affordability. The lower costs and longer

shelf life of processed foods make them more accessible, perpetuating dietary habits that contribute to excessive salt consumption. Consequently, any successful strategy to reduce salt intake for PoAD must extend beyond individual education and address the deep-rooted socio-economic inequalities that shape dietary choices.

1.1.3 Salt Sensitivity and PoAD

Salt sensitivity refers to the excessive increase in blood pressure in response to salt consumption. This physiological trait affects around one-third of healthy individuals and over half of those with hypertension, making it a major risk factor for CVDs (Bailey & Dhaun, 2024). Salt sensitivity is prevalent among PoAD (Elijovich et al., 2016; Jeong et al., 2023). Studies indicate that salt sensitivity affects 73% of individuals with hypertension and 36% of those with normal blood pressure in the population (Svetkey et al., 1996). According to Wilson et al. (1999), this trait can manifest at an early age in this demographic, with a prevalence of as high as 27% in healthy Black adolescents. This increased susceptibility is partly due to genetic factors that affect how the kidneys excrete sodium or how hormonal pathways, such as the renin-angiotensin-aldosterone system (RAAS), regulate sodium balance by facilitating sodium retention through aldosterone secretion, which increases sodium reabsorption in the kidneys (Jeong et al., 2023). The increased salt sensitivity among PoAD indicates that while an excessive salt intake can negatively affect most populations, PoAD may experience an even more significant rise in blood pressure with similar amounts of sodium intake.

The consequences of salt sensitivity in PoAD are profound. Research indicates that reducing daily salt consumption by 3 grams can result in a decrease in blood pressure by 5mmHg in salt-sensitive individuals, an effect size capable of reducing the overall burden of hypertension and its related complications (Law et al., 1991). Given that PoAD are disproportionately

affected by salt sensitivity, targeted interventions aimed at practical methods for reducing sodium intake can provide immediate and meaningful benefits. Additionally, these factors underscore the importance of public health interventions that integrate an understanding of genetic vulnerability with culturally relevant educational initiatives, enabling PoAD to effectively manage their salt intake while preserving valued culinary traditions.

1.1.4 Dietary Salt Literacy and Public Health Campaigns

Health literacy is generally understood as the ability to obtain, interpret, and use health-related information crucial for managing chronic illnesses (Nutbeam, 2023; Usman et al., 2024b). When applied to salt intake, “dietary salt literacy” involves understanding the health implications of high salt intake and learning to reduce sodium content in everyday meals. This could involve reading nutrition labels, identifying alternative seasonings, or developing the skills to cook tasty dishes with less salt. Consequently, improving dietary salt literacy can be a preventive measure against hypertension and related conditions in populations at risk.

Progress has been made in reducing population salt consumption in the UK through extensive reformulation efforts and mass media outreach (He, Brinsden, & MacGregor, 2013; Song et al., 2023). These initiatives prompted the food industry to gradually lower sodium levels in widely consumed foods and increase public awareness about the dangers of excessive salt intake. Nonetheless, these population-wide efforts may not have captured the factors affecting dietary choices among PoAD, such as cultural practices, language barriers, and distrust in conventional healthcare systems (Usman et al., 2024b). The distrust in mainstream healthcare services is widespread among PoAD, and it is deeply rooted in their experiences of discrimination, marginalisation, and cultural insensitivity. For example, in the United States, the infamous Tuskegee Syphilis Study, where African American men were misled and denied

treatment, has had long-lasting effects on the population's trust in medical institutions (Jeon, 2024; Reverby, 2022). Moreover, many PoAD continue to report perceived racism and negative healthcare experiences, which contribute to the increased distrust in the conventional healthcare system (Wiltshire et al., 2022). Additionally, health policies in colonial and postcolonial Africa, which often favoured European models over local knowledge and practices, fostered scepticism regarding the relevance and transparency of mainstream healthcare systems (Stilson, 2019). Thus, salt-reduction initiatives should involve tailored messaging that addresses culturally specific foods, cooking methods, and generational attitudes and beliefs towards food preparation. These customised programmes could also feature resources such as recipe modification, cooking demonstrations, and accessible educational materials, all aimed at making lower-sodium cooking both practical and appealing to the population (Usman et al., 2024b).

1.1.5 Digital Interventions for Salt Literacy

Digital health interventions are gaining popularity as effective and scalable solutions for improving health outcomes (Murray et al., 2016). These interventions commonly include mobile applications, interactive websites, or social media communities that provide users with instant feedback, recipe ideas, and practical tips for managing sodium consumption. By leveraging user-friendly features such as push notifications, barcode scanning for food products, and instructional videos, digital health interventions can simplify monitoring daily salt intake and adopting healthier dietary behaviours.

For PoAD, digital platforms provide an avenue for promoting culturally tailored messaging, providing guidance on reducing salt while maintaining the flavours integral to their culinary traditions. This could involve demonstrating methods for seasoning dishes with herbs, spices,

or citrus and sharing low-salt techniques to prepare foods (Goff et al., 2014; Usman et al., 2024b). Personalised digital interventions could also support PoAD in overcoming structural challenges by guiding them to affordable, lower-sodium grocery options and highlighting community resources such as farmers' markets or local fresh produce delivery options.

Digital interventions face numerous challenges, despite their promise. Disparities in internet accessibility, varying degrees of digital literacy, and inadequate technological infrastructure can hinder consistent engagement with these interventions (Berardi et al., 2024; Mumtaz et al., 2023). Co-design strategies, in which the potential users, healthcare professionals, and researchers are actively involved in developing and testing digital tools, can help overcome these challenges while improving the impact of the interventions (Saxton et al., 2022). Such participatory strategies ensure that interventions resonate with the everyday lifestyles, values, and barriers influencing dietary habits among PoAD.

1.2 Rationale

The disproportionate burden of salt-sensitive hypertension among PoAD underscores the critical need for multifaceted interventions that target educational, behavioural, and environmental determinants of salt intake. Although global salt reduction efforts have become more popular, they often rely on generic messages that may not adequately address cultural nuances or the unique health needs of marginalised groups (Berardi et al., 2024; Mumtaz et al., 2023; Usman et al., 2022). PoAD, who are at a higher risk of salt sensitivity, continue to face high risks of hypertension and related cardiovascular issues if their specific experiences and susceptibilities are not considered.

In the UK, the population's sodium intake consistently exceeds the recommended limits (Song et al., 2023). Socioeconomic barriers, such as limited access to affordable, nutritious foods

and inconsistent engagement with mainstream healthcare services, further exacerbate these health inequalities (Usman et al., 2024a, 2024b; Vilar-Compte et al., 2021). Therefore, public health initiatives must evolve beyond conventional approaches to connect with communities where salt reduction efforts could provide substantial health improvements. Exploring innovative approaches that integrate cultural relevance into actionable recommendations is also crucial.

Digital interventions present an attractive solution as they can provide evidence-based guidance tailored to community customs while enabling greater reach and cost-effectiveness. This combination of cultural tailoring and digital accessibility forms the foundation for the development of MINDTHESALT.

1.2.1 MINDTHESALT: A Tailored Online Intervention

MINDTHESALT was designed to fill a crucial gap in public health efforts by offering a culturally sensitive digital platform to modify dietary behaviours contributing to excessive salt intake among PoAD. The intervention was developed based on evidence from existing literature on dietary salt, hypertension, online interventions, and data on the unique challenges faced by PoAD in managing their salt intake. MINDTHESALT aims to empower its users with practical skills and knowledge to manage their salt intake more effectively. By enhancing dietary salt literacy, the platform enables PoAD to make informed health decisions while preserving their cultural identities.

The development of MINDTHESALT recognises the substantial obstacles that PoAD face in accessing culturally appropriate health resources. Traditional public health interventions have often failed to engage these populations meaningfully, while digital health efforts typically lack

the cultural nuances necessary for lasting behavioural change. MINDTHESALT integrates digital technology with behaviour change theories to offer a culturally relevant and scalable solution for reducing hypertension rates in the UK and throughout the global African diaspora. The intervention features include goal setting, progress tracking, a salt tracker, blood pressure logs and charts, educational modules, interactive games, and social support elements to encourage sustained engagement with the platform (Klaic et al., 2022). This intervention also incorporates culturally sensitive recipes, reminder systems, and peer support to foster accountability and community cohesion, which is essential for achieving sustained behaviour change in chronic disease management (Bashi et al., 2020; Zheng et al., 2024).

As the prevalence of hypertension and related conditions among PoAD continues to rise amid the expanding roles of digital health solutions (Fryar et al., 2023), MINDTHESALT presents a potentially valuable intervention by addressing the socio-economic, cultural, and genetic factors contributing to salt-related health conditions among PoAD. Additionally, MINDTHESALT seeks to improve salt literacy while fostering a sense of personal responsibility among its users. This is especially relevant for PoAD who may face language or systemic barriers in conventional healthcare settings (Nazroo et al., 2019; Wallace et al., 2016). By integrating evidence-based nutritional information with cultural insights, the intervention aims to increase awareness about the impacts of excessive salt intake and strengthen the practical skills needed to apply the knowledge in everyday dietary choices. Ultimately, MINDTHESALT aspires to contribute to reducing the morbidity and mortality related to hypertension and related conditions, aligning with broader public health objectives to address the disproportionate cardiovascular risks faced by PoAD (Cappuccio, 1997). MINDTHESALT could also serve as a model for future digital health initiatives that might be adapted to other minority populations facing the challenges of chronic health conditions.

1.3 Thesis Aims and Objectives

This thesis aims to develop and conduct a primary evaluation of MINDTHESALT, a gamified, culturally tailored online intervention to reduce salt intake and improve dietary salt literacy among PoAD in the UK. The aims of this thesis are structured to align with the studies that constitute the research project. The thesis is structured around four main aims; each linked to a distinct research phase that focuses on the development and primary testing of MINDTHESALT.

Aim 1: Review the existing literature on internet-based interventions (IbIs) targeting CVDs among PoAD (Study One, Chapter Four).

This aim focused on assessing the current landscape of digital health interventions and identifying the factors contributing to their effectiveness and engagement among PoAD.

- **Objective 1:** Conduct a systematic review and synthesis of existing evidence on the effectiveness and engagement strategies of IbIs for CVD prevention and management among PoAD.
- **Objective 2:** Identify the key features and engagement strategies of effective interventions that could guide the design of MINDTHESALT.

Aim 2: Explore online health information-seeking behaviours and preferences of PoAD in the UK (Study Two, Chapter Four).

This aim seeks to understand how PoAD in the UK use online health information, specifically regarding hypertension and dietary salt intake, to inform the design of MINDTHESALT.

- **Objective 3:** Explore the online health information-seeking behaviours, preferences, and challenges PoAD face when accessing online health resources related to dietary salt and its impact on hypertension.
- **Objective 4:** Identify barriers and facilitators to accessing and using online health information and determine how these factors can be addressed in the design of MINDTHESALT.

Aim 3: Investigate the knowledge, attitudes, and practices of PoAD towards dietary salt and its health implications (Study Three, Chapter Four).

The purpose of this aim is to understand the cultural, social, and knowledge-based factors that influence dietary salt consumption among PoAD to effectively tailor MINDTHESALT.

- **Objective 5:** Assess the current level of knowledge and awareness among PoAD about the risks associated with excessive dietary salt intake and its link to hypertension.
- **Objective 6:** Explore the cultural, social, and environmental factors that influence dietary salt consumption among PoAD and determine how these factors can be integrated into the educational content of MINDTHESALT.

Aim 4: Develop and conduct a primary evaluation of the MINDTHESALT intervention (Chapters Five and Six).

The final aim focused on the development, co-design and primary evaluation of MINDTHESALT, applying insights from the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) framework.

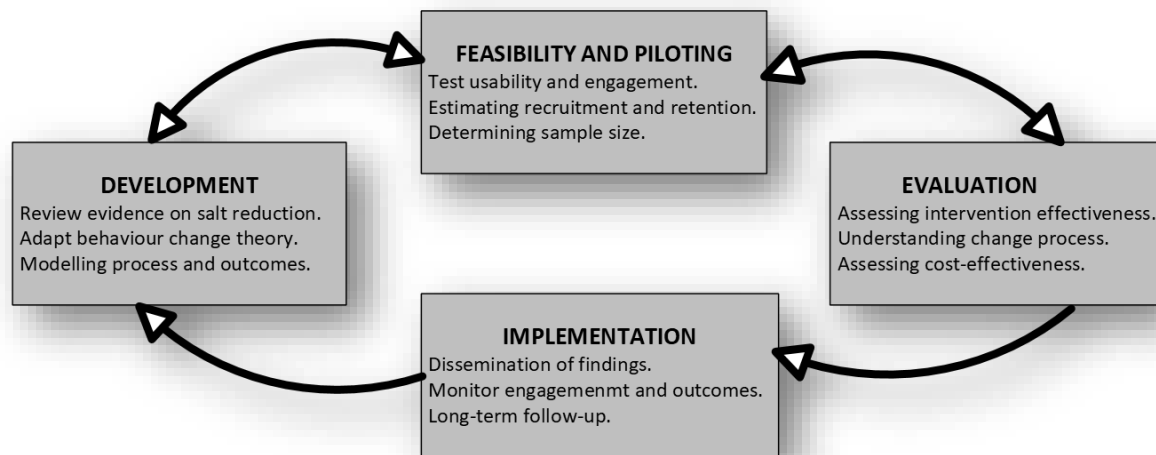
- **Objective 7:** Apply the UTAUT2 framework and the principles of co-design to develop MINDTHESALT, ensuring that the platform is tailored to the needs, preferences, and cultural values of PoAD in the UK.
- **Objective 8:** Conduct a primary evaluation study to assess the usability, acceptability, and preliminary impact of MINDTHESALT on improving dietary salt literacy among PoAD.
- **Objective 9:** Collect feedback from primary evaluation participants to refine the intervention and to prepare for future large-scale evaluation and implementation.

1.4 The Scope of the Thesis

This thesis is guided by the Medical Research Council (MRC) Framework for developing and evaluating complex interventions (Figure 1.1). This framework offers a comprehensive guide for systematically developing, piloting, and evaluating interventions in health and social care (Craig et al., 2008; Skivington et al., 2021). The MRC framework emphasises the need for a phased progression, starting with theory development, followed by feasibility testing, before moving to full-scale evaluation and implementation. This thesis specifically focuses on the development and preliminary testing stages of the intervention. The evaluation and implementation phases are planned for future research.

Figure 1.1

MRC Framework for Developing and Evaluating Complex Interventions



Note. This schematic illustrates the four key stages of the MRC framework as applied to the MINDTHESALT thesis project. Each stage ensures a structured approach to designing and primary testing of MINDTHESALT. Adapted from Craig et al. (2008) and Skivington et al. (2021).

1.4.1 Development of MINDTHESALT using the MRC Framework

The development phase of the MRC framework involves identifying the evidence base, establishing the theoretical basis, and modelling processes and outcomes (Craig et al., 2008; Skivington et al., 2021). This thesis follows this phase, beginning with a systematic review of existing literature on Ibls for CVDs among PoAD, as well as a targeted literature review related to dietary salt literacy, hypertension, and online health interventions. These reviews help identify gaps in existing interventions and inform the development of MINDTHESALT, ensuring that it is culturally sensitive and responsive to the specific needs and preferences of PoAD in the UK.

The framework also emphasises the importance of theory in guiding intervention design (Craig et al., 2008; Skivington et al., 2021). In line with this, the development of MINDTHESALT is

grounded in UTAUT2 (Venkatesh, Thong, & Xu, 2012a, 2012b). The UTAUT2 is used to predict how the target population will engage with the digital platform and the development of the educational and interactive components of the intervention.

Furthermore, this thesis employs a co-design approach by collaborating with PoAD in the design of MINDTHESALT, aligning with the MRC framework's emphasis on stakeholder engagement in the development process of interventions. This ensures that MINDTHESALT is evidence-based and tailored to be culturally acceptable and relevant to the population (Wadi et al., 2021; Zhou et al., 2023).

1.4.2 Primary Testing

The primary testing phase played a critical role in this thesis. This phase ensured that MINDTHESALT is practical and effective before moving to full-scale evaluation and implementation. This phase focused on assessing the intervention's preliminary usability, acceptability, and initial impact, offering an opportunity to refine the intervention before advancing to full-scale feasibility and pilot testing. The findings from this testing phase will also help estimate the appropriate sample size for future trials, ensuring the intervention can demonstrate robust and meaningful health outcomes. This primary testing phase further identified barriers, such as technical or cultural challenges, and ensured they were resolved. This phase was crucial for refining MINDTHESALT and provided key insights into the intervention's scalability and long-term sustainability, shaping future implementation and evaluation stages.

1.5 Delimitations of the Thesis

Although the MRC framework provides a comprehensive process that includes development, feasibility testing, evaluation, and implementation, this thesis is limited to the development and primary evaluation of MINDTHESALT. The evaluation and implementation stages, which typically involve randomised controlled trials (RCTs) to measure the intervention's long-term efficacy and effectiveness, are beyond the scope of this thesis. Such trials and large-scale implementation strategies will be the focus of future research, building upon the findings of this thesis.

Furthermore, the thesis is geographically delimited to address the needs of PoAD within the UK, mainly targeting this population's unique health challenges related to salt-sensitive hypertension. The intervention's cultural tailoring is based on the UK context. While the principles could be adapted elsewhere, this thesis does not include populations from other countries or consider cross-national comparisons.

Lastly, MINDTHESALT's full-scale technological infrastructure is not included in this thesis. This will be the focus of future feasibility and pilot studies. Although this thesis emphasises user experience, usability, and acceptability testing, it does not address broader technical challenges that might arise from scaling the intervention.

1.6 Research Questions

The overarching goal of this thesis is to develop and assess the preliminary acceptability and usability of MINDTHESALT. To achieve this goal, the following research questions were formulated in alignment with the thesis's aims and objectives.

1. *What are the critical features and engagement strategies of effective lbls for CVD prevention and management among PoAD in the UK? (addressed in Chapter Four).*

This research question guided a systematic review of existing lbls for CVD prevention and management among PoAD in the UK. The review identified key features and engagement strategies that contribute to the effectiveness of these interventions. Insights from this review informed the development and design of MINDTHESALT, ensuring the intervention incorporated proven strategies to enhance its adoption and effectiveness.

2. *How do PoAD in the UK seek and use online health information related to dietary salt and hypertension? (addressed in Chapter Four).*

This research question led to a qualitative study that explored the online health information-seeking behaviours of PoAD in the UK. By understanding how PoAD search for, interpret, and utilise online health information, the study identified key patterns, preferences, and challenges in current digital health resources. These insights provided a basis for the design of MINDTHESALT, ensuring that it met the specific needs and preferences of PoAD.

3. *What barriers and facilitators influence access to and use of online health information among PoAD? (addressed in Chapter Four).*

This research question was explored as part of a qualitative study that explored the barriers that hinder and facilitate access and engagement with online health resources among PoAD. By identifying the barriers that limit engagement and the facilitators that encourage it, this study provided a framework for designing MINDTHESALT to maximise accessibility and usability for the target audience.

4. What are the knowledge, attitudes, and perceptions (KAP) of PoAD in the UK regarding dietary salt and its health implications? (addressed in Chapter Four).

This research question led to a qualitative study that assessed the current level of knowledge and awareness among PoAD regarding the health risks of excessive dietary salt consumption and its link to hypertension. The study also explored the cultural and social attitudes towards salt and how these perceptions influence dietary behaviours. The findings were crucial in designing the educational content of MINDTHESALT, ensuring it was culturally tailored and effective in promoting healthy dietary habits.

5. What are the key design elements and user preferences that can make MINDTHESALT a culturally tailored, effective, and acceptable digital intervention for PoAD? (addressed in Chapters Four and Five).

This research question aimed to identify the key design features that ensure MINDTHESALT is engaging and user-friendly. By applying the UTAUT2 framework and co-design principles, this research question explored the design elements and user preferences. These elements were incorporated into the final design of MINDTHESALT prior to feasibility testing.

6. What are the preliminary usability and acceptability of the MINDTHESALT intervention in improving dietary salt literacy among PoAD? (addressed in Chapter Six).

This research question examined the preliminary impact of MINDTHESALT through a primary evaluation study. The study assessed whether MINDTHESALT was user-friendly, culturally sensitive, acceptable, and capable of engaging PoAD. It also examined the initial outcomes

regarding understanding the effects of excessive dietary salt intake and intentions to reduce salt intake.

7. How can feedback from primary evaluation participants be utilised to refine MINDTHESALT for large-scale implementation and evaluation? (addressed in Chapter Six).

The final research question focused on analysing participants' feedback in the primary evaluation study to inform the refinement of MINDTHESALT. The feedback was used to identify areas for improvement in MINDTHESALT's design and functionality in preparation for future feasibility studies, large-scale implementation, and long-term evaluation.

1.7 Research Democratisation and Stakeholder Engagement

Research democratisation is an important principle underpinning this thesis. Democratisation makes research more inclusive, equitable, and accessible to all stakeholders, including participants, communities, and researchers (Terry & Lieungh, 2020). In this thesis, the principle is reflected in the participatory and co-design approach used to develop MINDTHESALT, ensuring that PoAD are not merely subjects of the research but active collaborators in developing the intervention. Research democratisation is especially relevant when working with underserved or marginalised communities, such as PoAD, who have historically been underrepresented in health research and public health initiatives.

The co-design process employed in this thesis actively involves the target end-users, including some healthcare professionals, in the design and testing phases of the intervention. By engaging the PoAD early and throughout the process, this intervention is designed to be

culturally relevant, acceptable, and responsive to the specific needs and preferences of the target population (Ocloo & Matthews, 2016).

1.7.1 Accessibility and Inclusivity in Digital Health Interventions

A crucial aspect of research democratisation within this thesis is ensuring that the intervention is accessible to all individuals, regardless of socio-economic status or geographical location. By leveraging the power of digital technology, MINDTHESALT has the potential to reach a broad audience, including those who face barriers to accessing traditional healthcare services. According to Makri (2019), digital health interventions must be designed with inclusivity in mind to avoid the 'digital divide' that can worsen existing health disparities. Thus, the development of MINDTHESALT prioritises user-friendly design principles that make the platform accessible to individuals with varying levels of digital literacy. The content within the platform is also designed to be culturally sensitive and easy to understand, regardless of an individual's education level. This strategy ensures that PoAD can benefit from MINDTHESALT without barriers.

1.7.2 Community Ownership and Empowerment

A key tenet of research democratisation is fostering community ownership and empowerment. In this thesis, PoAD are involved in developing the intervention and encouraged to take ownership of its success. By providing communities with the tools and knowledge to manage their health, the intervention aims to empower individuals to take control of their dietary habits and reduce their sodium intake (Bhaskar, 2023). This sense of ownership is important for promoting long-term behaviour change and ensuring the sustainability of MINDTHESALT. This approach aligns with the values of the target population,

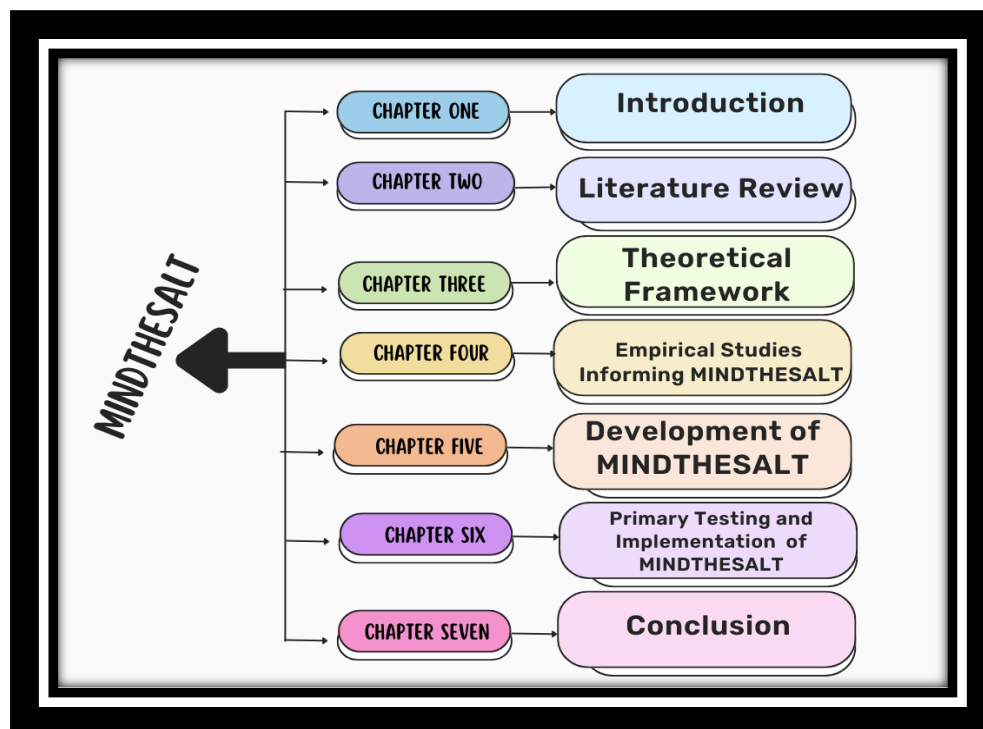
which emphasises collective action and shared decision-making as integral aspects of cultural identity (Goff et al., 2014; Usman et al., 2024b). Through this participatory model, MINDTHESALT seeks to build capacity within this demographic, enabling them to be more proactive in managing their health and dietary behaviours.

1.8 Structure of the Thesis

This thesis is organised into several chapters (Figure 1.2), each focusing on a vital aspect of the development and primary evaluation of MINDTHESALT. The flow chart below presents the thesis structure.

Figure 1.2

Thesis Structure for the Conceptualisation and Development of MINDTHESALT



Note. This diagram outlines the sequential chapters of the thesis, showing how each contributes to the overall framework.

Chapter One: Introduction

The opening chapter sets the foundation for the thesis. It outlines the challenges associated with excessive dietary salt consumption on a global scale as well as those specific to the UK, highlighting its role as a modifiable risk factor for hypertension and related health conditions. The chapter presents the rationale for developing MINDTHESALT, as well as its key aims, objectives, and research questions. In addition, it introduces the principles of research democratisation, emphasising the participatory approach adopted in developing the intervention. The chapter concludes with a brief outline of the thesis structure.

Chapter Two: Literature Review

This chapter provides a comprehensive review of the literature surrounding dietary salt intake, digital interventions, gamification, and the health challenges faced by PoAD as a result of excessive salt intake. The chapter further explores issues related to salt sensitivity among PoAD. The literature review investigates existing digital health interventions for chronic disease management, especially those incorporating culturally tailored approaches. Gaps in existing literature are identified, justifying the need for MINDTHESALT.

Chapter Three: Theoretical Framework

This chapter discusses the theoretical basis of MINDTHESALT. It begins by presenting the research philosophy and research paradigm, followed by an explanation of the MRC framework for developing complex interventions, which guided the design, testing, and refinement of the intervention. It then introduces the behaviour change theory, UTAUT2, which was used to structure MINDTHESALT's content and delivery.

Chapter Four: Empirical Studies Informing MINDTHESALT

This chapter combines the findings from three empirical studies that informed the development of MINDTHESALT. Each study contributes critical insights into the design and functionality of the intervention. The chapter presents the findings of a systematic review of digital interventions targeting CVD management among PoAD in the UK. The review synthesises evidence regarding the effectiveness, engagement strategies, and cultural relevance of these interventions, highlighting the gaps in the literature. The chapter also presents the findings of a study investigating how PoAD in the UK seek health information online. The study explored the preferences, challenges, and barriers PoAD face in accessing digital health resources through a qualitative research methodology. The chapter then presented the findings of another qualitative study exploring the knowledge, attitudes, and perceptions of PoAD regarding dietary salt. The study identified key cultural and social factors influencing dietary behaviours, which were crucial for shaping the educational content and messaging of MINDTHESALT. Finally, the chapter offers an integrative analysis of how the three studies relate to each other and form a cohesive foundation for the development of the intervention.

Chapter Five: Development and Primary Evaluation of MINDTHESALT

This chapter examines the development of MINDTHESALT. Drawing on insights from earlier chapters, it contextualises public health challenges into a culturally tailored intervention. The chapter further details the co-design methodology, highlighting how community input shaped all aspects of the intervention, from conceptual frameworks to prototype iterations. It also discusses the focus group methodology, refinement process, and the final components of the

intervention. Finally, the chapter discusses ethical considerations and expected outcomes of MINDTHESALT.

Chapter Six: Primary Testing and Implementation of MINDTHESALT

Chapter six details the primary evaluation of MINDTHESALT, presenting how users engaged with the platform. The chapter highlights the preliminary findings, including usability, participant opinions, and behavioural insights, along with the refinements made to improve the cultural relevance and technical functionality of MINDTHESALT. The evidence collected in this chapter will inform plans for scaling MINDTHESALT and evaluating its long-term impact.

Chapter Seven: Conclusion

The final chapter summarises the key findings of the thesis. It discusses their implications for public health practice, especially regarding the management of hypertension and the development of digital health interventions for PoAD. It reflects on MINDTHESALT's potential to address health disparities in the UK and beyond. The chapter concludes with recommendations for future research, including large-scale evaluations and the potential integration of these findings into public health policy.

CHAPTER TWO

Literature Review

2.1 Introduction

This chapter critically examines the current body of knowledge on salt reduction strategies, dietary habits, and cultural factors relevant to PoAD, with a particular focus on the UK. As highlighted in Chapter One, excessive salt intake and hypertension are major public health issues among PoAD (Usman et al., 2024b). Building on these points, this chapter synthesises findings from various studies that have examined different dimensions of salt consumption and reduction, ranging from national-level policies to smaller-scale initiatives. Special emphasis is placed on the growing use of mHealth and gamification principles to promote sustainable dietary changes.

The literature reviewed spans large-scale studies within the UK population (e.g., Collins et al., 2014; He et al., 2013b; Kypridemos et al., 2017; Payne Riches et al., 2021; Shankar et al., 2012; Song et al., 2023; Wyness et al., 2011) to smaller, community-focused studies (e.g., Earland et al., 2010; Ewrierhoma et al., 2019; Goff et al., 2014; Lawrence et al., 2007; Masango & Khokhar, 2009). Furthermore, some studies adopt a global perspective (Alzghoul, 2024; Johnson et al., 2016; King et al., 2013), offering insights into broader trends in gamified interventions that can be tailored for diverse cultural contexts. By evaluating the success, challenges, and gaps identified in these studies, this literature review presents an integrated viewpoint that underlines the need for MINDTHESALT.

2.2 Search Strategy

The search was conducted to gather evidence on critical aspects, including salt consumption patterns, the cultural and socio-economic factors influencing these patterns, the impact of gamification on digital health, and the effectiveness of interventions designed to reduce salt intake within this demographic. This section describes the databases searched, the search terms utilised, and the inclusion and exclusion criteria applied to ensure a focused literature review.

2.2.1 Databases and Search Terms

A systematic literature search was conducted in December 2024 across several key databases to explore the literature on dietary salt intake, health literacy, and public health interventions among PoAD in the UK. The databases searched were PubMed (regarded for biomedical and clinical research), Web of Science (valuable for citation analysis and offers a broad view across multiple scientific fields), Scopus (regarded for its comprehensive coverage of social sciences, technology, and health disciplines), and Google Scholar (valuable for locating grey literature, theses, and interdisciplinary research).

The PEO (Population, Exposure, Outcome) framework (Hosseini et al., 2024) guided the development of search terms:

- Population (PoAD): “people of African descent,” “African descent,” “Black British,” “African immigrants,” “Afro-Caribbean,” “African Caribbean.”
- Exposure (dietary salt, digital intervention, gamification): “dietary salt,” “sodium intake,” “salt reduction,” “online health intervention,” “digital health,” “mobile health,” “mHealth,” “gamification,” “gamif*.”

- Outcome (improved blood pressure, CVD prevention, health literacy, dietary salt reduction, dietary salt literacy): “reduced dietary salt,” “improved blood pressure,” “CVD prevention,” “hypertension reduction,” “salt literacy,” “health literacy,” “dietary salt literacy.”

Boolean operators (AND, OR) were used to combine these terms, ensuring a comprehensive retrieval of relevant studies.

2.2.2 Inclusion and Exclusion Criteria

Inclusion:

- ❖ Studies targeting PoAD in the UK, focusing on salt consumption behaviours, dietary interventions, and health literacy.
- ❖ Peer-reviewed publications, systematic reviews, meta-analyses, qualitative and cohort research, RCTs, and pertinent grey literature.
- ❖ Articles published in English up to and including December 2024.

Exclusion:

- Non-peer-reviewed sources lacking empirical data (e.g., opinion pieces, editorials, etc).
- Research that did not focus on salt intake, health literacy, or relevant public health efforts targeting PoAD.

2.2.3 Data Extraction and Synthesis

Data from the selected studies were extracted into a review matrix capturing study design, demographic information, types of interventions, key findings, and implications. This enabled

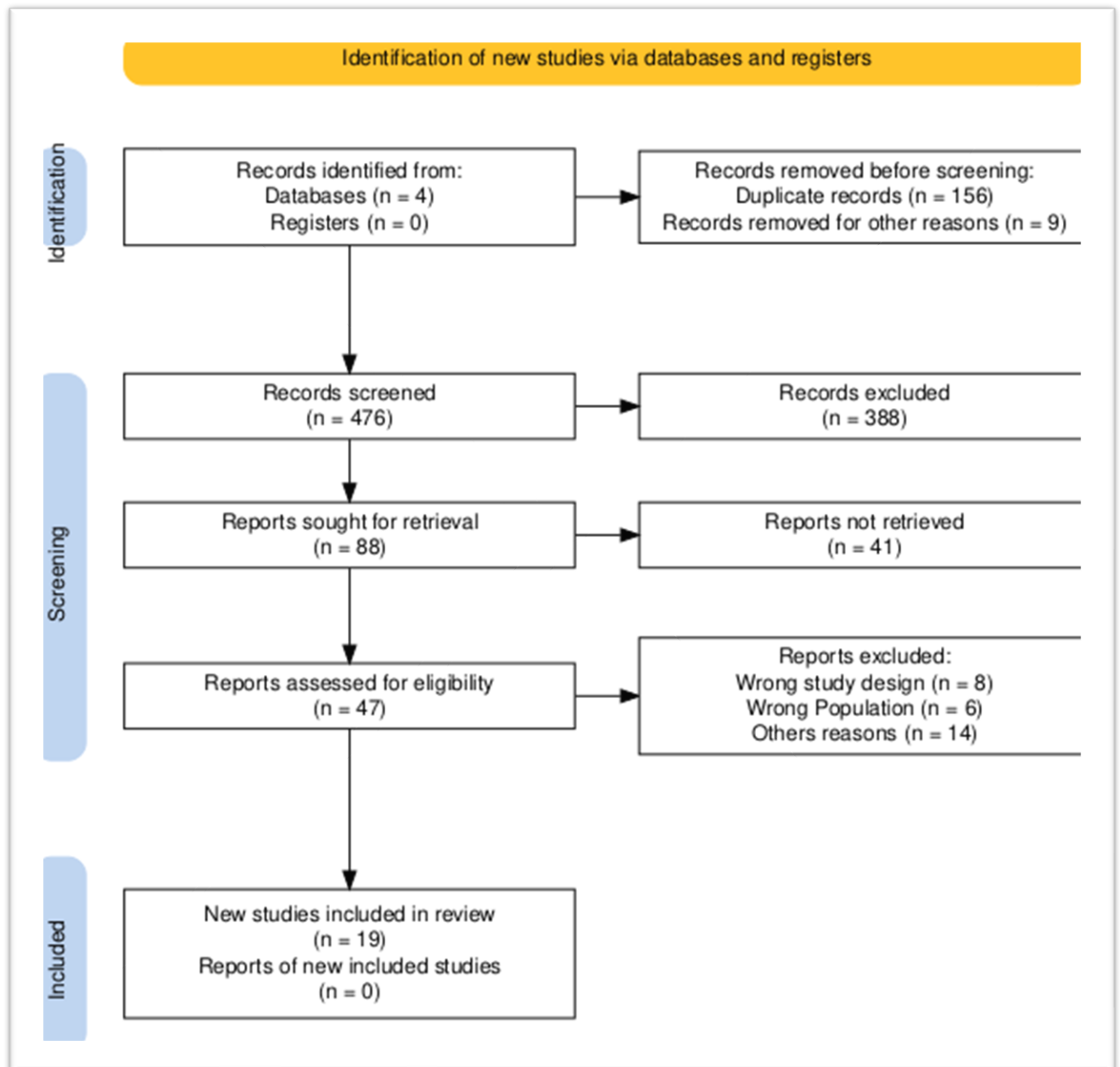
thematic analysis to identify common themes and gaps in the literature, providing a foundation for the development of MINDTHESALT.

2.2.4 Search Results

The initial search yielded 476 studies after removing duplicates. After screening titles for relevance, 88 studies were selected for further review. Following a review of abstracts, 47 studies were selected for full-text examination. After the full-text review, 19 studies met the inclusion criteria (Figure 2.1).

Figure 2.1

Adapted PRISMA Flowchart Illustrating Study Selection in the Literature Review



Note. This flowchart depicts the stages of the PRISMA process as applied to the literature review for MINDTHESALT. It shows the number of records retrieved, duplicates removed, records screened, full-text articles assessed for eligibility, and studies included in the final synthesis. Adapted from Page *et al.* (2021).

The studies (summarised in Appendix A) included policy analyses, observational studies, qualitative studies, and cross-sectional investigations, illustrating patterns of salt consumption, health literacy issues, digital health strategies, and the impact of public health efforts on dietary salt reduction in the UK.

2.3 Thematic Analysis of the Literature

Drawing on the findings (Appendix A), this section presents a thematic analysis of existing literature. Each subsection examines distinct aspects of salt consumption habits and interventions, gradually establishing a comprehensive understanding of the need for a gamified, culturally tailored web-based intervention. This approach is especially important for PoAD, considering the unique cultural and dietary factors that shape their salt intake and response to health interventions (Goff et al., 2014; Usman et al., 2024b).

2.3.1 Current Salt Reduction Efforts and Policy Context

Efforts to reduce excessive salt consumption have influenced global public health strategies, with the UK standing out as a prominent leader in establishing reformulation targets and raising consumer awareness. Although there has been notable progress, recent evidence indicates a stagnation in results and persistent disparities. This section outlines the successes, challenges, and evolving policy landscape contributing to the continuous effort to mitigate health risks associated with excessive salt intake.

2.3.1.1 National-Level Interventions in the UK

Multiple large-scale policy measures have been implemented in the UK to reduce the overall salt intake in the country. Collins et al. (2014) conducted a cost-effectiveness simulation study on various salt reduction efforts, demonstrating that coordinated strategies, such as product

reformulation targets, could substantially reduce the burden of CVDs. He et al. (2013a) corroborated these findings by analysing various public health measures, ranging from voluntary sodium limits for processed foods to comprehensive awareness campaigns. One such measure is the UK's voluntary salt reduction programme, implemented in the mid-2000s. Under this programme, the food industry committed to reformulating high-salt products, significantly reducing daily sodium intake among adults. Between 2003/2004 and 2011, the mean salt intake of the UK general population decreased by approximately 15%, resulting in significant reductions in blood pressure and the incidence of stroke and ischaemic heart disease (He et al., 2013b). Parallel public awareness campaigns highlighted the recommended daily salt limit of 6 grams (a gram higher than the WHO's recommendation of 5 grams per day). A survey by Wyness et al. (2011) indicated that consumer awareness increased with these campaigns, reflecting a change in purchasing behaviours. Despite these successes, progress has stalled in recent years (Song et al., 2023). Analysis of data from national urinary sodium excretion tests and mortality statistics between 2014 and 2018 revealed that the average salt intake in the population had increased. Consequently, researchers have suggested that additional structural policies and consistent monitoring are essential to maintain sustained progress in reducing salt intake across all groups within the UK population (Trieu et al., 2015).

2.3.1.2 Health Equity Modelling

While national initiatives to reduce salt intake have had a positive impact on UK public health, evidence suggests that deprived populations benefit less from these efforts. PoAD, as well as Bangladeshi and Pakistani ethnic groups, are among those most likely to live in deprived neighbourhoods in the UK, where socioeconomic barriers further exacerbate health

disparities (Ali et al., 2021). A modelling analysis by Gillespie et al. (2015) found that although salt-reduction policies generally improve cardiovascular health, their effects on health inequality vary based on the type of intervention. Mandatory reformulation of processed foods is projected to provide greater benefits to deprived groups, thus reducing socioeconomic issues. Conversely, interventions reliant on individual behaviours, such as social marketing or improved nutritional labelling, may provide improvements but could leave the disparities between wealthy and poorer groups largely unchanged. Moreover, a systematic review by Contreras Navarro et al. (2024) found that only a few studies on salt-reduction initiatives report outcomes stratified by socioeconomic status. This review analysed data from over 111,000 adults, revealing that while these policies generally succeed in reducing salt intake, the absence of disaggregated data makes it unclear if lower socioeconomic groups, who typically consume 5-10% more salt and experience higher cardiovascular risks, benefit equally. These findings underscore the importance of targeted interventions considering deprivation, cultural norms, culinary practices, and access to healthier food options to achieve equitable health outcomes.

Further evidence for the need to tailor interventions is provided by Kyridemos et al. (2017), who employed a dynamic microsimulation model to evaluate the potential future effects of improved structural measures. Their findings showed that broad population-level policies prevented over 52,000 cases of CVD, and structural policies aimed at reducing socioeconomic inequalities could prevent an additional 19,000 cases. These figures highlight the effectiveness of integrating universal strategies with culturally and socioeconomically sensitive programmes, especially among groups at higher risk for hypertension, such as PoAD.

2.3.1.3 Gaps in Salt Reduction Efforts

The stagnation and gaps in salt reduction in the UK suggest that, although some progress has been made, further improvements are needed to effectively engage underserved populations. Millett et al. (2012) noted a steady decrease in salt intake from 2003 to 2007; however, they pointed out that awareness and intake were disproportionately lower among younger individuals, men, ethnic minorities, and lower socioeconomic class groups. Similarly, Song et al. (2023) found a halt in salt reduction after 2014, as the initial momentum from campaigns and food reformulation commitments began to wane. These patterns necessitate renewed policy initiatives that specifically target underserved populations.

Cost evaluation studies, such as those by Collins et al. (2014), and population-level research consistently affirm that interventions aimed at reducing salt intake are among the most cost-effective strategies for reducing CVD risk. The question is not whether to pursue salt reduction but how to ensure that every segment of society, including PoAD, can reap the benefits of the interventions. Researchers and policymakers stress the importance of combining generic approaches with culturally adaptable elements to effectively reduce salt intake across the population (Ikuomola & Airhihenbuwa, 2021). This combined strategy may help bridge the knowledge, awareness, and resources gap, perpetuating disparities in salt-related health outcomes.

2.3.2 Cultural Adaptations and Socio-Economic Factors

Cultural heritage and socioeconomic conditions shape dietary practices, influencing how salt reduction initiatives are implemented in daily life. For example, in many Asian cuisines, salt plays a crucial role in traditional cooking, often being added during meal preparation and consumed through preserved or fermented products. A systematic review by Johnson et al.

(2017) found that the average salt intake in India is about 10.98 g/day, more than double the WHO-recommended limit of 5 g/day, and there has been no significant decline in consumption over time despite public health efforts. For PoAD, strong culinary traditions and economic limitations complicate efforts to reduce salt intake. This section explores how cultural preferences, acculturation, and economic inequalities collectively impact salt consumption and the effectiveness of public health interventions.

2.3.2.1 Understanding Dietary Acculturation

Dietary acculturation refers to the process by which people adopt the eating habits and food choices of a new cultural environment. It is typically seen when immigrants incorporate elements of the host country's diet into their own (Satia-Abouta et al., 2002). This phenomenon is closely linked to the rise in consumption of commercially processed foods. As individuals acculturate, they may consume more processed and ultra-processed foods common in the host culture, often containing high levels of added salt, sugar, and fat. Commercial food processing has a significant impact on sodium consumption. Salt is frequently used in curing, brining, and as a preservative to improve taste, texture, and shelf life. For instance, salt is used during cheese production to regulate pH levels, inhibit microbial growth, and influence texture, making it challenging to reduce sodium levels without compromising product quality (Pastorino et al., 2003).

For ethnic minority groups, dietary acculturation greatly influences food choices and salt intake. Goff et al. (2014) conducted an observational study assessing dietary habits among Caribbean and West African adults living in the UK. They found that participants who had resided in the UK longer had higher intakes of energy, fat, and sodium, indicating a transition toward processed and convenience foods. Although West African participants still obtained a

significant portion of their sodium from traditional meals, Caribbean participants consumed more Westernised options, such as sugar-sweetened beverages and fast food. The study concluded that dietary acculturation presents both advantages and disadvantages by offering wider culinary options while potentially introducing new risks, such as higher sodium intake from processed foods (Goff et al., 2014).

Similarly, Earland et al. (2010) found that cultural dietary habits strongly affect health outcomes for PoAD in the UK. In their research, participants reported using cooking methods that incorporated high-sodium seasonings or salted meats, reflecting longstanding cultural habits. Furthermore, Masango and Khokhar (2009) emphasised the importance of cultural context in salt consumption. They found that many African-Caribbean and Asian households in their sample frequently exceeded the recommended daily intake of salt. Traditional cooking practices were found to be deeply rooted, yet participants had a low awareness of national salt guidelines. This highlights the crucial need for culturally sensitive public health messaging to bridge the awareness gap.

2.3.2.2 Socio-Economic Constraints

Socio-economic factors substantially influence dietary choices (Affret et al., 2017). Material deprivation, such as lower incomes, limited time, and restricted access to reliable transportation, often leads to a reliance on convenience and fast foods. These foods are typically more affordable, easier to access, and quicker to prepare; however, they often contain excessive salt (Vilar-Compte et al., 2021). Hilton et al. (2023) explored the perspectives of various stakeholders in the UK regarding obesity policies and found notable parallels with efforts to reduce salt consumption. Stakeholders indicated that healthier food options can be expensive or unavailable in low-income areas. Structural factors, such as inequalities in food

distribution networks and the marketing of high-salt, high-fat, and sugary (HFSS) foods, continue to reinforce nutritional disparities. Although the study primarily focused on obesity, it aligns with concerns about salt intake, especially for communities facing long-term economic challenges.

Another consideration is the level of trust and engagement that ethnic minority communities have with mainstream healthcare services. Nazroo et al. (2003, 2019) stress that historical injustices and institutional racism can lead to scepticism towards healthcare services. If PoAD perceive that standard health interventions do not reflect their lived experiences or cultural practices, they may be less likely to adopt the guidance on salt reduction. These complex dynamics underscore the urgent need for culturally appropriate, community-focused strategies that effectively address socio-economic and institutional barriers.

2.3.2.3 Intersection of Culture and Socio-Economics Factors

The intersection of cultural heritage and socioeconomic realities creates a complex matrix of factors that facilitate or hinder healthy eating. Some traditional dishes may rely on fresh ingredients and homemade cooking methods, which can result in lower sodium levels. Conversely, existing cooking methods that use salted fish, seasoning powders, or brining foods in salt-heavy mixtures can substantially increase sodium levels in food (Earland et al., 2010; Goff et al., 2014; Masango & Khokhar, 2009). The shift toward Western food systems, dominated by processed products, also introduces hidden sodium (Goff et al., 2014). Efforts to reduce salt intake must also consider that individuals make food choices within a broader social, cultural, and economic ecosystem rather than in isolation. If barriers such as high costs, time constraints, cultural food preferences, and a lack of confidence in public health systems are not addressed, well-meaning initiatives are likely to be unsuccessful.

2.3.3 Gamification in Dietary Interventions

Gamification incorporates game-like elements, such as points, levels, and rewards, into health interventions to enhance motivation and engagement. Research shows that well-designed gamified platforms can improve the adoption of healthier dietary behaviours (Berger & Jung, 2024). This section presents key strategies for gamification in nutrition, exploring its potential advantages, underlying theories, and importance in culturally tailored interventions designed to reduce dietary salt consumption.

2.3.3.1 Defining Gamification

Gamification is a rising trend in health promotion. It is characterised by the application of game design elements to encourage user engagement and facilitate behaviour change in non-game contexts (Berger & Jung, 2024; King et al., 2013; Miller et al., 2014). Johnson et al. (2016) conducted a systematic review of gamified health initiatives, finding that although short-term user engagement appears to increase, the outcomes for long-term changes vary. The incremental success of these strategies demonstrates promise for leveraging intrinsic and extrinsic motivators to drive behaviour change. Aigner et al. (2023) developed a gamified app named 'Nutrition Garden' to promote healthier dietary habits by highlighting specific food items that prevent non-communicable diseases (NCDs). The app sought to keep users motivated and engaged over extended periods by incorporating gamification elements. An evaluation involving five participants highlighted the app's promise, with users particularly valuing aspects such as nutritional insights and its non-judgmental stance on unhealthy dietary practices. These findings suggest that combining gamification with tailored nutritional messaging can effectively support sustained dietary behaviour change (Orte et al., 2023).

2.3.3.2 Evidence for Gamified Approaches in Salt Reduction

Johnson et al. (2016) suggest that game elements, such as points, progress trackers, and mini challenges, are most effective when combined with user education, social interaction, and support systems. This strategy provides a framework for developing more effective digital interventions that share information and promote enjoyment, competition, and collaboration. Given that dietary choices are deeply ingrained in everyday routines, gamification may introduce an element of novelty, helping users break old habits by providing immediate rewards for healthier choices (Aigner et al., 2023; Johnson et al., 2016; Orte et al., 2023).

The literature search did not identify any study specifically addressing gamified interventions for PoAD, which is crucial considering the cultural and socio-economic nuances that shape their dietary habits. Berger and Jung (2024) emphasise the importance of tailoring game mechanics to different demographic groups, suggesting that a one-size-fits-all gamified tool may not resonate uniformly across diverse communities. These findings support the justification for MINDTHESALT, which integrates gamification strategies with a focus on culturally appropriate guidance for salt reduction.

2.3.3.3 Gamification Mechanics and Behaviour Change Theory

A growing body of research indicates that the effectiveness of gamified digital interventions is shaped not only by conventional behaviour change theories but also by models that explain technology acceptance. The UTAUT2 can offer insights into why individuals adopt and continue using digital platforms (Venkatesh et al., 2012a, 2012b). UTAUT2 posits that user acceptance is influenced by performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, and habit, thus guiding designers to integrate technical usability with motivational incentives.

Chib et al. (2023) argue that digital tools require real-time, personalised feedback to help users monitor their gradual progress towards their health-related objectives. By combining performance expectancy (the belief that the tool will improve health outcomes) with hedonic motivation (the enjoyable or rewarding aspects of gamified features), users can receive immediate reinforcement for their behaviour modifications. Johnson et al. (2016) highlight the importance of social influence, noting that features based on group dynamics, such as leaderboards, can foster social bonds, accountability, and cultural significance. When users perceive that their peers or community members support the platform (social influence) and find it easy to navigate (effort expectancy), they are more likely to use it consistently (Venkatesh et al., 2012a, 2012b).

These findings indicate that merely adding points and badges to existing nutrition applications is insufficient without a theoretical underpinning that addresses motivation and technology acceptance. As Thesen et al. (2023) noted, game elements can be integrated into educational content and supported by community efforts to ensure long-term engagement. UTAUT2 further clarifies this perspective by emphasising the need to reduce barriers and sustain user enjoyment (hedonic motivation), all while acknowledging cultural nuances. For PoAD, incorporating traditional foods or alternative seasonings within the game elements can help bridge the gap between cultural identity and health goals, making the intervention more engaging and contextually relevant.

2.3.4 Cost-Effectiveness of Salt Reduction Interventions

Salt reduction efforts have been widely recognised as cost-efficient, mainly due to their ability to reduce risk factors associated with CVDs, stroke, and other chronic conditions. Although previous sections of this chapter have covered the clinical and public health aspects of these

efforts, examining their economic impacts can offer further insights into targeted strategies, especially among PoAD.

2.3.4.1 Evidence from Modelling Studies

Many modelling studies support the notion that reducing salt intake across the population leads to substantial healthcare savings and improved health outcomes. Collins et al. (2014) conducted simulations by applying various policy measures (mandatory reformulation targets, improved food labelling, partnership between the Food Standards Agency and the food industry, and public awareness campaigns) to a representative sample of the UK population. By measuring potential changes in hospital admission rates for stroke and coronary heart disease (CHD), they demonstrated a significant reduction in healthcare expenditures, supporting the argument that reducing salt intake is significantly cost-effective compared to many other public health interventions. They suggested that these financial benefits would increase exponentially as more categories of processed foods adopt reformulated options with lower sodium contents.

Similarly, Kypridemos et al. (2017) introduced a dynamic microsimulation method to examine the effects of ongoing salt reduction policies in the UK. They found that current strategies have already prevented many CVD cases, thereby relieving national healthcare systems of tens of thousands of costly medical procedures and hospitalisations. These findings underscore that even a modest reduction in daily sodium intake can translate into considerable benefits at the population level. Although these studies did not focus explicitly on PoAD, they remain relevant and applicable to MINDTHESALT. Since PoAD often experience salt-sensitive hypertension (Agyemang & Bhopal, 2003; Jeong et al., 2020; Ji & Cappuccio, 2014), reducing sodium intake could yield disproportionately large protective benefits.

2.3.4.2 Equity and Cost-Effectiveness

An increasing amount of research emphasises the relationship between cost-effectiveness and equity. Specifically, the extent to which various social and ethnic groups benefit from universal salt reduction efforts can impact the indicators of cost savings within health systems. For example, Gillespie et al. (2015) employed equity-focused modelling to investigate how different demographics respond to standard salt reduction initiatives in England. Although they found reductions in overall CVD incidence, the magnitude of improvement was often less pronounced among the deprived demographic. This suggests that these subpopulations may not benefit from salt reduction programmes to the same degree as the affluent population. Consequently, the cost-effectiveness of national policies may be undermined if a substantial subpopulation continues to experience disproportionately high rates of health conditions.

Ji and Cappuccio (2014) found that, while the UK has significantly reduced its average salt intake, less favourable outcomes were evident among certain ethnic and lower-income groups. The inadequate dissemination of public health messages limited the cultural relevance of mainstream programmes, and constraints on accessing affordable, low-sodium food alternatives collectively hindered progress for these communities. From a financial perspective, high salt consumption within any subgroup in the country raises long-term treatment costs associated with conditions such as stroke, heart failure, and kidney diseases. These cost burdens accumulate to strain health services and diminish the overall economic benefits typically linked to universal salt reduction interventions (Nilson et al., 2020). Therefore, adopting an equity perspective in cost-effectiveness assessments provides a more realistic understanding, highlighting that culturally adapted strategies may counterbalance the higher initial investment needed to bridge communication gaps, foster trust, and ensure

accessible solutions. The interaction between equity and cost-effectiveness becomes more evident when focusing on populations with higher rates of salt-sensitive hypertension, as this relationship can save medical costs and prevent productivity losses, leading to enhanced efficiency within a universal policy framework.

2.3.5 Addressing Health Equity and Structural Factors

A comprehensive understanding of the cost-effectiveness of dietary salt reduction necessitates an examination of the structural determinants of health and existing health disparities. This section explores how socio-economic inequalities, cultural misalignment, and systemic barriers both hinder and promote salt reduction efforts in minority communities, especially among PoAD. It examines the gaps in minority engagement, the interplay between food environments and local infrastructure, and the importance of cultural sensitivity in addressing persistent health disparities.

2.3.5.1 Minority Engagement Gaps

Goff et al. (2014) detail how some Black Caribbean and West African adults have experienced an increase in sodium consumption over time, a trend partly attributed to dietary acculturation, the increasing availability of processed foods, and perhaps broader structural issues associated with socioeconomic status and the food environment. Different generational subgroups within the same community may also adopt distinct eating habits. For example, older adults may prefer salted fish or heavily seasoned stews, while younger individuals may gravitate towards fast food, which is often high in sodium (Goff et al., 2014; Usman et al., 2024b). Consequently, universal guidelines may not resonate with either group if they are presented in a generic, one-size-fits-all manner.

Additional concerns regarding social and economic barriers become particularly important in "food deserts," where access to fresh, low-sodium food options is limited (Janatabadi et al., 2024). Khatri and Assefa (2022) found that language barriers, financial constraints, and unfamiliarity with healthier cooking methods often reduce the effectiveness of mainstream campaigns aimed at Culturally and Linguistically Diverse (CALD) populations. A similar trend was reported by Millett et al. (2012), who found that improvements in salt consumption awareness lagged among men and ethnic minorities, often due to the use of inadequately tailored messages. Meanwhile, Masango and Khokhar (2009) opined that many African-Caribbean and Asian households were unaware of the recommended salt limits, underscoring the persistent gaps in communication.

For public health interventions to successfully engage these communities, it is important to incorporate accessible, culturally tailored resources (Lawrence et al., 2007). Nazroo et al. (2019) and Wallace et al. (2016) contend that generational distrust of healthcare systems, rooted in experiences of discrimination, remains a critical barrier unless public health efforts demonstrate genuine cultural understanding. Collaborating with community leaders, local businesses, and faith-based organisations can improve reach and acceptance. Without such cooperative approaches, disparities in health literacy, cultural norms, and living situations will continue to hinder engagement, resulting in uneven progress in efforts to reduce salt consumption (Moore, 2016).

2.3.5.2 Systemic Inequities in the Food Environment

Socioeconomic disparities can manifest as limited geographic access to various food choices, resulting in a predominance of convenience shops and fast-food outlets. Hilton et al. (2023) address this within the context of obesity policy, but the relevance to salt consumption is

equally significant. These environments limit consumer choice, prioritising cost and accessibility over nutritional value. Compounding these problems is the issue of targeted marketing strategies. Many low-income communities experience aggressive advertising for budget-friendly processed foods, which are typically high in sodium. Weak or inconsistent regulation of food marketing can normalise high-salt diets in communities already grappling with limited health resources. As individuals juggle multiple jobs or demanding schedules, the appeal of quick, inexpensive meals often overshadows the long-term benefits of reducing sodium intake. Over time, this pattern of convenience-based consumption can become deeply ingrained, making it challenging to adhere to recommended salt guidelines (Pita Ruiz et al., 2020). Addressing these systemic inequalities requires more than just individual awareness campaigns. Policymakers could implement zoning regulations that restrict the concentration of high-salt fast-food outlets, encouraging the establishment of full-service grocery stores in underserved areas or providing subsidies for fresh produce to lessen the burden of preparing low-sodium meals for families (Pita Ruiz et al., 2020). These structural changes can be transformative for many PoAD, whose diets are already susceptible to sodium overload due to cultural factors and socio-economic issues.

2.3.6 Specific Vulnerability of PoAD

The salt-related susceptibilities of PoAD encompass salt-sensitive hypertension, cultural ties to salted foods, and socio-economic challenges that collectively shape everyday dietary choices. By examining these interlinked factors, this section presents why PoAD often face increased risks of hypertension, stroke, and other adverse health outcomes compared to the general population.

2.3.6.1 Salt Sensitivity and Genetic Factors

Scientific literature points to a biochemical basis for the disproportionate impact of sodium on blood pressure in PoAD. For individuals with salt sensitivity, even minor changes in daily sodium intake can lead to a significant increase in blood pressure. Swift and MacGregor (2004) highlight that even when sodium intake exceeds recommended levels only moderately, the blood pressure increment in PoAD can be more pronounced compared to other populations. Jones and Rayner (2020) attribute the difference partly to variations in kidney function and the RAAS, which regulate sodium balance and vascular resistance.

The epidemiological importance of these findings can be found in He and MacGregor (2003), who demonstrated that a decrease in dietary salt intake of 3 grams per day could lead to a reduction in blood pressure of 3.6 to 5.6/1.9 to 3.2 mm Hg (systolic/diastolic) in hypertensives and 1.8 to 3.5/0.8 to 1.8 mm Hg normotensives. The effect would be doubled with a daily decrease of 6 grams and tripled with a daily decrease of 9 grams. Similarly, a conservative estimate suggests that reducing salt intake by 3 grams per day would lower the incidence of strokes by 13% and IHD by 10%. Reducing salt consumption by 9 grams per day (e.g., from 12 to 3 grams per day) could reduce strokes by roughly one-third and IHD by about one-quarter, potentially preventing about 20,500 stroke deaths and 31,400 IHD deaths annually in the UK.

2.3.6.2 Historical and Cultural Experiences

In addition to genetic factors, historical and cultural factors contribute to the high salt intake in PoAD. Flavours and cooking traditions tend to persist among PoAD, often representing cultural identity and pride (Usman et al., 2024b). Some PoAD may regard traditional dishes as being linked to family memories, community gatherings, and cherished customs. These high-sodium culinary traditions intersect with the convenience culture of Western urban living,

leading to increased salt consumption among this demographic. Some PoAD may maintain their traditional salt-heavy recipes while adopting Western-style fast food (Goff et al., 2014), resulting in sodium overload. Thus, interventions must carefully balance the preservation of traditions with health promotion.

In this context, demonstrating low-salt cooking techniques that preserve the taste and communal nature of the dishes can result in better acceptance. For example, reducing the saltiness of salted fish by using a mixture of herbs and spices instead of salt, or marinating with low-sodium sauces, could lower overall sodium consumption without stripping a dish of its identity. Although these nuances may seem minor, they underscore the significant role of heritage in everyday food practices.

2.3.7 Research Gaps in Salt Reduction

Acknowledging the complexities outlined in previous sections, two critical research gaps were identified:

- Advancing gamification and digital tools
- Strengthening cultural co-design and community partnerships

2.3.7.1 Advancing Gamification and Digital Tools

Recent studies highlight the emerging promise of gamification in promoting dietary changes, emphasising that regular interaction, challenge-based rewards, and peer support can help maintain user motivation over time (Johnson et al., 2016; King et al., 2013; Miller et al., 2014). Hilton et al. (2023) emphasise that successful public health regulations on unhealthy food marketing require insights from key stakeholders to be sustainable in the long term. Transferring this idea to salt reduction, digital tools that reflect local culture can enhance

community ownership by involving users in creating or selecting recipes, awarding them badges for answering salt-related questions correctly, and offering visual trackers that link small incremental efforts to health benefits. By ensuring that the goals in the gamified interventions are achievable, the “effort expectancy” (Venkatesh et al., 2012a, 2012b) remains manageable, which helps to reinforce continuous usage. Such personalisation is especially relevant for PoAD, who may have unique salt tolerances or preferences for specific traditional foods, necessitating a flexible approach that evolves according to user engagement and realities.

2.3.7.2 Strengthening Cultural Co-Design and Community Partnerships

A critical direction is to embed co-design within the development process of interventions aimed at reducing salt consumption. Masango and Khokhar (2009) emphasised the importance of household-level interventions, yet many digital or face-to-face programmes continue to utilise top-down designs. Genuine co-design for the PoAD would involve members of the target demographic from the outset, allowing them to shape all aspects of the intervention and ensure it aligns with their cultural norms and daily dietary practices.

Moore (2016) highlights the role of community members (such as respected community elders, faith leaders, etc.) who can advocate for health initiatives. In the context of salt reduction, these community advocates could facilitate interactive cooking skill sessions, highlight the benefits of using low-salt seasonings, and foster a collective campaign against promoting high-sodium convenience foods. By highlighting the importance of reducing dietary salt intake in a visible, enjoyable, and culturally sensitive manner, these partnerships can ground national guidelines in local authenticity, building momentum that extends beyond the immediate participants of the intervention.

2.3.8 Chapter Conclusion

This literature review has analysed the multifaceted aspects of salt reduction, demonstrating how factors such as cost-effectiveness, equity considerations, cultural identities, and socio-economic barriers converge to influence health outcomes for PoAD in the UK. Evidence suggests that broad policy measures, such as food reformulation and awareness campaigns, have successfully contributed to a reduction in national salt consumption. However, gaps remain in engagement, especially within minority populations who encounter both structural disadvantages and genetic susceptibility to salt-sensitive hypertension.

In this context, culturally relevant, equity-focused interventions are paramount. Smaller community-based studies indicate that interactive education, recognising traditional food practices while suggesting healthier modifications, can encourage lasting dietary changes. Additionally, research into gamification and co-design underscores the potential of digital tools and community engagement to motivate behavioural changes. However, very few have been specifically tailored for dietary salt reduction among PoAD. These findings suggest that for salt reduction interventions to be most successful and cost-efficient, they must transcend beyond broad, generic messages and adopt co-design, cultural sensitivity, and digital innovation.

CHAPTER THREE

Methodological and Theoretical Framework

3.0 Overview

This chapter presents the methodological and theoretical foundations of MINDTHESALT. It begins by exploring the research paradigm and philosophy that inform the project, emphasising both pragmatic and interpretive aspects, before discussing the mixed-methods research design, UTAUT2 framework, and co-creation strategies. The chapter then details the MRC Framework for developing and evaluating complex interventions. This is followed by a discussion of ethical considerations, including cultural respect, informed consent, and data protection. The researcher's positionality and reflexivity were also presented, examining the subjective perspectives that may influence the research.

3.1 Research Paradigm and Underlying Philosophy

Embarking on any research endeavour entails making critical decisions about what constitutes knowledge, how the knowledge is obtained, and which methodological approaches best capture the intricate nature of the phenomena being examined. In the context of MINDTHESALT, these choices were particularly significant: understanding and influencing dietary salt practices in PoAD encompass biological or nutritional aspects, as well as socio-cultural, historical, and behavioural dimensions. This section highlights the research paradigm and the philosophical foundations that frame the thesis, illustrating how pragmatism and interpretive traditions unite to create a contextually sensitive inquiry.

3.1.1 The Research Paradigm: Pragmatism with an Interpretive Lens

Pragmatism focuses on practical solutions or “what works” for addressing specific problems (Tashakkori & Teddlie, 2010), making it particularly suitable for the applied nature of MINDTHESALT. However, an exclusively pragmatic approach may overlook important interpretive aspects, especially considering the multi-generational knowledge transfer and historical mistrust of mainstream health messaging in some Black communities (Nazroo, 2003; Wallace et al., 2016).

Interpretive frameworks suggest that social realities, such as the communal cooking practices of PoAD, are shaped by subjective experiences and the collective process of creating meaning within the community (Greenhalgh et al., 2016). By integrating interpretivism into a primarily pragmatic framework, the research ensures that MINDTHESALT is informed by participants’ insights on the significance of salt in community traditions, rather than imposing a purely biomedical perspective. Moreover, continuous feedback from PoAD helps the iterative refinement of MINDTHESALT, acknowledging that lived realities may evolve or vary across subgroups. Ultimately, the study leverages the flexibility of pragmatism to merge quantitative and qualitative methods while also harnessing interpretive perspectives to preserve cultural integrity. This balanced framework fosters a context-sensitive, solution-driven approach that respects the complex dynamics of salt consumption in PoAD.

3.1.2 Philosophical Foundations: Ontology, Epistemology, and Methodology

The selection of a research paradigm fundamentally shapes what is considered valid knowledge (ontology), how the knowledge is acquired or interpreted (epistemology), and the method regarded as appropriate for discovering the knowledge (methodology) (Guba &

Lincoln, 1994). Since culturally influenced health behaviours, such as salt intake, are multidimensional, relying solely on a single-paradigm approach risks oversimplification.

3.1.2.1 Incorporating Pragmatism and Interpretive Considerations

Ontology

Excessive salt consumption is not uniform. It is co-constructed across multiple domains and cannot be reduced to a single causal factor (Bryman, 2012). Therefore, this research adopts an ontology of multiple, context-specific realities, acknowledging that various factors shape salt intake among PoAD. Also, instead of framing excessive salt intake as a purely “objective” behaviour that can be measured through simple clinical metrics, this research recognises that generational knowledge, traditional culinary practices, and interactions with broader societal systems influence each individual’s behaviour. Consequently, there is a need to design an intervention that can account for the diversity of realities, ensuring that recommended changes genuinely align with the cultural and socio-economic contexts of PoAD.

Epistemology

This research combines a pragmatic emphasis on finding workable solutions with an interpretive focus on understanding subjective nuances (Yvonne Feilzer, 2009). The pragmatic perspective primarily aims to mitigate salt-related cardiovascular risks among PoAD by prioritising interventions and metrics that can be evaluated for effectiveness.

Simultaneously, the interpretive lens asserts that deep, culturally relevant insights are critical for understanding how and why excessive salt consumption patterns are maintained. The views of PoAD on salt intake might be deeply intertwined with community or religious norms, histories, or family traditions. Consequently, data collection and analysis in this research are

designed to reveal these subjective meanings, ensuring that MINDTHESALT resonates with participants' lived realities.

Methodology

Building upon these ontological and epistemological foundations, a mixed-methods methodology is utilised, integrating quantitative data with qualitative insights (Creswell & Plano Clark, 2018). The quantitative metrics provide empirical rigour and the capacity to assess the success of the intervention; meanwhile, qualitative insights reveal cultural nuances, such as preferences for salted foods, culinary traditions, or factors contributing to scepticism in conventional healthcare messaging. This mixed-method strategy informed the design and evaluation of MINDTHESALT, balancing quantitative data (e.g., user engagement metrics, sodium intake tracking, and sodium excretion) with qualitative insights (e.g., user feedback from interviews or focus groups and thematic analysis of facilitators or barriers to adoption).

3.1.3 Balancing Positivist and Relativist Extremes

This research adopts a pragmatic approach that bridges the gap between positivism, which asserts that an objective reality exists independently of context, and relativism, which views truths as entirely subjective (Morgan, 2014). By adopting a pluralistic perspective, the thesis preserves the interpretive subtleties essential for understanding culturally rooted behaviours while also utilising quantifiable health indicators to evaluate the impact of MINDTHESALT. This pragmatic stance ensures that the interpretive dimensions of participants' experiences do not overshadow the need for robust, measurable metrics to assess the effectiveness of MINDTHESALT, striking a balance that respects cultural context and scientific rigour.

3.2 Research Design

This section outlines the research design and methodological framework for MINDTHESALT, demonstrating how a mixed-methods approach can address the complexities of excessive salt intake and salt-sensitive hypertension among PoAD. The subsequent subsections present the philosophical rationale for employing mixed methods and the sequential phases of the study design.

3.2.1 Rationale for a Mixed-Methods Approach

According to Creswell and Plano Clark (2018), mixed methods facilitate a thorough exploration of “what” changes occur (numerical data) and “why” these changes do or do not occur (narrative insights). Focusing exclusively on numerical data may overlook the communal significance of salted foods, while qualitative research, which provides cultural perspectives, lacks substantial and measurable evidence (Creswell & Plano Clark, 2018). Combining these approaches provides a comprehensive insight into both the effectiveness and cultural resonance of MINDTHESALT.

3.2.1.1 Philosophical Foundations, Advantages, and Challenges of Mixed Methods

The mixed-methods approach is grounded in pragmatism and emphasises practical solutions to real-world problems (Yvonne Feilzer, 2009). Concurrently, interpretive factors influence how cultural norms, historical context, or trust in mainstream healthcare impact the use of MINDTHESALT (Morgan, 2014). This combination of performance metrics (such as usage logs) with personal motivation ensures that outcomes are evidence-based and culturally relevant. However, combining quantitative and qualitative data can be resource-intensive and time-consuming for researchers and policymakers, as it requires data collection using different

methods (Almalki, 2016; O'Cathain et al., 2010; Plano Clark & Ivankova, 2016). MINDTHESALT addresses these challenges through phased data collection, implementing robust data management strategies, and keeping clear decision records when discrepancies in data arose (Creswell & Plano Clark, 2018).

3.2.2 Overall Study Design

The choice of research methods represents only one aspect of the research process; the strategy employed to organise and implement these methods is equally important. This subsection presents the overall research design, highlighting the sequential phases of data collection and demonstrating how each stage informs and guides the next.

3.2.2.1 Multistage (Multiphase) Mixed-Methods Approach

This thesis adopts a multiphase (multistage) mixed-methods framework, encompassing multiple studies, ranging from a systematic review to qualitative studies and, finally, the development and primary testing of MINDTHESALT (Creswell & Plano Clark, 2017). The multistage approach strategically combines systematic evidence collection, qualitative research, and pilot-scale quantitative evaluation studies, with each phase informing and refining the next.

3.2.2.1.1 The Multistage Research Phases

Linking four phases in a multiphase mixed-methods approach ensures that the project systematically progressed from evidence synthesis (systematic review) to qualitative insights (two studies), culminating in the development and primary testing that integrates quantitative and qualitative data. Each phase produced independent insights and directly informed the

direction of subsequent stages, thereby minimising assumptions and enhancing cultural alignment (Tashakkori & Teddlie, 2010).

Phase 1: Systematic Review

Purpose: Synthesised existing literature on Ibls targeting cardiovascular risk in PoAD.

Contribution: This study highlights gaps in cultural tailoring and user engagement strategies, establishing a preliminary evidence base for future qualitative investigations.

Phase 2: Qualitative Explorations

Purpose: Two qualitative studies (focusing on online health information-seeking behaviour and the knowledge, attitudes, and practices of PoAD regarding dietary salt) were conducted to provide in-depth cultural, social, and behavioural insights.

Contribution: Results inform the conceptual foundation for MINDTHESALT, highlighting user concerns, cultural nuances, and potential barriers or enablers.

Phase 3: Intervention Development

Purpose: MINDTHESALT is co-designed based on findings from phases 1 and 2 and focus group insight, integrating culturally relevant elements, trust-building features, and content tested by users.

Contribution: Ensures the platform resonates with the realities of PoAD, their diaspora culinary customs, and potential scepticisms toward mainstream healthcare systems.

Phase 4: Primary Testing

Purpose: Quantitative metrics (such as usage logs and salt literacy surveys) and nested qualitative feedback (focus group) were used to evaluate the preliminary impact, usability, and acceptance of MINDTHESALT.

Contribution: Provides information on preliminary effectiveness and contextual appropriateness, guiding iterative refinements before implementation.

3.2.2.2 Research Questions and Alignment with Methodology

Every research question focuses on a different facet of salt reduction among PoAD, ranging from broader evidence on online interventions to the primary testing of MINDTHESALT. This project ensures methodological transparency and thoroughness by connecting data collection and analytical methods to each question and indicating the chapters where these are addressed. The different data collection and analytic strategies align collaboratively with a multiphase, mixed-methods framework (Creswell & Plano Clark, 2018). Preliminary insights from the systematic review (RQ1) pave the way for qualitative studies into the digital health information-seeking behaviours of PoAD and their dietary salt KAP (RQ2-RQ4). Following this, co-creation processes (RQ5) integrate these findings into a functional prototype of MINDTHESALT. The pilot-phase quantitative and qualitative data (RQ6-RQ7) validate the preliminary impact of MINDTHESALT and guide further refinements.

Table 3.1 presents the relationship between the seven research questions (RQ1-RQ7), data sources, analysis techniques, and the corresponding chapters. The thesis maintains logical consistency and methodological rigour by linking each research question with a particular stage of the study and method.

Table 3.1.*Mapping Research Questions to Data Sources and Chapters*

Research Question	Data Source/Method	Chapter Addressed
RQ1: What are the critical features and engagement strategies of effective online intervention for CVD prevention and management among PoAD in the UK?	A systematic review of existing literature on Ibls (Screening MEDLINE, EMBASE, etc.).	Chapter Four (Study One).
RQ2: How do PoAD in the UK seek and use online health information related to dietary salt and hypertension?	A qualitative study using semi-structured interviews was analysed using reflexive thematic analysis.	Chapter Four (Study Two).
RQ3: What barriers and facilitators influence access to and use of online health information among PoAD?	A qualitative study using semi-structured interviews was analysed using reflexive thematic analysis.	Chapter Four (Study Two).
RQ4: What are the knowledge, attitudes, and perceptions of PoAD in the UK regarding dietary salt and its health implications?	The second qualitative study (Study 3) targeted salt-specific knowledge, attitudes, and practices.	Chapter Four (Study Three).
RQ5: What are the key design elements and user preferences that can make MINDTHESALT a culturally tailored, effective, and acceptable digital intervention for PoAD?	Integration of findings from RQ1 - RQ4 Co-creation sessions with PoAD (focus groups, advisory panels).	Chapter Five (Development Stage).
RQ6: What are the usability and acceptability of the MINDTHESALT intervention in improving dietary salt literacy among PoAD?	Primary testing (mixed methods) using surveys (salt literacy scales, usage logs) and follow-up interviews.	Chapter Six (Primary Testing).
RQ7: How can feedback from primary evaluation participants be utilised to refine MINDTHESALT for large-scale implementation and evaluation?	Post-evaluation feedback loops using detailed usage analytics and stakeholder consultations.	Chapter Six (Refinement and Future Plans).

Note. This table illustrates the connection between each research question and the specific data sources utilised, as well as the corresponding thesis chapter where analysis and discussion are presented.

3.3 The Unified Theory of Acceptance and Use of Technology 2 (UTAUT2)

This section introduces the UTAUT2 as a robust framework for analysing how PoAD might respond to a digital tool that seeks to reduce salt intake, particularly one that leverages gamification.

3.3.1 Overview and Evolution of UTAUT

Initially designed for organisational contexts, the UTAUT evolved into UTAUT2 to address consumer-oriented scenarios. The UTAUT is a comprehensive framework combining essential elements from multiple models to explain and predict technology acceptance and usage (Venkatesh et al., 2003). It incorporates components from the Technology Acceptance Model (TAM), Theory of Planned Behaviour (TPB), Innovation Diffusion Theory (IDT), Motivational Model (MM), Social Cognitive Theory (SCT), Model of PC Utilisation (MPCU), and Theory of Reasoned Action (TRA). By consolidating these models, UTAUT outlines four core constructs that influence behavioural intention and usage: performance expectancy, effort expectancy, social influence, and facilitating conditions.

The extension of the UTAUT, UTAUT2, adds key aspects such as hedonic motivation and price value, demonstrating that consumers weigh both enjoyment and financial factors when using a digital product (Swargiary, 2024; Venkatesh et al., 2012a). These elements are essential in health contexts, as users may not be mandated to use the digital intervention (unlike employees in a corporate setting), making their willingness and consistent habit critical for success. Overall, UTAUT2 offers a comprehensive framework for understanding the influence of personal, social, and contextual factors on technology acceptance (Swargiary, 2024).

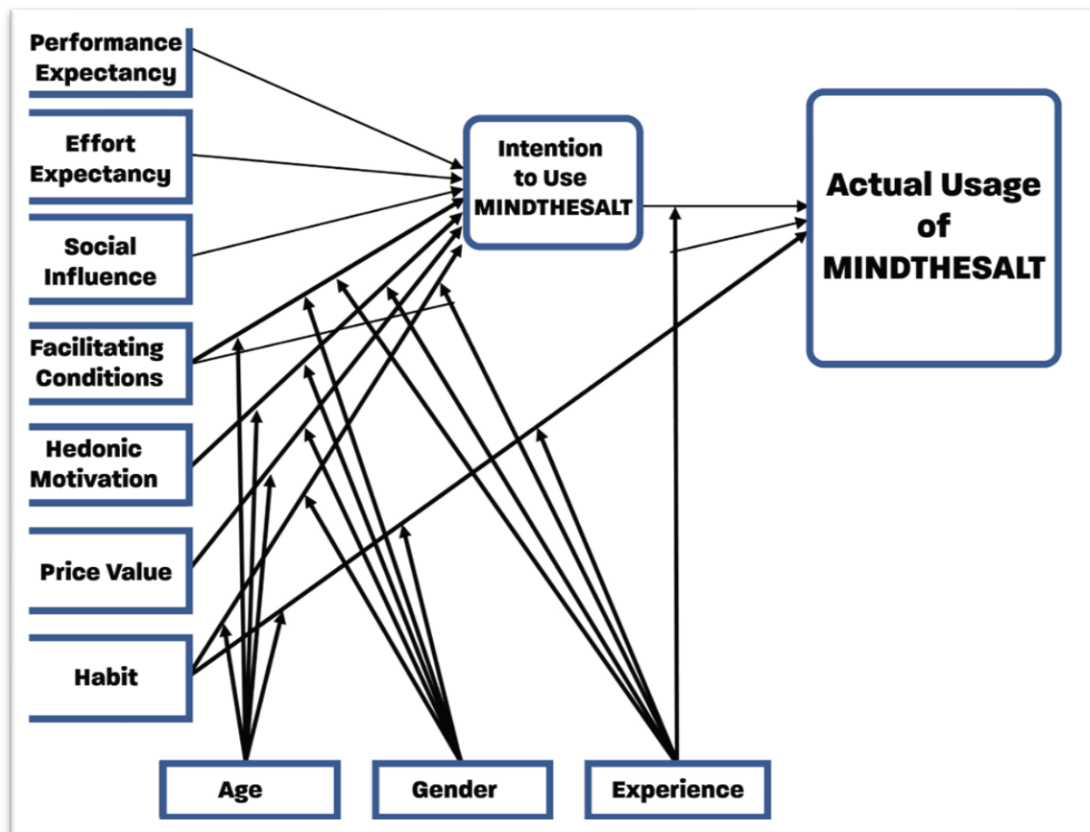
The UTAUT2 framework helps determine whether users perceive the digital intervention as enjoyable, beneficial, and socio-culturally relevant in consumer health solutions. Research applying UTAUT2 to diet, exercise, and mental health applications reveals that social influence often plays a significant role, particularly in communities where shared beliefs influence personal decisions (Schomakers et al., 2022). This trend parallels the communal cooking and family traditions common among PoAD (Goff et al., 2014; Reicks et al., 2022; Usman et al., 2024b).

3.3.2 Key Constructs in UTAUT2 and Application to MINDTHESALT

The UTAUT2 model encompasses seven key constructs that elucidate user acceptance and behaviour. When applied in the context of MINDTHESALT (Figure 3.1), these constructs provide valuable insights into why some individuals might choose to adopt or reject a digital intervention. Each construct serves as a diagnostic lens for understanding elements such as perceived effectiveness, ease of use, social influences, and habitual behaviours that shape user engagement. MINDTHESALT seeks to connect with diverse PoAD, including individuals of different ages, income levels, and varying digital literacy skills and experience. In this context, UTAUT2 could be a predictive model for user acceptance and an iterative tool for refining the platform. This section explores each construct, providing specific examples tied to MINDTHESALT.

Figure 3.1

Applying UTAUT2 to MINDTHESALT.



Note. This conceptual framework adapts the UTAUT2 model to the MINDTHESALT intervention. It illustrates the influence of key determinants, including performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, and habit, on users' intention to engage with the intervention. Age, gender, and experience are moderating variables that shape these relationships, ultimately influencing usage behaviour. Adapted from Venkatesh et al. (2012a, 2012b).

Performance Expectancy (PE)

This is the belief that MINDTHESALT can effectively help users reduce their salt intake. The PE increases when users observe measurable results or find intervention suggestions that are compatible with their cooking habits (Venkatesh et al., 2012a, 2012b).

Effort Expectancy (EE)

This emphasises ease of navigation or use. For instance, if some PoAD struggle with a cluttered interface or are discouraged by multiple registration steps, EE decreases, likely leading to lower usage rates (Venkatesh et al., 2012a, 2012b).

Social Influence (SI)

This reflects the impact of external endorsements. Encouragement from trusted figures such as faith leaders, respected family members, or community health workers can markedly enhance the adoption of MINDTHESALT within culturally cohesive groups such as PoAD (Moore, 2016; Nazroo, 2003; Wallace et al., 2016).

Facilitating Conditions (FC)

This includes the practical resources necessary for consistent usage. Examples of FC are reliable internet access, device availability, and support for digital literacy. When these elements are lacking, participants may abandon the intervention, perceiving it as too burdensome (Venkatesh et al., 2012a, 2012b).

Hedonic Motivation (HM)

MINDTHESALT leverages gamification features to sustain enjoyment and engagement. The intervention thrives if the game elements align with cultural traditions (Cheng & Ebrahimi, 2023; Hamari et al., 2014; Oliveira et al., 2022).

Price Value (PV)

Although MINDTHESALT is freely accessible, low-income users might be worried about hidden costs, such as mobile data usage. This demonstrates that interventions specifically designed to reduce mobile data consumption are more likely to succeed (Medhi et al., 2009).

Habit

This refers to how MINDTHESALT becomes an integral part of users' daily lives. Moving from extrinsic motivation to habitual behaviours encourages persistence (Venkatesh et al., 2012a, 2012b).

Moderators (age, gender, experience)

In the UTAUT2 model, the voluntariness of use is crucial for understanding how various demographic and situational factors influence the adoption of MINDTHESALT. This understanding enables the platform to be tailored to accommodate the unique needs and preferences of different users, including older individuals who may prefer simplicity and more experienced users seeking advanced features (Venkatesh et al., 2012a, 2012b).

3.3.2.1 Cultural and Economic Nuances in Digital Health

For many PoAD, cooking is not usually a solitary activity; it is often a family or community endeavour (Goff et al., 2014; Reicks et al., 2022; Usman et al., 2024b). This social aspect can amplify or impede the use of MINDTHESALT, depending on whether respected family or community members endorse it. Furthermore, economic variables such as internet data costs and unstable jobs can influence daily priorities, affecting how and if users can integrate digital tools into their busy routines (van Dijk, 2020). By thoroughly evaluating each component of the UTAUT2 framework, the study can identify deficiencies in facilitating conditions or

negative perceptions of cost that may overshadow PE, prompting necessary strategic adjustments (Venkatesh et al., 2012a, 2012b).

3.4 Co-Creation in Healthcare

Although co-creation has been proven vital in the development of successful lifestyle interventions aiming to support clinical populations (McIntosh et al., 2023), some minority communities often struggle when top-down models overlook local knowledge, cultural nuances, and existing scepticism towards healthcare systems (Truong et al., 2014; Uvhagen et al., 2018). This section discusses co-creation as a pivotal approach to ensure MINDTHESALT aligns with the culinary heritage, familial dynamics, and socio-economic contexts of PoAD.

3.4.1 Defining Co-Creation

Grounded in participatory action research, co-creation involves users, researchers, and stakeholders collaboratively defining the features, goals, and processes of an intervention (Greenhalgh et al., 2016). Instead of imposing an external blueprint, co-creation focuses on dialogue by combining local insights with academic or professional expertise to create solutions that resonate with the lived realities of the target population (Halvorsrud et al., 2021; Vargas et al., 2022). For PoAD, co-creation entails recognising the socio-historical significance of salted dishes while exploring practical and feasible ways to preserve flavour with reduced sodium.

3.4.2 Strategies for Co-Creation

Well-designed strategies are required to ensure co-creation extends beyond mere tokenism. Many PoAD maintain strong social networks, including churches, mosques, associations, and ethnic grocery stores (Adogame, 2014; Nam et al., 2019). By involving these community

members from the outset of the project, MINDTHESALT builds credibility. Online focus groups were conducted to establish culturally safe spaces for open and candid discussions and to accommodate the participants' busy schedules. The focus groups highlighted preferences for intervention features. Paper mock-ups and brief screencasts were presented early in the design process to give participants a clear understanding of MINDTHESALT's development trajectory (Sanders & Stappers, 2014). Testing these prototypes through short, iterative feedback cycles improved agility, allowing the design team (the researcher and a web developer) to address concerns promptly.

Furthermore, a review panel, conducted via WhatsApp over flexible times to suit participants' schedules, enabled users to test prototypes and provide real-time feedback on design aspects. This approach facilitated immediate iterations when some features were misaligned with user expectations (Mohamed Ibrahim et al., 2024). By adopting this collaborative design method instead of traditional researcher-led methods, the web app was tailored to include genuine cultural references, low-salt recipes, and interactive social components, ensuring greater relevance and user engagement.

3.4.3 Benefits of Co-Creation for MINDTHESALT

Engaging users directly ensures that MINDTHESALT resonates with the cultural contexts of its intended audience. The platform fosters a sense of familiarity and connection by featuring recipes relevant to PoAD, using supportive and culturally sensitive language, and incorporating visually appealing elements. These components enhance relatability and cultivate trust among users by acknowledging and respecting their cultural heritage.

Historical marginalisation often breeds distrust towards health recommendations, particularly within minority communities (Nazroo et al., 2019; Wallace et al., 2016). To address this issue,

MINDTHESALT adopts a co-creation model, encouraging participants to shape the development of the intervention. Involving users as co-creators reduces power imbalances, ensuring their perspectives are acknowledged and valued. This participatory strategy transforms users into collaborators, fostering a sense of ownership and trust in the final product.

The MINDTHESALT design is adaptable and responsive to evolving needs. Even after the primary testing phase, the established user network provides a dependable feedback mechanism to identify new needs or respond to emerging community trends. This dynamic evolution keeps the platform relevant, offering timely updates or expansions that reflect the changing circumstances of its user base, ensuring long-term engagement and effectiveness.

3.5 The MRC Framework

Promoting dietary salt literacy and managing salt-sensitive hypertension in PoAD necessitate a structured framework that balances innovation with evidence-based practices. This subsection explores the MRC Framework, which provides a stepwise blueprint for conceptualising, piloting, and scaling MINDTHESALT. The MRC framework outlines the roadmap for developing a culturally relevant and impactful tool to address excessive salt consumption and salt-sensitive hypertension in PoAD. By following this Framework, MINDTHESALT avoids the "pilot-and-forget" pitfall and ensures a seamless transition from conceptualisation to a scalable health intervention.

3.5.1 Overview of MRC Phases

The MRC Framework outlines four interconnected stages that transform conceptual ideas into validated interventions (Craig et al., 2008; Skivington et al., 2021). Each stage integrates

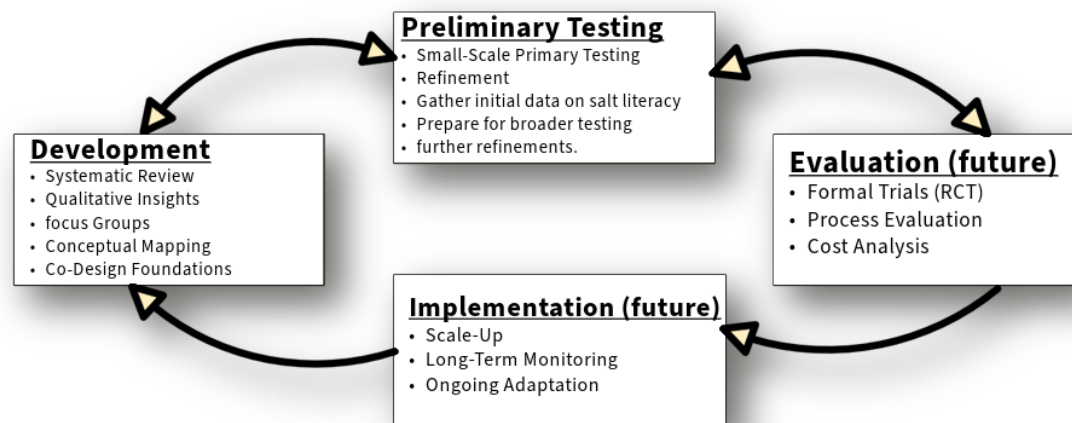
recommended methodologies, stakeholder engagement, and iterative evaluation checkpoints to ensure the intervention is feasible and effective. This structured approach reduces the risks of prematurely deploying large-scale interventions by grounding each iteration on empirical learning and user feedback.

Phase 1: Development

This phase focuses on creating a robust theoretical and empirical foundation for the intervention. The researcher integrates insights from literature reviews, focus groups, a theoretical model (UTAUT2), and co-creation frameworks to develop MINDTHESALT (Figure 3.1). This phase identified the gaps in UK salt-reduction initiatives and their adoption by PoAD. It analysed the online information-seeking behaviours and the attitudes and views of PoAD on dietary salt. Additionally, it addressed the preferences of PoAD for digital tools such as reminders, gamification, and community participation, and how these factors could affect daily salt consumption. The insights obtained informed the development of culturally appropriate prototypes that reflect the values and preferences of PoAD, thereby ensuring resonance and effectiveness.

Figure 3.2

Applying the MRC Framework to MINDTHESALT



Note. This figure illustrates the MINDTHESALT development process, which begins with research and co-design, followed by primary testing. Future phases will involve implementation that emphasises scaling up and adaptation, as well as evaluation through comprehensive trials, process assessments, and cost analyses.

Phase 2: Feasibility and Piloting

For MINDTHESALT, the Feasibility and Pilot phase was transformed into a primary evaluation, focusing on small-scale preliminary testing to assess operational viability and cultural fit. Gathering feedback through iterative cycles enabled the researcher to refine prototypes in real-time, ensuring the intervention meets the needs of PoAD before investing in extensive feasibility and piloting studies.

Phase 3: Evaluation (Planned for the Future)

This phase will evaluate the effectiveness of MINDTHESALT using RCTs or observational studies. Key outcomes will focus on measurable reductions in sodium intake and improvement in blood pressure. Alongside outcome evaluations, process assessments will explore essential

elements such as user subgroup engagement with the platform, the impact of co-creation on sustained commitment, and how UTAUT2 constructs influence adoption over time. This phase will provide the empirical evidence needed to support the scaling of the intervention to broader populations.

Phase 4: Implementation (Planned for the Future)

MINDTHESALT will transition to the Implementation phase, expanding its reach beyond the pilot communities after validation. Collaboration with local public health agencies will support scalability while preserving the core principles of the intervention. Ongoing stakeholder engagement will enable continuous adaptation, ensuring the web app remains culturally and contextually relevant as it integrates into larger health systems. Ultimately, the intervention has the potential to become an integral part of national health campaigns, thereby enhancing its impact on public health outcomes.

3.6 Ethical Considerations

Ethical integrity is fundamental to the research process, influencing every step from participant recruitment to data interpretation. This subsection highlights the measures implemented to protect the participants, consider cultural sensitivities, and adhere to data protection laws. MINDTHESALT aspires to model an ethically conscious approach to public health innovations by presenting consent procedures, privacy measures, and respecting community standards.

3.6.1 Informed Consent Procedures

Obtaining genuine consent, where participants thoroughly understand the research objectives, potential benefits, and risks, is paramount, particularly when working with

communities that may harbour distrust due to historic health inequities. The researcher created simplified English consent forms to accommodate diverse literacy levels (Appendix F). The consent forms also covered how data would be used. Participants were informed that personal identifiers would be excluded, while anonymised results might be included in academic publications or public reports. The researcher ensured that no participant felt pressured or feared adverse consequences from participating or opting out of the studies. This culturally informed consent approach fosters an atmosphere of mutual respect and understanding, promoting a more inclusive and respectful environment.

3.6.2 Data Privacy and Security

Digital interventions inevitably collect user data, such as usage logs and sensitive health metrics. Ensuring the safety and confidentiality of this information is a fundamental moral and legal responsibility. Operating within the UK mandates compliance with the General Data Protection Regulation (GDPR) and local privacy laws (Information Commissioner's Office, 2022). Consequently, MINDTHESALT's data framework is built to:

- ❖ Encrypt data in transit using TLS/SSL protocols.
- ❖ Pseudonymise user records to ensure that raw personal details (such as names and phone numbers) never appear in analytic datasets.
- ❖ Restrict server access to authorised research personnel with password-protected credentials.

The research also addressed ethical concerns about linking personal information with sensitive health data by assigning distinct alphanumeric IDs to each research participant. These IDs appear in usage logs and survey responses, enabling cross-method correlations (for

example, comparing time spent on gamified tasks with pre- and post-salt literacy changes) without revealing personal identities.

3.6.3 Cultural Sensitivity and Respect

In addition to privacy and consent, ethical research with minority communities must also consider cultural norms, historical injustices, and the intangible aspects of food traditions that shape their identities. Due to the role salt plays in the culture of PoAD, the educational modules of MINDTHESALT present dietary salt reduction by offering alternative flavouring techniques while respecting the historical, communal and cultural significance of specific dishes. Recipe adaptations prioritise flavour retention to mitigate the belief that making healthier choices results in the loss of cultural heritage (Partarakis et al., 2021).

From an ethical perspective, criticising high-salt diets might overlook the socio-economic constraints and the limited control some individuals have over their dietary choices. Instead, MINDTHESALT adapted its messaging to focus on user empowerment, emphasising that small, practical steps and supportive networks can lead to meaningful behaviour change. The researcher is trained to steer conversations away from shame-based discussions towards collective problem-solving, acknowledging external factors such as the high price of fresh produce and the lack of adequate grocery options in densely populated neighbourhoods with a high proportion of PoAD.

3.6.4 Ethical Approval

Sheffield Hallam University Ethical Review Committee ensures that all research conducted under the university's auspices adheres to UK and global ethical standards. The researcher submitted ethical protocols via the institution's Converis system, which oversees all ethics

reviews and approvals. The submissions featured key components such as project descriptions, participant information sheets (Appendix E), informed consent forms (Appendix F), risk management strategies, and data management plans.

The four studies underwent separate ethical reviews and received individual approvals to confirm adherence to the university's rigorous standards. These approvals included detailed evaluations of the methodologies, risk mitigation strategies, and participant engagement plans tailored to each study.

3.6.5 Researcher's Positionality and Reflexivity

Reflexivity involves constant self-awareness and recognising how one's identity, experiences, and assumptions could impact data collection, analysis, or rapport with participants (Berger, 2013). As a PoAD, the researcher brings valuable contextual insights, including a rich understanding of cuisines, cultural nuances, and intergenerational attitudes toward salt intake. This insider's perspective fosters empathy and enhances the relevance of the questions asked. Additionally, the dual role of the researcher as a nurse and a public health professional may shape participants' perceptions, likely leading to socially favourable responses. To reduce overidentification or bias, the researcher engaged in reflexive journaling and maintained awareness of their positionality and possible impact on the research process. This strategy utilises the researcher's background to build trust and rapport while integrating transparent reflexive techniques to maintain rigour.

The researcher's ethnic identity and professional roles did not affect the rigour or neutrality of the data collection and analysis. Instead, various measures were employed to uphold the objectivity and validity of the findings. The researcher utilised reflexive thematic analysis to

ensure rigour and minimise biases in data interpretation. This approach involves continuous self-reflection and acknowledges the researcher's active role in the analysis (Braun & Clarke, 2019). By keeping a detailed reflexive journal, the researcher documented personal reflections on how their background and assumptions could influence the dynamics of interviews and thematic development. This method ensured transparency and accountability in decision-making (Braun & Clarke, 2019).

Additionally, a systematic coding process was employed to minimise subjectivity. Codes were created iteratively, revisited during the analysis, and applied consistently across the dataset, allowing themes to emerge directly from participants' narratives (Nowell et al., 2017). To further enhance credibility, an audit trail of all analytical steps, including coding decisions and thematic adjustments, was maintained to provide a transparent account of the research process (Nowell et al., 2017). Additionally, triangulation was employed through collaboration with the researcher's supervisory team, which represented diverse cultural perspectives, facilitating a balanced and critical reflective evaluation.

3.7 Integrating the MRC Framework, UTAUT2, and Co-Creation

This section presents how the interaction between these models provides a robust solution for addressing excessive salt intake and salt-sensitive hypertension in PoAD, ensuring that no important aspect of user engagement or cultural context is overlooked.

3.7.1 Conceptual Synergy

The interaction between the MRC Framework, UTAUT2, and co-creation is depicted in Figure 3.2, with each playing a crucial role in the logical and practical development of MINDTHESALT. The MRC Framework provides a structured, stepwise research approach, ensuring that each

phase is thoroughly evaluated and refined before being implemented more broadly. UTAUT2 complements this by examining factors that shape user acceptance, including performance expectancy, effort minimisation, and social influences. Concurrently, co-creation emphasises the realities and perspectives of PoAD, bridging the gaps between theoretical frameworks and real-world applications while addressing the misalignment often found in untailored public health initiatives (Senga et al., 2023). These frameworks provide a robust foundation for designing an evidence-based and culturally relevant intervention.

3.8 Chapter Conclusion

This chapter has detailed the methodological framework that guides the development and primary testing of MINDTHESALT. It incorporates mixed methods, UTAUT2, co-creation processes, and a systematic approach aligned with the MRC Framework. This ensures that each research phase is methodical, iterative, and grounded in theoretical depth and practical significance. These complementary strategies provide a comprehensive view of user behaviours and preferences. By integrating these insights, MINDTHESALT ensures that user needs and cultural relevance drive intervention, focus groups, and recipe adaptations. Furthermore, maintaining ethical standards through comprehensive informed consent and secure data practices safeguards participant welfare and builds trust.

CHAPTER FOUR

Empirical Studies Informing MINDTHESALT

4.0 Overview

Chapters One through Three established the context, methodologies, and theoretical framework of the thesis. Chapter Four presents three empirical studies that collectively contributed to the development of MINDTHESALT. Study One reviewed Ibls aimed at preventing CVDs in PoAD, assessing their effectiveness and identifying areas that need further research. Study Two explored how PoAD in the UK seek and understand health information online, revealing their digital engagement trends, preferences, and obstacles. Study Three investigated the knowledge, attitudes, and practices (KAP) related to dietary salt among PoAD, highlighting the roles of cultural norms and gaps in awareness. This chapter synthesises the findings from these studies to provide a foundation for the design of MINDTHESALT in Chapter Five and its primary testing in Chapter Six, ensuring that both cultural relevance and digital accessibility are prioritised.

4.1 Study One

4.1.1 Context and Rationale

Full Citation

Usman, J. E., Childs, C., Rogerson, D., & Klonizakis, M. (2022). A Systematic Review of Internet-Based Interventions for the Prevention and Self-Management of Cardiovascular Diseases among PoAD. International journal of environmental research and public health, 19(14), 8872. <https://doi.org/10.3390/ijerph19148872>.

Context

Research consistently suggests that PoAD face significantly higher rates of CVD mortality, which can be attributed to socio-economic factors, possible genetic susceptibilities, and lifestyle choices (Lip et al., 2007). Meanwhile, the Internet has become a powerful tool for delivering large-scale health interventions (Liu et al., 2013; McManus et al., 2021). The systematic review identified and evaluated Ibls focusing on preventing or managing CVD risk factors in PoAD.

4.1.2 Study Aims and Review Framework

Study Aims

This systematic review aimed to identify the practical components of existing interventions for CVD prevention or management in PoAD, as well as to identify gaps in cultural adaptation, user engagement, and outcome evaluation. The review's objectives were to:

- Assess the impact of Ibls on clinical outcomes (such as blood pressure, blood glucose levels, and weight) and behavioural changes (including medication adherence, dietary habits, and physical activity).
- Examine user acceptability, the degree of cultural adaptation, and the methodological rigour of various interventions.
- Provide evidence-based recommendations to inform future digital health interventions targeting PoAD.

Review Framework (PICOS Criteria)

The study used the PICOS (Population, Intervention, Comparator, Outcomes, Study Design) criteria to facilitate article selection.

Population: Adults aged 18 and over who identify as a person of African or Caribbean descent.

Intervention: Any Ibl lasting at least four weeks, addressing at least one CVD risk factor (e.g., hypertension, diabetes, obesity, or physical inactivity).

Comparators: Control groups (no intervention or usual care) or other interventions (non-Internet-based), including pre- and post-designs.

Outcomes: Clinical indicators (blood pressure, HbA1c, cholesterol levels) or health-related behaviours (salt intake, physical activity levels, medication adherence).

Study Design: RCTs or quasi-experimental studies, all including a baseline measurement and at least one follow-up.

4.1.3 Methodology

The review adhered to PRISMA guidelines and was registered with PROSPERO (ID: CRD42022316357), ensuring a structured process and transparent reporting.

Literature Search

The authors searched MEDLINE, EMBASE, CINAHL, and the Web of Science from inception to February 2022, using keywords such as “People of African Descent,” “Internet-based interventions,” “cardiovascular disease,” “hypertension,” and “diabetes.” Manual checks of reference lists and searches of grey literature complemented the electronic retrieval to enhance comprehensiveness.

Eligibility Screening and Quality Appraisal

Of the initial 2413 records (post-deduplication), 13 studies fully met the inclusion criteria. The quality of these studies was assessed using the Jadad Scale (Jadad et al., 1996) and the Cochrane Collaboration’s Risk-of-Bias Tool (Cumpston et al., 2019; Higgins et al., 2008). Eleven studies scored ≥ 3 (out of 5) on the Jadad Scale, indicating “high quality,” while lower-rated studies mainly consisted of quasi-experiments lacking randomisation or participant blinding.

Ethical Approval

The study was carried out in accordance with Sheffield Hallam University's research ethics and integrity guidelines. The application for ethical clearance for this review was submitted via Converis (Appendix B).

4.1.4 Key Findings

Interventions and Technologies

A range of Internet-based modalities was reported:

- Mobile Apps: Frequently used to facilitate self-monitoring (e.g., blood pressure, glucose) or to deliver real-time feedback and reminders.
- Web Portals: Offered structured education modules, activity logs, and forums for peer interaction, occasionally supplemented with push notifications.
- Social media: Utilised Facebook groups or group text challenges to foster community support.
- Voice Technologies: Utilised automated calls or interactive voice responses for medication reminders or motivational interviewing.

Study Populations and Settings

All 13 studies were conducted in the United States, mostly recruiting African Americans from urban settings. Sample sizes ranged from 20 to 337, with an average participant age of approximately 50 years. Women were overrepresented, reflecting typical lifestyle changes or weight-loss research recruitment patterns (Pagoto et al., 2012).

Impact of Ibls on Clinical Outcomes and Behaviour Change

Several RCTs reported moderate reductions in blood pressure, with systolic and diastolic values dropping by 4-5 mmHg among intervention participants. Conversely, some trials did not show significant differences, suggesting variability in effectiveness. For diabetes management, some studies reported substantial reductions in HbA1c levels, while others found no significant changes. Similarly, findings related to weight and obesity were

inconsistent; some participants experienced modest weight loss, whereas others showed little to no change. These variations could be attributed to short follow-up periods or inconsistent implementation of the interventions.

Behavioural and lifestyle changes also varied among studies. None of the studies explicitly targeted the reduction of salt intake as a primary outcome, highlighting a critical gap in addressing this major cardiovascular risk factor. About half of the studies reported improvements in physical activity, such as increased daily step counts or higher exercise frequencies, often encouraged by text reminders or social media support. While some studies observed a slight improvement in medication adherence, this was not consistently evaluated across all studies.

Acceptability and Adherence

Most studies reported moderate to high acceptability, but adherence varied. While some participants engaged frequently, others dropped out early, often due to the complexity of the interventions. Community or peer interventions often improved retention.

Limitations and Gaps

The systematic review revealed several limitations and gaps that hinder the general applicability and effectiveness of Ibls for CVD prevention and management among PoAD. A notable geographic concern is that all the trials included were conducted within the United States, providing no direct evidence relevant to the UK or other countries with PoAD demographics.

Additionally, most studies featured short follow-up periods, typically ranging from three to six months, which limited the evaluation of the long-term effectiveness and sustainability of the

interventions. Moreover, many of the interventions, although branded as culturally tailored, failed to explain how they integrated cultural preferences, raising doubts about their actual cultural relevance.

Finally, inconsistencies in measurement across studies, such as differing clinical endpoints, an overreliance on self-reported outcomes, and modest sample sizes, limited the ability to formulate definitive conclusions regarding the effectiveness. These limitations highlight the need for more geographically diverse, culturally informed, and methodologically robust research to thoroughly understand and optimise the potential of Ibls for PoAD.

4.1.5 Implications for MINDTHESALT

Designing for Engagement: Interventions featuring personalised feedback, motivational supports, or community elements usually facilitated higher engagement. MINDTHESALT incorporates peer support features, community forums, the ability to share low-salt recipes, and culturally relevant reminders to sustain user interest.

Need for Salt-Specific Focus: The lack of emphasis on salt reduction as a key outcome points to a unique opportunity for MINDTHESALT. The platform can pioneer culturally adapted salt-reduction strategies by explicitly focusing on sodium intake.

UK Contextual Considerations: Ibls can potentially change some CVD risk factors among minority groups. Due to the absence of studies focusing on PoAD in the UK, MINDTHESALT tailors content and designs to reflect local dynamics, forging community partnerships to ensure authenticity. Differences in healthcare systems underscore the importance of pilot testing in a UK-specific context.

4.2 Study Two

4.2.1 Introduction and Rationale

Full Citation

Usman, J. E., Childs, C., Rogerson, D., & Klonizakis, M. (2024). Online Health Information-Seeking Behaviour among People of African Descent in the United Kingdom: A Qualitative Study. Healthcare (Basel, Switzerland), 12(9), 897.
<https://doi.org/10.3390/healthcare12090897>

Context

Digital technologies have transformed how people access health information. Data from the Office for National Statistics (2020) show near-universal Internet access in UK households, but not all demographics utilise online resources to the same extent (Prescott, 2019). Among PoAD, factors such as socio-cultural barriers or limited digital literacy can affect health information-seeking behaviour (Birru & Steinman, 2004; Muvuka et al., 2020). Recognising these patterns is crucial for MINDTHESALT. This study examined how PoAD seek, trust, and utilise online health information.

4.2.2 Study Aim

The study aimed to identify the digital platforms (search engines, social media, websites) that PoAD employ to access health information online, how often they use them, and why they do so.

4.2.3 Methodology

Recruitment and Sampling

A sample of 21 PoAD (ages 20-70, 67% female) from diverse urban and suburban areas in England, Wales, Northern Ireland, and Scotland was recruited through social media announcements, flyers, and personal networks. The goal was to include participants with different levels of digital literacy to capture diverse behavioural patterns.

Data Collection

Semi-structured interviews were conducted remotely via Zoom between October and December 2022, each lasting approximately 30 to 60 minutes. The interview guide (Appendix I) covered questions about participants' sources of health information, devices used to access health information, and cultural or generational influences on their health-seeking behaviours.

Ethical Approval

The study was conducted following the Declaration of Helsinki and received approval from the Sheffield Hallam University Ethical Review Committee. The request for ethical approval for this study was submitted via Converis (Appendix C). Before interviews, participants signed digital consent forms, emphasising anonymity and data security.

Data Analysis

The interview transcripts were analysed using Reflexive Thematic Analysis (Braun & Clarke, 2006, 2022). Codes were generated inductively from the transcripts, ensuring the emergent themes remained participant-driven. A reflexivity journal was utilised to document the

potential influence of the researcher's background on interpretative decisions (Olmos-Vega et al., 2022).

4.2.4 Key Findings

Five themes emerged following the reflective thematic analysis.

Theme 1: Internet Usage and Preferences

All participants agreed that Internet connectivity is essential to their daily lives. Smartphones were identified as the primary device for web access, indicating a strong trend towards a mobile-first approach. In comparison, laptops, desktops, and tablets were utilised less often. Older participants displayed more caution in their online behaviour, with many visiting fewer websites or engaging with the Internet less than younger users. This generational gap highlights the differences in digital confidence and reliance on technology.

Theme 2: Attitudes Toward Social Media

Social media platforms played a substantial role in participants' online experiences. WhatsApp was universally popular among all participants (21/21). Facebook is also a favourite for many (15/21). Ten participants reported using these platforms to access health-related information. However, concerns about misinformation and unqualified professionals often hinder deeper engagement with health content. Participants using Instagram or YouTube for health-related purposes highlighted the value of endorsements from recognised healthcare professionals, demonstrating a preference for verified and credible sources in navigating social media for health information.

Theme 3: Barriers to Seeking Health Information Online

Participants consistently expressed concerns over data misuse and the risk of exploitation, which prevented them from fully utilising online health resources. Many reported feeling overwhelmed by the sheer volume of conflicting health information online (information overload). Consequently, some abandoned their online searches and relied on trusted offline sources, such as in-person medical consultations. Inadequate digital skills compounded these issues, especially for older participants with limited online experience. These individuals often found it challenging to evaluate the credibility of websites, making them vulnerable to misinformation.

Theme 4: Trust and Reliability of Online Information

Professional credibility was identified as a crucial factor in evaluating the trustworthiness of online health information. Participants consistently favoured content from reputable online sources and certified medical professionals. Notably, the ethnic or racial alignment of content creators was deemed less important than the authenticity and clarity of the information provided.

Theme 5: Cultural Influences on Online Health Information Seeking Behaviour

Cultural beliefs played a crucial role in shaping participants' interactions with online health information. Some respondents indicated that certain PoAD prefer to pray for their health or rely on traditional African healing methods, dismissing digital resources that contradict established family or cultural practices. Additionally, doubts regarding Western medicine influenced some participants' willingness to use digital health tools. This scepticism, rooted in

historical marginalisation (Wallace et al., 2016), often led to cautious or selective engagement with online health platforms.

4.2.5 Implications for MINDTHESALT

Mobile-Centric Design: The study found that all participants use smartphones for Internet access. This underscores the importance of MINDTHESALT adopting a mobile-first strategy. Implementing low-bandwidth usage, intuitive navigation, push notifications, and clear interfaces will improve accessibility and usability, especially for users with varying digital skills.

Trust-Building Features: Participants expressed concerns regarding data privacy, which emerged as a critical barrier. Therefore, implementing visible trust-building measures is essential for MINDTHESALT to succeed. Future collaboration with trusted entities, such as the National Health Service (NHS) or local health charities, can serve as endorsements that enhance user trust in MINDTHESALT. Furthermore, providing transparent disclaimers about data collection and usage is crucial in mitigating concerns about data misuse, addressing a key concern of participants.

Addressing Information Overload and Misinformation: Participants frequently felt overwhelmed by conflicting online health information, leading some to withdraw from digital resources. MINDTHESALT delivers precise and consistent messages tailored to participants' cultural and dietary preferences, providing a potentially more effective approach.

Incorporating Community and Cultural Nuances: Cultural beliefs substantially influence health behaviours among PoAD, including scepticism towards Western medicine. MINDTHESALT embeds cultural values into its framework to address these concerns by featuring culturally relevant recipes, moderated forums for sharing experiences, and a

provision to contact a health professional. These elements can help bridge the gap between traditional health beliefs and contemporary practices while fostering trust and engagement.

Harnessing Digital Engagement: The study reveals that PoAD actively seek online health information. For MINDTHESALT, it was crucial to develop an intervention that utilises these digital engagement patterns and addresses barriers such as limited digital skills and mistrust. Providing professionally validated content from reliable sources and ensuring user-friendly access across different devices is essential for promoting sustained engagement.

4.3 Study Three

4.3.1 Introduction and Rationale

Full Citation

Usman, J. E., Morley, A., Childs, C., Rogerson, D., & Klonizakis, M. (2024). Exploring Dietary Salt Knowledge, Attitude, and Practices among People of African Descent in the United Kingdom: A Qualitative Study. Healthcare, 12(19), 1969. <https://doi.org/10.3390/healthcare12191969>.

Context and Need

Growing evidence indicates that PoAD experience higher rates of hypertension. Despite the increased rates of hypertension in this population, which are often associated with salt sensitivity and longstanding dietary practices (Agyemang & Bhopal, 2003; Cappuccio et al., 1997), there is limited research on how PoAD in the UK understand, utilise, and respond to health messaging about salt. This gap is critical because interventions that overlook cultural factors often struggle to drive meaningful behaviour change (Malott & Glenn, 2006). Given that MINDTHESALT seeks to address salt-related risks among PoAD, it was crucial first to

explore the cultural significance of salt, assess participants' baseline understanding of recommended daily intakes, and address any existing myths or misconceptions about salt consumption.

4.3.2 Study Objectives and Theoretical Underpinnings

Aims

The study aimed to explore the knowledge, awareness, attitudes, and practices of PoAD toward reducing salt intake, including motivating factors (such as a family history of hypertension or a desire for better health) and obstacles, including cultural taste preferences and infrequent reading of food labels.

4.3.3 Methodology

The researchers employed purposive sampling to recruit 21 participants (67% female, 33% male) aged 20 to 70, ensuring a diverse range of socioeconomic and generational backgrounds. Recruitment channels included social media advertisements, word of mouth, and community outreach. Participants were recruited from various regions in the UK, including London, Birmingham, Manchester, Sheffield, and Cardiff.

Data Collection

Semi-structured interviews were conducted via Zoom and lasted between 30 to 60 minutes. Participants followed an interview guide that prompted them to share their overall understanding of the health impact of excessive salt intake, engagement with food labels, and awareness of public health efforts targeting excessive salt intake. The conversations also

explored their knowledge of national salt reduction initiatives, including the UK's initial guideline of 6 grams per day and the WHO's recommendation of 5 grams per day.

Ethical Approval

The study adhered to the Declaration of Helsinki and obtained approval from Sheffield Hallam University Ethical Review Committee. Ethical approval was requested through Converis (Appendix C). Before the interviews, participants signed digital consent forms, ensuring their anonymity and the protection of their data.

Data Analysis

The research utilised Braun and Clarke's (2006) Reflexive Thematic Analysis for interpreting qualitative data. This process included familiarising with transcripts through multiple readings, creating codes to highlight key insights, and categorising these codes into overarching themes. Reflexive notes were kept strengthening rigour, and themes were repeatedly refined to ensure clarity and coherence, providing a framework for understanding participants' perspectives.

4.3.4 Key Findings

The study identified six themes highlighting the intricate relationship between salt use and cultural identity among PoAD.

Theme 1: The Diverse Roles of Salt in Culinary Practices

Participants frequently noted that salt is essential for enhancing flavour and preservation, such as curing fish or meat and rinsing vegetables. For many older individuals, meals rich in salt were essential to what they considered authentic African or Caribbean cooking, signifying their cultural identity.

Theme 2: Awareness of Health Risks Associated with High Salt Intake

Many respondents linked excessive salt intake to health issues such as hypertension. However, this awareness rarely led to a reduction in salt use, as cultural taste preferences often took precedence. Some participants seemed to accept these risks, considering salt an unavoidable aspect of their culinary practices.

Theme 3: Knowledge Gaps on Daily Salt Intake Recommendations

Only a few participants accurately state the recommended daily limit of 2,300 milligrams of sodium, which is equivalent to 6 grams of salt. Instead, they relied on vague measures, such as "a spoon." This suggests an educational gap in public health messaging, where guidelines often fail to become practical knowledge.

Theme 4: Cultural Factors Influencing Salt Intake

Many participants felt that PoAD use more salt than other ethnicities, attributing this to longstanding habits and traditions. The desire to recreate the Afro-Caribbean flavours often led to heavier seasoning, strengthening cultural connections to salt use.

Theme 5: Limited Attention to Food Labels

Most participants indicated they rarely checked nutritional labels for salt content, focusing instead on expiration dates. The perceived complexity of food labels deterred them from engaging with the information, and some deemed it irrelevant due to their confidence in traditional cooking methods.

Theme 6: Awareness of Salt Reduction Initiatives

Only one participant recalled a specific campaign targeting salt or sugar reduction, highlighting a significant gap in public health efforts. This suggests that these campaigns are not effectively reaching or resonating with PoAD.

4.3.5 Implications for MINDTHESALT

Cultural Sensitivity: MINDTHESALT emphasises gradual reductions in salt intake instead of recommending an abrupt stop. For example, offering tutorials on rinsing salted fish or using partial salt alternatives, such as fresh herbs, can help retain flavour while lowering sodium levels.

Bridging Knowledge Gaps: To combat the lack of awareness about recommended salt levels, MINDTHESALT introduces clear, straightforward educational modules. Graphical illustrations, such as visualising 6 grams of salt compared to a teaspoon, can improve user understanding and make the guidelines more relatable. These modules could act as foundational resources to empower users with practical knowledge about salt consumption.

Enhanced Food Label Engagement: Another essential factor is encouraging greater engagement with food labels. MINDTHESALT addresses this issue by incorporating videos and photos that demonstrate how to read and analyse sodium levels in everyday groceries, potentially normalising label checking and encouraging informed dietary choices.

Incorporating Traditional Practices: Combining traditional culinary techniques with modern health-conscious adaptations can promote acceptance and cultural relevance. For instance, encouraging the adoption of moderate salting while suggesting healthier alternatives allows users to connect with their culinary heritage without compromising their health.

4.4 Integrative Analysis: Synthesising Insights from the Three Studies

Integrating the findings of Studies One, Two, and Three provides a comprehensive understanding of how cultural perspectives, digital engagement, and salt-related knowledge intersect in PoAD. These findings lay the groundwork for strategic recommendations for MINDTHESALT.

Internet as a Vehicle for Health Promotion

Studies One and Two note that while PoAD frequently access the Internet, their interaction with formal campaigns or reading food labels is often limited. Study One reinforces that mobile devices are the go-to means for PoAD when accessing health information online. Consequently, MINDTHESALT implements a fully digital strategy, incorporating smartphone-friendly layouts and offline options to overcome connectivity barriers.

Social Media and Community Involvement

Study Two indicates that PoAD frequently use social media but are concerned about misinformation. Study Three highlights how communal cooking and family dynamics influence salt consumption. MINDTHESALT incorporates moderated peer support groups and community features to cultivate group accountability while addressing misinformation.

Cultural Relevance and Common Health Concerns

Study Three highlights the cultural significance of salt in the cuisines of PoAD, serving as more than just a seasoning, but also strengthening communal identity. Study Two emphasises that digital strategies must consider cultural intricacies to connect with minority groups. MINDTHESALT recognises the culinary traditions of African and Caribbean communities in its strategies, avoiding negative messaging regarding traditional uses of salt. Initiatives for

reducing salt intake should be communicated within culturally positive contexts, possibly using endorsements from community leaders or faith organisations to boost credibility and connection (Moore, 2016; Santos et al., 2021; Trieu et al., 2015).

The Knowledge-Action Discrepancy

Study Three identified a disconnect between salt-related health awareness and practical action, often affected by cultural complacency. Study One stresses the importance of structured behavioural change initiatives, including goal setting and feedback. Study Two cautions that conflicting online information can discourage meaningful action. MINDTHESALT embeds a comprehensive behaviour change framework (UTAUT2) to close this gap. Features such as weekly challenges and progress tracking can facilitate the development of healthy habits.

Trust, Misinformation, and Expert Validation

Study Three reveals limited official campaigns and professional resources to reduce salt intake among PoAD. This study further highlights the significance of credibility, noting that endorsements from healthcare professionals may carry more weight than suggestions based on ethnicity. Study Two attributes low engagement or adherence to distrust and unresolved cultural issues. MINDTHESALT plans to showcase endorsements from respected healthcare professionals and health organisations. Interactive features such as “Ask the Expert” or monthly Q&A sessions can enhance credibility and provide direct access to professional guidance.

4.5 Chapter Conclusion

The systematic review in Study One illustrates the success of Ibls in fostering behaviour change, even within historically underserved ethnic groups. It also highlights the need for culturally tailored adherence strategies and methodologically sound research. MINDTHESALT can address this critical gap by focusing on dietary salt reduction through a co-designed, evidence-based digital platform tailored to the cultural and behavioural norms of PoAD.

Study Two indicates that while PoAD heavily depend on smartphones and are open to seeking health information online, concerns about privacy, misinformation, and cultural misalignment can create barriers to trust. To mitigate this, MINDTHESALT features transparent privacy policies, curated content, and interactive forums overseen by professionals, which enhances credibility and engagement.

Study Three emphasises that salt goes beyond mere seasoning; it plays a key role in the preservation, cultural identity, and shared cooking traditions of PoAD. Initiatives that focus solely on the health risks of reducing salt without considering cultural importance may alienate this audience. Therefore, MINDTHESALT adopts a culturally sensitive approach, recognising these traditions while promoting gradual changes.

CHAPTER FIVE

Development of MINDTHESALT

5.0 Introduction

As established in previous chapters, PoAD face unique socio-cultural and physiological vulnerabilities related to salt-sensitive hypertension (Agyemang & Bhopal, 2003; Cappuccio et al., 2013). Over the past decade, various public health efforts in the UK have promoted salt reduction, resulting in a significant reduction in sodium consumption at the population level (He & MacGregor, 2011; Song et al., 2023). However, epidemiological data indicate that the reduction was less evident in lower socioeconomic groups, suggesting that these public health interventions may not be equally effective across all populations (Ji & Cappuccio, 2014; Millett et al., 2012).

This chapter presents the development of MINDTHESALT, highlighting the advantages of tailored interventions and the co-design process informed by previous chapters and feedback from focus groups. It details the methods used for focus group recruitment, data collection, and intervention refinement based on thematic insights. Furthermore, this chapter discusses ethical considerations and the potential for future scalability, concluding with reflections on how user-centred co-creation positions MINDTHESALT as a culturally sensitive eHealth model for minority groups.

5.1 Appropriateness of a Digital Intervention

Digital platforms can help overcome several logistical barriers (such as time, location, and cost) associated with face-to-face interventions (Joseph et al., 2021; Murray et al., 2016). Hamari

et al. (2016) found that many users of digital solutions prefer online learning due to its flexibility. This format suits their busy schedules, promotes self-paced learning, and may incorporate interactive or gamified features. Furthermore, the high use of social media among PoAD suggests that well-designed eHealth tools could harness community dynamics and promote "group accountability," linking knowledge with peer support (Usman et al., 2024a).

Despite these benefits, trust and cultural authenticity remain paramount in digital health contexts, especially for PoAD (Nittas et al., 2024; Raza et al., 2023; Usman et al., 2024a). For example, a generic calorie tracker that categorises Egusi soup (a popular West African dish prepared with ground melon seeds, leafy greens, and frequently accompanied by meat or fish in a savoury broth) as an "unidentified dish" can lead to frustration and increased dropout rates among PoAD. Furthermore, structural disparities in digital access, such as a lack of broadband or suitable devices, underscore the need for MINDTHESALT to be mobile-friendly, data-efficient, and user-friendly (Tsetsi & Rains, 2017; Wang & Liu, 2021).

5.2 Rationale for Cultural Tailoring

Cultural tailoring in health interventions involves shaping educational content, user interfaces, and motivational techniques to align with the target community's normative, linguistic, or cultural contexts (Barrera et al., 2016; Kreuter et al., 2003). For PoAD, the use of dietary salt is shaped by tradition, taste preferences, and social norms; thus, a "one-size-fits-all" approach to dietary salt reduction, especially those that emphasise Western fast foods or overlook Afro-Caribbean staples, may be unsuccessful (Goff et al., 2014; Usman et al., 2024b).

Beyond dietary salt reduction, culturally tailored programmes for diabetes and blood pressure management in PoAD consistently show higher engagement and reasonable improvements in health outcomes compared to generic versions (Cappuccio et al., 2006; Usman et al., 2022,

2024a). For example, online platforms that celebrate Afro-Caribbean foods or feature local pastors and community leaders may increase retention rates. PoAD may respond favourably to interventions mentioning their local dishes (Bramble et al., 2009; Brown et al., 2019). Applying these findings to salt reduction is crucial, as the challenges revolve around substituting or minimising the use of high-sodium seasonings while recognising and respecting cherished cultural dishes.

5.3 Preliminary Intervention Components

Prior to the pre-development focus group, the researcher drafted a conceptual blueprint for the MINDTHESALT intervention. All studies presented in Chapter Four emphasise the need for user engagement strategies, such as gamification and social support, while aligning the intervention with the specific needs and preferences of PoAD (Usman et al., 2022, 2024a, 2024b). Based on these insights, the initial intervention framework was structured around the following key components.

Low-Salt Recipe Library: This section included African and Caribbean staple dishes modified for lower salt content. Each recipe references recommended sodium intake levels and practical tips, such as soaking preserved meats or fish overnight to reduce sodium levels.

Interactive Quizzes: To enhance engagement, brief quizzes were developed to educate users about salt reduction while awarding “Health Coins (HC).” The intervention also incorporates a leaderboard, which has been reported to encourage healthy user competition inspired by successful eLearning platforms (Hamari et al., 2016).

Simple Self-Monitoring Tools: This blueprint featured a daily salt usage log and an optional blood pressure log and chart, with results represented in clear, easy-to-read charts (Mair et al., 2023).

Cultural Elements: The blueprint incorporated vibrant colours and motifs from Afro-Caribbean art and cultural patterns (Ghamari & Amor, 2016). This approach sought to instil a sense of pride and cultural identity.

5.4 The Co-Design Approach

Recognising that the initial blueprint is only foundational, the researcher organised a pre-development focus group to validate and refine the initial design. This method aligns with co-design principles, emphasising collaborative development with end-users to ensure that MINDTHESALT is practical and relevant to their context (Greenhalgh et al., 2016; Mangai et al., 2018). The focus group sought to validate the content of the blueprint and usability needs, such as mobile-friendly designs and data consumption, as well as gauge interest in interactive features, including quizzes and community forums. While the focus group affirmed many elements of the initial blueprint, participants also suggested new considerations. This iterative feedback process exemplifies the co-design principles, fostering a user-centred strategy that enhances the relevance and effectiveness of the intervention (Mangai et al., 2018).

5.4.1 Rationale for Co-Design in MINDTHESALT

Co-design is essential for MINDTHESALT for three main reasons. Firstly, the cultural identity of PoAD is deeply rooted in various culinary traditions originating from the African continent and the Caribbean diaspora. Correctly reflecting this rich heritage requires direct contributions from this demographic. Secondly, ethnic minority groups can harbour distrust toward

mainstream public health efforts (Usman et al., 2024a; Wallace et al., 2016). Incorporating their perspectives in the intervention nurtures a sense of ownership, builds trust, and encourages engagement (Greenhalgh et al., 2016). Thirdly, digital literacy varies widely among PoAD, especially older adults with limited skills and access to digital technology. Co-design enables developers to tailor interface complexity, layout, and device compatibility to accommodate diverse user needs (Greenhalgh et al., 2016; Mangai et al., 2018; Murray et al., 2016). User-centred design in eHealth reveals that disregarding user agency can lead to poor adoption rates and health outcomes (Bartolomé et al., 2013; Triberti & Brivio, 2019). By systematically incorporating feedback from PoAD, MINDTHESALT strives to ensure sustained engagement and close the gap between knowledge and behavioural changes in salt reduction.

5.5 The Pre-Development Focus Group

An online pre-development focus group with 11 participants (Table 5.1) was convened on February 25, 2024, via Microsoft Teams (Microsoft Corporation, 2024. [web version: 24010419130]). Its objective was to explore the perspectives of the participants on the challenges of reducing salt intake and assess their willingness to adopt digital solutions. The session also aimed to validate or refine the features of the blueprint, such as a low-salt recipe library, interactive quizzes, and self-logging tools. Additionally, the focus group gathered insights into user preferences related to data privacy, community sharing, and optional anonymity, laying the foundation for a “Review Panel”-an ongoing advisory group that provides continuous feedback via WhatsApp.

5.5.1 Recruitment and Consenting

Participants were recruited through targeted outreach on social media platforms (Facebook and WhatsApp), as well as word-of-mouth referrals. The recruitment efforts prioritised inclusiveness, encouraging participation from individuals of various locations in the UK, ages, socio-economic backgrounds, professions, and digital proficiencies. The inclusion criteria were:

- Adults aged 18 and older of Afro-Caribbean descent.
- Interest in health or dietary management tools.
- Access to an internet-enabled device capable of running Microsoft Teams.

The recruitment materials emphasised that participation in the session was voluntary and assured participants that their privacy would be protected. All interested participants were screened to determine their eligibility. Before the session, participants received an information sheet detailing the study's objectives, procedures, and confidentiality measures (Appendix E). Participants were sent consent forms (Appendix F) via a pre-session email, which they completed and returned to the researcher as scanned copies. During the session, the participants were verbally reminded of their right to withdraw at any time. Furthermore, the participants were assigned anonymous identifiers during transcription and analysis to protect their privacy (Bergeria et al., 2024; Cordell et al., 2021).

5.5.2 Rationale for Focus Group Over Surveys

Although a survey may have been simpler, the focus group format was chosen for its ability to encourage spontaneous discussions, enhance group interaction, and facilitate a more in-depth clarification of ideas (Morgan, 2009). Unlike surveys, which limit responses to pre-

defined choices, focus groups empower participants to engage in active discussions, yielding richer insights through interaction. In this research, a focus group proved particularly valuable for establishing trust and rapport with PoAD, which is essential for navigating cultural nuances and addressing potential distrust of mainstream health systems.

Additionally, the online focus group provided a flexible platform for real-time brainstorming on culturally relevant features, such as Afro-Caribbean recipes and gamification, which might not have been uncovered in a structured survey. This approach encouraged creative thinking and iterative dialogue among participants by allowing them to share and build on each other's ideas (Morgan, 2009; Sanders & Stappers, 2014). The focus group also fostered a collaborative environment where cultural insights naturally emerged, enriching the design process and ensuring that MINDTHESALT was culturally sensitive and user-centric (Greenhalgh et al., 2016).

5.5.3 Demographic Characteristics of Focus Group Participants

The 11 participants were recruited from various towns and cities across the UK (Table 5.1). Ages ranged from 22 to 68 years, with an average age of 41.9 (SD $\pm$ 11.8), encompassing a broad range of life stages that helped reveal generational differences in digital literacy, comfort with online health interventions, and awareness of salt-reduction strategies. Out of the 11 participants, six were women, and five were men, creating a modest yet crucial gender balance. Their occupations varied widely, including teacher, nurse, web developer, lawyer, social worker, small business owner, and student, reflecting the economic and professional diversity of PoAD in the UK.

Although most participants reported frequent phone use, they shared their preferences for various secondary devices, such as laptops, tablets, or smart TVs, for work or entertainment purposes. Some older participants noted that tablets offer better readability, while many younger participants often multitask between laptop-based tasks and phone-based social media. This diverse sample, comprising mixed ages and genders from various regions in the UK, captured a wide range of lifestyles, technological skills, and daily routines of PoAD (Bryman, 2012). This diversity was indispensable in preventing the thematic findings and design considerations for MINDTHESALT from being shaped by a single, homogeneous perspective. Instead, the demographic diversity and device preferences underscore the need for MINDTHESALT to create a mobile-friendly, user-friendly interface that resonates with a broad audience (Murray et al., 2016; Udoewa, 2022).

Table 5.1.

Participant Demographic Characteristics

Participant (occupation)	Age	Gender	Occupation	Primary Device	City/Town
1 (Teacher)	45	Female	Secondary School Teacher	Phone for daily tasks and browsing	London
2 (Healthcare)	38	Male	Healthcare Worker	Phone for streaming and social media	Manchester
3 (Student)	22	Male	University Student	Laptop for academic research	Birmingham
4 (Nurse)	68	Female	Nurse (NHS)	Phone (WhatsApp and shopping)	Sheffield

5 (Lawyer)	50	Male	Self-Employed Lawyer	Phone (calendar and social media)	Nottingham
6(Web Developer)	36	Male	Web Developer	Phone for daily tasks and Netflix	Bristol
7 (Stay-at-home)	29	Female	Stay-at-Home Mum	Phone (social media and recipes)	Leeds
8 (Doctor)	47	Male	Medical Doctor	Phone (emails and browsing)	Glasgow
9 (Social Work)	40	Female	Social Worker	Phone for browsing and messaging	Liverpool
10 (Office)	51	Female	NHS Office Worker	Phone (WhatsApp and YouTube)	Newcastle
11 (Small Business Owner)	35	Female	Small Business Owner	Phone for client orders and designs	Cardiff

Note. This table summarises the demographic profile of study participants, including age, gender, ethnicity, education level, and other relevant characteristics.

5.5.4 Analytical Approach to Focus Group Data

The pre-development focus group provided valuable insights into the diverse perspectives, experiences, and expectations of PoAD in the UK. The researcher used reflexive thematic analysis (Braun & Clarke, 2006) to analyse the conversations and inductively coded the transcripts to reveal themes. This flexible approach is well-suited for the diverse participant group, which included young university students and older professionals, web developers and teachers, nurses, and small-business owners, capturing their unique digital behaviours, cultural identities, and perspectives on dietary salt reduction.

The familiarisation process involved multiple readings of the transcript, during which the researcher took notes to describe emerging insights. This phase revealed initial codes, which were later further refined using NVivo software (version 14.23.3). At this stage, concise codes were systematically assigned to relevant lines in the transcript without prematurely imposing a strict framework on the data. Once the codes were established, the researcher moved to the theme development stage, organising related codes to form coherent overarching categories. The iterative refinement stage involved reviewing these emerging themes to ensure they accurately represented the participant perspectives and were backed by sufficient sample extracts.

The “Review Panel” consisting of five focus group participants was consulted to bolster the interpretive credibility of the emergent themes. Panel members received brief, anonymised summaries of each theme and were asked to validate or critique them, indicating whether the analysis was resonant or incomplete. Their feedback aided the researcher in refining specific themes, especially around how participants valued “control” over personal data logs and the “fun” in digital interactions.

5.5.5 Focus Group Findings

The thematic analysis of the focus group transcripts yielded five overarching themes (Table 5.2). Each illustrates how participants’ insights are connected to specific features, design choices, and the overall philosophy of MINDTHESALT.

Table 5.2

Summary of Emerging Themes, Illustrations from Focus Groups, and Implications for MINDTHESALT

Theme	Illustrations from Transcript	Implications
1. Reliance on Mobile Phones	<i>"I can do nearly everything on my phone, and it's always within reach."</i> (Participant 2). <i>"My phone is my best friend and personal assistant."</i> (Participant 5).	Optimisation of MINDTHESALT for mobile screens, incorporating large icons, streamlining workflows, and facilitating fast usage for on-the-go interactions.
2. Digital Health Engagement and Motivation	<i>"The health messages need to be short and straight to the point. Let the message and the images reflect our culture and our way of life."</i> (Participant 8). <i>"Before I had my baby, I used to play some fun educational games like free trivia games, something like Who Wants To Be A Millionaire.....they also rewarded me whenever I got the answers right...."</i> (Participant 7).	Incorporation of mini-challenges, short quizzes, and reward systems (e.g., Health Coins). Promotion of strong, visual culturally sensitive content.
3. Cultural Embedding in Dietary and Culinary Practices	<i>"My daughter has introduced me to some fitness apps - like calorie counters or run trackers,.....It concentrated on burgers, fries, and Western foods. It didn't include yam stew or other African dishes I enjoy. I abandoned it quickly."</i> (Participant 10). <i>"Just make sure MINDTHESALT stays rooted in our culture - foods we eat, family-style cooking, holiday feasts, and so on."</i> (Participant 5).	Creation of a recipe library focusing on common Afro-Caribbean foods, with clear instructions. Recognition of the deep cultural connections to dishes.
4. Privacy, Trust, and Data Security	<i>"What if I want to monitor my salt but keep my anonymity?"</i> (Participant 5). <i>"I want to be sure that my data is not shared with third parties or revealed online. I want a clear policy that"</i>	Implementation of clear, plain-English privacy policies and data encryption notices to promote trust. Establishment of alias-based usage and a "guest mode" feature to accommodate user flexibility concerns.

outlines how my data is stored and utilised.” (Participant 9).

5. Feedback Loops and Co-Creation	<i>“If you implement my ideas, I’m definitely going to keep using the app.” (Participant 7).</i>	Implementation of iterative user feedback processes and establishment of a Review Panel. Incorporated real-time user suggestions and promptly addressed them.
	<i>“I’m willing to provide feedback as long as I see my suggestions taken seriously. Seeing changes based on my feedback would keep me engaged.” Participant 1).</i>	

Note. This table presents the key themes that emerged from focus group discussions, exemplar participant quotations illustrating each theme, and the corresponding implications these findings have for refining and implementing the MINDTHESALT intervention.

Theme 1: Reliance on Mobile Devices

An important finding was the prevalence of mobile phones as the primary means for participants to access digital content. Younger participants reported nearly constant engagement through social media and streaming apps, while older participants preferred tablets or larger screens. Despite this, mobile phones remained the main tool for everyday activities, such as online shopping, messaging, and internet browsing. Participant 11 (Small Business Owner, 35 years old, Female) stated, *“I cannot do my business without my phone. It is my main device for everything.”* Similarly, Participant 5 (Lawyer, 50 Years Old, Male) described his phone as *“my best friend and personal assistant...”*, emphasising its importance and how he used it in short bursts throughout the day.

Nuances emerged within this theme. Some older adults indicated they switched to tablets for easier reading, yet the phone was still the favoured tool for quick tasks, notifications, or short quizzes. This constant connectivity suggests that any eHealth intervention should fit into brief attention spans, rather than relying on extended sessions. Many participants, who juggle

multiple responsibilities or work shifts, stressed the need for efficiency, implying that any app or website requiring complex logins or multi-step processes would likely be unsuccessful.

Considering these insights, the MINDTHESALT research team prioritised a mobile-optimised user interface featuring large, easily tappable buttons and concise text blocks that do not require lengthy registrations to access. Recognising that participants use their phones frequently, MINDTHESALT was designed for micro-engagement, quick quizzes, or logging salt consumption in a few seconds, rather than expecting users to devote substantial, uninterrupted time.

Theme 2: Engagement with Digital Health and Motivation

The second key theme centred on participants' perceptions of health apps and their motivation to use them. Some participants recalled experiences with calorie trackers or step counters, expressing that their initial excitement was followed by a rapid decline in use due to monotony, irrelevant food databases, or guilt-inducing messages. Participant 10 (Office Worker, 51 Year Old, Female) stated, *"I have tried some fitness app but I delete them after about a week or so."* This highlights a preference for positivity, interactive features, and "game-like" activities that reward trivial improvements instead of criticising setbacks.

A recurring concept was the idea of fun or challenge. Some participants mentioned "fun" and "reward" as strategies they had seen in other apps, stating that these features can transform an app from a chore into an exciting habit. Participant 8 (Doctor, 47 Years Old, Male) remarked, *"I use apps like Duolingo for language learning and Headspace for meditation. They're not only fun but also reward me for whenever I am consistent."* Similarly, Participant 7 (Stay-at-Home Mum, 29 years old, Female) noted, *"I used to play some fun educational games like free trivia games, something like Who Wants To Be A Millionaire.....they also rewarded me whenever I*

got the answers right...." This inclination towards gamification aligns seamlessly with previous evidence highlighting "fun" as a critical factor for sustained eHealth engagement (Hamari et al., 2016).

This feedback prompted the MINDTHESALT team to introduce HC, awarding digital coins for playing the MINDTHESALT game. Weekly or monthly challenges were also included as activities that could be completed online or offline. By incorporating elements of competition and self-improvement, participants began to view the app less as a didactic health tool.

Theme 3: Cultural Embedding in Dietary and Culinary Practices

A key theme from the focus group highlighted how deeply participants connected salt usage to their cultural identity and heritage. Considering this, participants called for interventions to incorporate practical low-salt recipes that would adapt, rather than eliminate, their beloved dishes. The participants noted that this approach would preserve the sense of tradition while gradually reducing salt content in the population. Participant 5 (Lawyer, 50 Years Old, Male) stated, *"Just make sure MINDTHESALT stays rooted in our culture, the foods we eat, family-style cooking, holiday feasts, and so on. That link will make the platform stand out and encourage our people to trust it."* Similarly, Participant 3 (University Student, 22 Years Old, Male) noted, *"Please ensure you include photos of Africans and our food on the platform."*

This theme substantially shaped how MINDTHESALT developed its library of low-salt recipes, prioritising regionally significant dishes such as Jollof Rice, Groundnut Soup, Ndole, and Suya, among others. User feedback strongly suggested that PoAD would lose interest or trust if the app appeared too generic. As a result, cultural embedding evolved into not just a design element but a core philosophical foundation of MINDTHESALT.

Theme 4: Privacy, Trust, and Data Security

Participants' focus on data privacy and the potential misuse of personal health information was a recurring theme. Many had experienced or heard of suspicious data practices in some mainstream digital platforms. This led to distrust about how MINDTHESALT might manage or share usage logs, blood pressure readings, or personal data. Participant 9 (Social Worker, 40 Years Old, Female) asked for a clear policy detailing data safety measures, stating, *"I want to be sure that my data is not shared with third parties or revealed online. I want a clear policy that outlines how my data is stored and used."* Similarly, Participant 1 (Teacher, 45 Years Old, Female) said, *"I'll log my salt intake or blood pressure if I'm assured it won't be sold."* To address these concerns, MINDTHESALT incorporates a transparent data policy that outlines the platform's compliance with GDPR guidelines (Information Commissioner's Office, 2022) and unauthorised access to logs.

Furthermore, Participant 5 (Lawyer, 50 Years Old, Male) emphasised the importance of tracking their salt intake without revealing their identity: *"What if I want to monitor my salt but keep my anonymity?"* In response to these concerns, the MINDTHESALT platform adopted an alias-based model for logging daily salt consumption and optional blood pressure entries, along with disclaimers regarding the web app's encryption measures. This approach conforms with established best practices in eHealth data management by minimising barriers for privacy-conscious users who might otherwise self-exclude (Murray et al., 2016; Oh et al., 2021).

Theme 5: Feedback Loops and Co-Creation

Participants showed a strong desire for ongoing involvement. Many emphasised how minority communities are often subject to "drive-by" research or temporary pilot projects that collect

data but often fail to consider user input meaningfully (Khan et al., 2024). In this focus group, many attendees were willing to keep contributing to MINDTHESALT, especially if they saw their feedback being acted upon. Participant 7 (Stay-at-Home Mum, 29 years old, Female) remarked, *“If you implement my ideas, I’m definitely going to keep using the app.”* MINDTHESALT aspires to forge a new relationship between end-users and eHealth solutions based on mutual respect and adaptive design by implementing a continuous feedback strategy. For historically marginalised communities, trust is built gradually as participants notice prompt developer reactions to their suggestions (Wallace et al., 2016).

5.5.5.1 Limitations of the Focus Group and Thematic Analysis

Although the focus group yielded valuable, culturally relevant insights for the design of MINDTHESALT, its findings should be interpreted with consideration of some limitations. Firstly, only a single focus group session was held, providing a limited overview of the participants’ perceptions rather than a comprehensive dataset (Morgan, 2009). To address this limitation, the researcher established a “Review Panel” of volunteers who offered continuous feedback via WhatsApp, reinforcing and refining emerging themes and improving MINDTHESALT based on real-time feedback.

Self-selection bias is another limitation, as volunteers may already feel comfortable discussing digital health (Copas et al., 2020). To mitigate this, the researcher advertised the session on Facebook and WhatsApp, emphasising open participation and scheduling flexibility.

Regarding geographic and socioeconomic factors, most participants were from urban areas with reliable internet access. While this limits the direct applicability to rural or economically disadvantaged communities, the researcher aimed to include a diverse mix of ages and

professions. The researcher integrated data-light and offline functionalities to MINDTHESALT, recognising the concerns regarding data costs.

Lastly, researcher bias presents another challenge, as the researcher's identity and worldview can impact the coding and thematic interpretation. Reflexive journaling and triangulation with the supervisory team addressed this issue, improving objectivity (Creswell & Plano Clark, 2017).

5.5.6 Interplay of the Focus Group with the Review Panel

A unique feature of MINDTHESALT's co-design approach is transforming the initial focus group into an ongoing "Review Panel." At the end of the focus group session, participants were invited to provide continuous feedback through alpha testing and engage in discussions on WhatsApp. Research supports the use of WhatsApp for continuous engagement, demonstrating its practicality and acceptability for conducting focus groups and gathering qualitative data (Anderson et al., 2021; Singer et al., 2023). The Review Panel initially started with five participants, but this group expanded to include over 20 additional peers, substantially enriching the diversity of perspectives. The panel served in various roles, including alpha testers who assessed early wireframes to identify glitches and areas requiring clarification, cultural liaisons who provided real-time feedback to ensure cultural accuracy, and ambassadors who promoted MINDTHESALT among PoAD. This approach aligns with co-design best practices, emphasising the importance of continuous, iterative collaboration that ensures user experiences and preferences shape every stage of the development of the intervention.

Moreover, MINDTHESALT's focus on persistent, iterative collaboration reflects the best co-design practices. As Anderson et al. (2022) emphasised, maintaining clear and consistent two-way communication among stakeholders and incorporating community voices throughout the co-design process is essential. This strategy ensures that all participants have a voice and fosters meaningful collaborations with the community. By transforming some of the initial focus group members into a continuous Review Panel, MINDTHESALT demonstrates a genuine commitment to participatory design. This method ensures that the end-user perspectives are integral throughout the development process, enhancing the cultural relevance and usability of the final product while fostering a sense of ownership and acceptance within the target community (Udoewa, 2022). Furthermore, for PoAD, who have historically been marginalised in mainstream design processes, the Review Panel helped eliminate the “researcher-participant” divide, transforming participants into co-designers. This method addresses the ethical dimension of ensuring that local voices are included in a project for changing cultural norms surrounding salt, thereby building trust and encouraging local support for MINDTHESALT among PoAD (Corsini et al., 2022).

5.5.6.1 The key elements of the Review Panel

Continuous Real-Time Feedback: Rather than waiting for monthly meetings or formal surveys, members can send quick messages in the group chat, and the developer will provide clarification or make instant modifications to MINDTHESALT.

Diverse Subgroups: The panel featured a mix of ages and sub-ethnicities of PoAD, such as West African, Afro-Caribbean, and East African. By recognising the various backgrounds of PoAD, MINDTHESALT's scope expanded rapidly.

Community-Driven Bug Reporting: This strategy enables minor issues to be addressed and promptly resolved. For example, errors in calculating HC for the game or images not displaying correctly on specific phone models were quickly reported, tested, and resolved. Participants reported a sense of fulfilment when they saw their suggestions implemented.

5.5.7 Design Considerations for the MINDTHESALT Web App

By analysing the five themes, it became evident that the success of MINDTHESALT relies heavily on integrating the findings into every aspect of the user experience. The researcher and a freelance website developer held several design meetings over a six-week period to translate these findings into actionable changes to the concept initially developed by the researcher. Wireframes and prototypes were regularly updated during these meetings to incorporate feedback from the Review Panel.

Mobile-First UI

Acknowledging the important role of phones in the lives of the participants, the interface was redesigned to accommodate smaller screens. The initial concept, which featured text-heavy instructions and complex sign-up processes, was replaced with a user-friendly layout that featured large, intuitive buttons. Accessibility for older users was enhanced by employing high-contrast colour designs and larger fonts. The team also added a “guest mode” that allowed users to explore recipes and quizzes without mandatory logins, catering to those who do not want to share personal data.

Cultural Anchoring

Focus group participants highlighted the importance of a visual cultural identity. As a result, the design features vibrant colour palettes inspired by African and Caribbean cultures, while

avoiding cluttered backgrounds that hinder readability. The text combines simple English with vocabulary unique to the PoAD, giving the participants a sense of cultural pride and familiarity. Consistent feedback from the review panel indicated that these references enhanced their emotional connection to the platform, making them feel MINDTHESALT is “ours” rather than just another generic health platform.

Furthermore, the "Recipe Library" prioritised Afro-Caribbean dishes such as Jollof Rice, Suya, and Egusi soup, among others. Each recipe included brief, context-sensitive tips for reducing sodium without sacrificing flavour, referencing trusted methods such as thorough rinsing or partial salting (Apekey et al., 2024; Usman et al., 2024b).

Gamified Quizzes

The idea of earning HC for playing the MINDTHESALT game and daily or weekly activities was refined to align with participants’ preferences for short and engaging tasks. A “Recipe Challenge” encourages users to photograph or document their attempts at cooking a dish using less salt. The point system was designed to be a positive experience, rewarding small progress while discouraging inactivity.

Privacy and Data Security

Trust in eHealth depends on transparent and secure data management (Odeh et al., 2024). MINDTHESALT achieves this through encryption, regulation compliance, and user anonymity, thus fostering confidence in digital health solutions. To safeguard user data, TLS/SSL encryption secures logins, data submissions, and usage logs, thereby reducing the risk of interception (Krawczyk et al., 2013; Tiwari & Jha, 2024). The platform complies with GDPR and ICO regulations, restricting access to raw data while anonymising analytics to bolster user

privacy (ICO, 2022). Research indicates that regulation compliance enhances user trust and engagement in eHealth platforms (Odeh et al., 2024; Tiwari & Jha, 2024).

A “Guest Mode” enables users to interact without registering, using a device-specific key instead of personal identifiers to maintain anonymity, an aspect that is linked to the greater adoption of digital health tools (He, 2023; Olatunji et al., 2024). To improve accessibility, privacy policies and disclaimers are expressed in plain English rather than legal jargon (Singh et al., 2010) and are reviewed by the Review Panel.

Co-Creation Continuity

The final design consideration was establishing ongoing mechanisms for user feedback. In addition to the official Review Panel, the web interface featured a prominent link labelled “Contact Us,” facilitating direct messaging to the development team. This embedded feedback system facilitates continuous usability testing and fosters a sustained sense of user ownership (Wynn & Maier, 2022).

5.6 Prototyping and Testing of MINDTHESALT

After finalising the architecture, the researcher and the web developer developed clickable prototypes that showcased the homepage flow, recipe pages, quiz format, and user logs (Borysova et al., 2024; Green & Brandon, 2024). Initial alpha testing involved five volunteers from the focus group, who tested the prototypes daily for one week. They were asked to provide real-time feedback regarding the interface, performance on older phones, and any usability concerns. For example, participants were frustrated by the need to scroll several times to launch a game, which led to the implementation of a prominent “Play Game” button on the homepage. Additionally, the participants' interest in more Afro-Caribbean recipes

prompted the team to expand the recipe library to include a wider range of African and Caribbean dishes. Performance issues were noted on older phone models, highlighting potential concerns regarding data bandwidth limits. In response, the development team compressed large images and deferred some background scripts to enhance page load speed. This optimisation process adhered to current eHealth guidelines that emphasise the importance of speed and low friction for older or low-resource devices (Göbl et al., 2024; Wilson et al., 2021).

The fluid nature of co-design was evident in regular micro-adjustments, unlike typical health application development cycles, which tend to be static until a major release (Noorbergen et al., 2021; Van Velthoven et al., 2018). The MINDTHESALT approach features continuous iteration. Over time, participants expressed a sense of ownership over the application, underscoring the relationship between co-creation theory and inclusive design principles for health solutions (Sanders & Stappers, 2014).

5.6.1 Components of the Final Intervention

Based on alpha testing feedback and contributions from the expanding Review Panel, the final version of MINDTHESALT crystallised into five core user-facing elements. Although some of these elements were previously introduced in the initial concept, focus group analysis informed their refinement and underlying rationale.

5.6.1.1 MINDTHESALT Website: Structure and Features

The MINDTHESALT web application (Figures 5.1, 5.2, 5.3, and 5.4) features a structured navigation system that facilitates easy access to its primary functions. It begins with an “About Salt” section, introducing users to the basics of dietary salt, including average consumption

levels, sources of hidden sodium, and the importance of monitoring salt intake. The “Health Risks” page presents medical evidence that links excessive salt intake to conditions such as hypertension, heart disease, and stroke, underscoring the importance of moderation. Within the “Research” page, users can explore the scientific foundations, insights, and ongoing studies that inform salt-reduction strategies. The “Community” page features success stories, discussion forums, and group events where users can share their experiences and connect with others for support. Finally, the “Resources” page provides practical tools, including recipe suggestions, printable guides, and infographics that transform nutritional guidance into actionable steps. A banner on the homepage clearly articulates MINDTHESALT’s overarching mission, which is to lower salt consumption through education, gamification, and community engagement. The footer of the web app contains key legal policies, including the Privacy Policy, Terms of Service, Cookie Policy, Data Retention Statement, and other relevant disclaimers. These documents collectively clarify user rights, data management practices, and general liability limitations, ensuring that visitors are well-informed about the legal landscape of the platform. The overall design features Afro-Caribbean-inspired elements that integrate cultural relevance across every page, ensuring the site is inclusive and visually engaging for all.

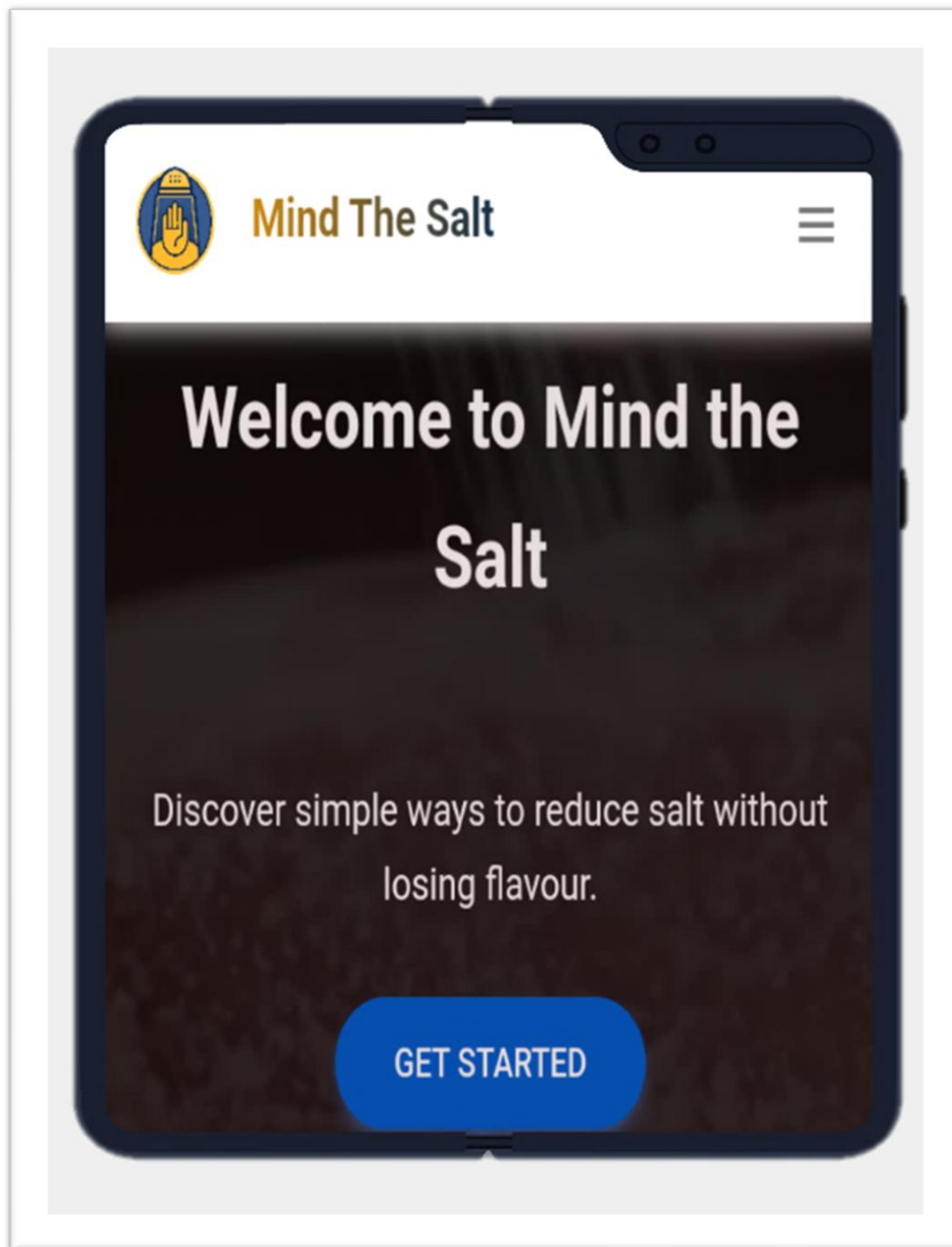
A key feature of the website is the “Dashboard” (Figure 5.3), which showcases logs, charts, and interactive learning modules on the effects of excessive salt intake. The Low-Sodium Recipes section offers guides for traditional Afro-Caribbean dishes that have been modified to reduce their sodium content. Instructions were tailored to reflect familiar cooking practices such as partial salting, rinsing ingredients, or using fewer bouillon cubes, allowing users to gradually reduce their salt intake while maintaining cultural authenticity (Archer et al., 2022; Imamoto et al., 2024). The Dashboard also features other interactive tools to promote user engagement. The “Hypertension Risk Assessment” enables users to assess their risk of

hypertension. The “Salt Tracker” and the “Blood Pressure Log” present a user-friendly interface for logging daily sodium intake and blood pressure, respectively.

The “Low-Salt Success Plan,” “Medication Adherence Reminder,” and “Stress Management Tool” provide personalised, data-informed support to help users manage their salt consumption, medication schedules, and stress levels. These tools provide a comprehensive approach to cardiovascular health, merging behaviour tracking, reminders, and interactive methods for sustained lifestyle improvements. Users can anonymously log their data, and graphical visualisations display trends over time, supporting progress tracking. With its blend of education, gamification, and personalised tracking, MINDTHESALT serves as a comprehensive platform for empowering users to make sustainable, culturally relevant dietary changes.

Figure 5.1

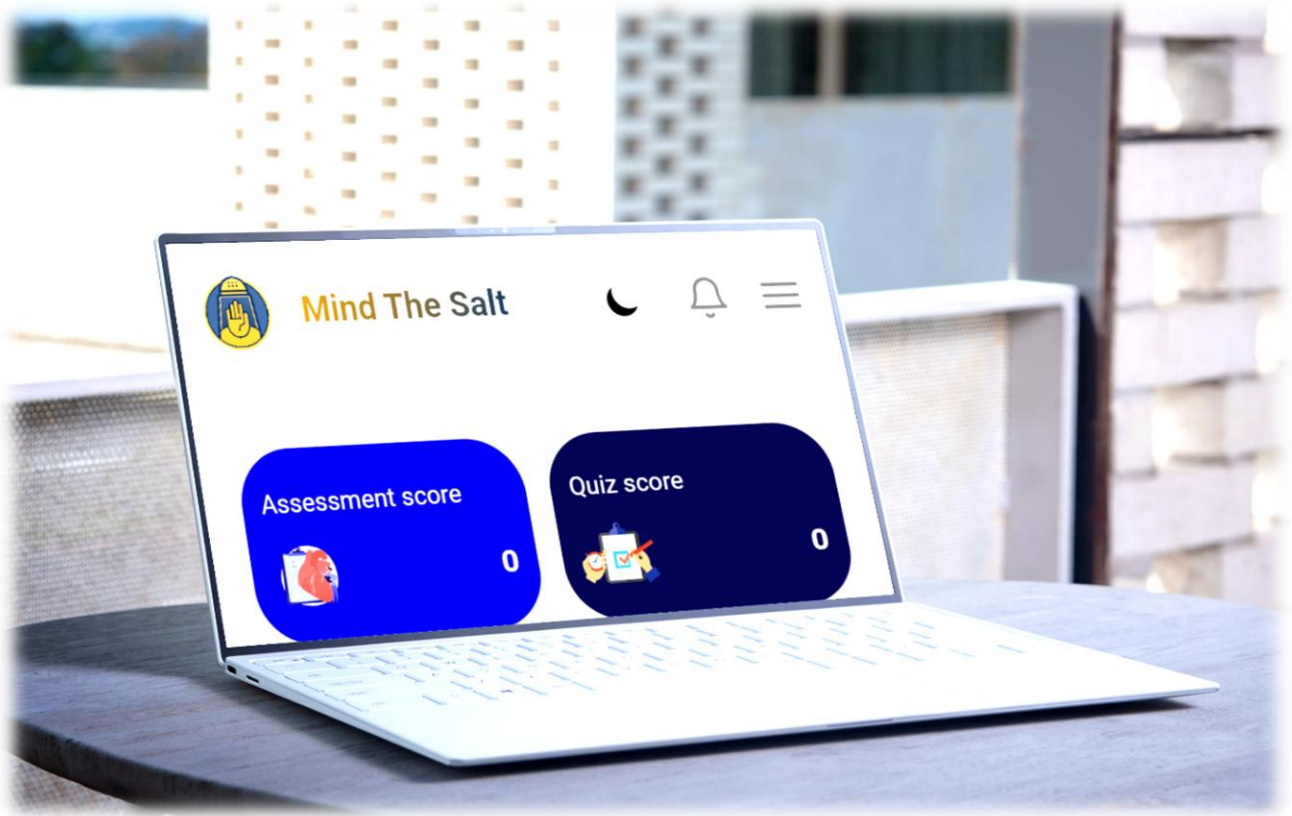
MINDTHESALT Web App Homepage



Note. A mobile screenshot showing MINDTHESALT’s header, featuring the logo, a “Welcome to Mind the Salt” message over a blurred salt background, and a prominent “GET STARTED” button.

Figure 5.2

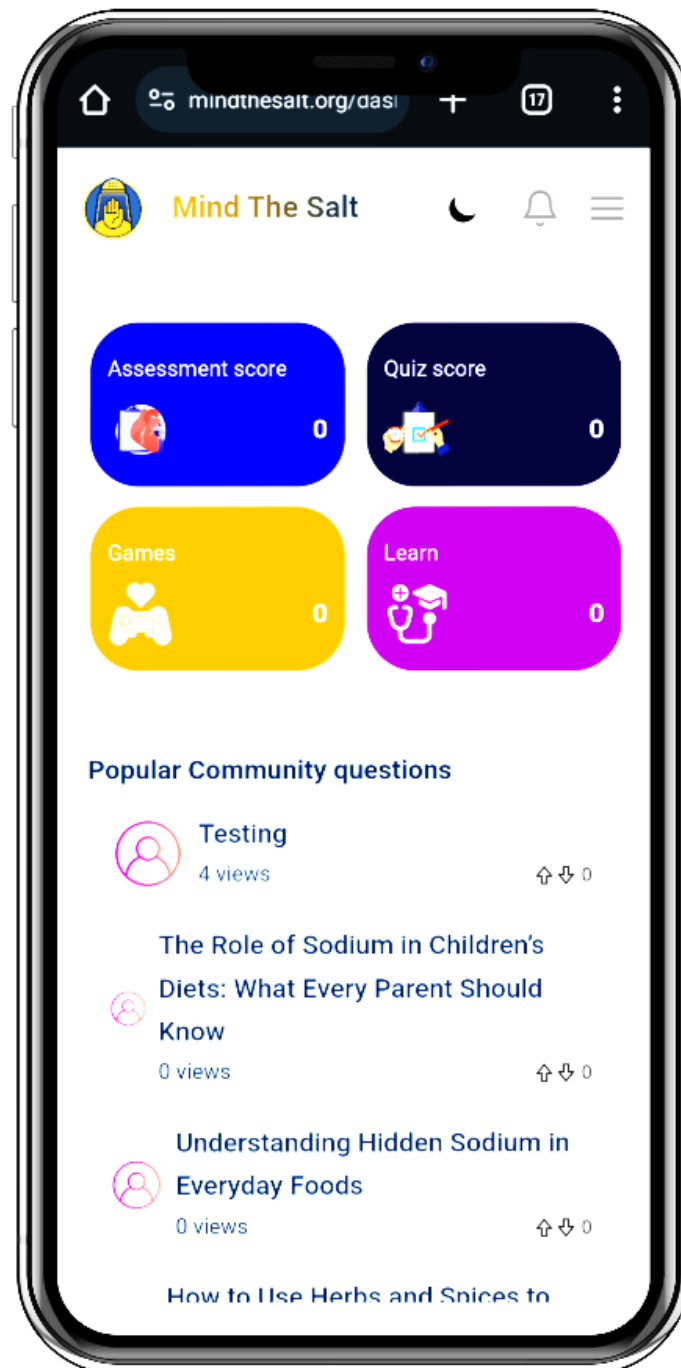
Features of the MINDTHESALT Web Application



Note. A screenshot of the app dashboard displaying the assessment score and quiz score panels alongside the logo, theme toggle, notification icon, and menu button.

Figure 5.3

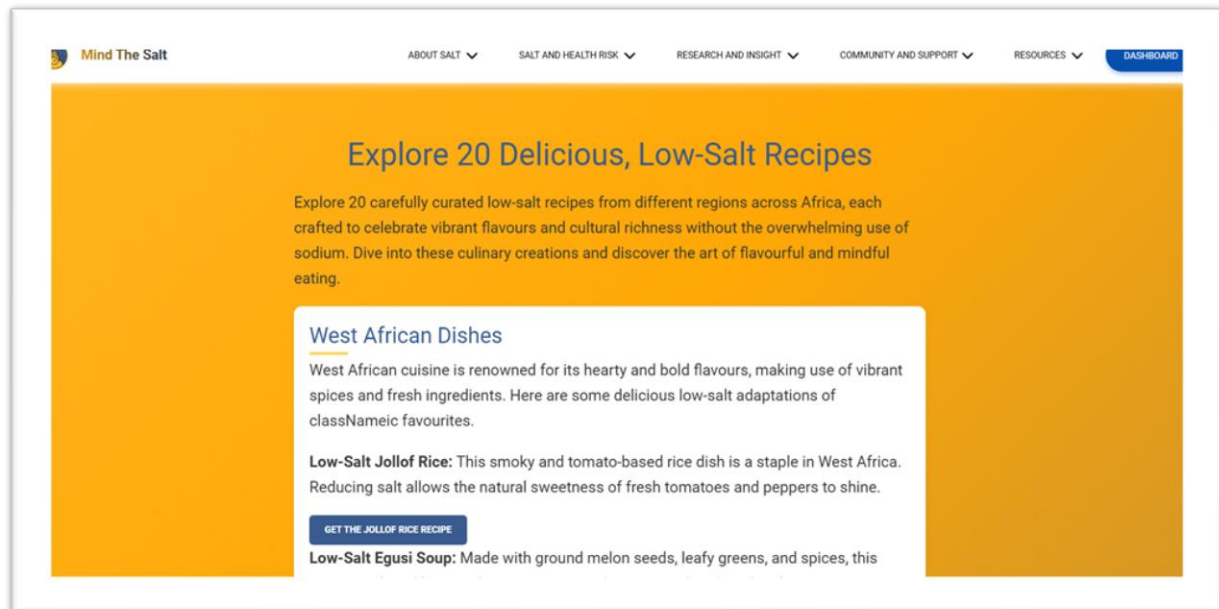
Dashboard Features of the MINDTHESALT Mobile Web App



Note. A screenshot displaying the user's assessment and quiz scores, quick-access game and learning modules, and a list of popular community questions

Figure 5.4

Low-Salt Recipes and Navigation Menu



Note. A screenshot showing the MINDTHESALT app's low-salt recipe section with recipe cards and the main navigation bar (Home, Recipes, Community, Profile) visible at the top.

5.6.1.2 The MINDTHESALT Game and Gamification Elements

MINDTHESALT incorporates gamified features to make reducing dietary salt both fun and educational. Feedback from focus group participants highlighted the importance of interactive elements, leading to the development of the MINDTHESALT Game (Figures 5.5 and Photo 5.6). This game is an interactive trivia experience designed to educate players about the health implications of excessive salt intake and provide practical strategies for reducing intake. The game features engaging, evidence-based questions that explore topics such as daily sodium recommendations, sources of sodium, the health risks associated with excessive sodium intake, and culturally appropriate low-sodium alternatives. It is a fun and informative approach that motivates users to assess their knowledge, discover new insights, and adopt

healthier eating habits with enjoyment. The game is organised into four levels - Basic, Intermediate, Advanced, and Professional - tasking players with increasingly challenging questions. Players earn HC for each correct answer, reinforcing positive behaviour. Safety levels are introduced at questions three, six, and nine to keep players engaged, ensuring they do not lose all progress after making a mistake or providing an incorrect response.

Additional game mechanics were introduced to boost user motivation. Lifelines such as “Shake the Salt” (which removes two incorrect answers) and “Health Swap” (which changes the question) enable players to use their earned HC strategically. Each question is visible for 30 seconds, along with a dynamic progress indicator called the “Salt Bar.” This bar decreases with incorrect answers, highlighting the importance of healthier choices. The interactive format fosters user engagement while teaching the effects of excessive salt consumption. Although leaderboards are private by default to respect user preferences, the potential for group challenges exists to further encourage group involvement in healthy eating.

Figure 5.5

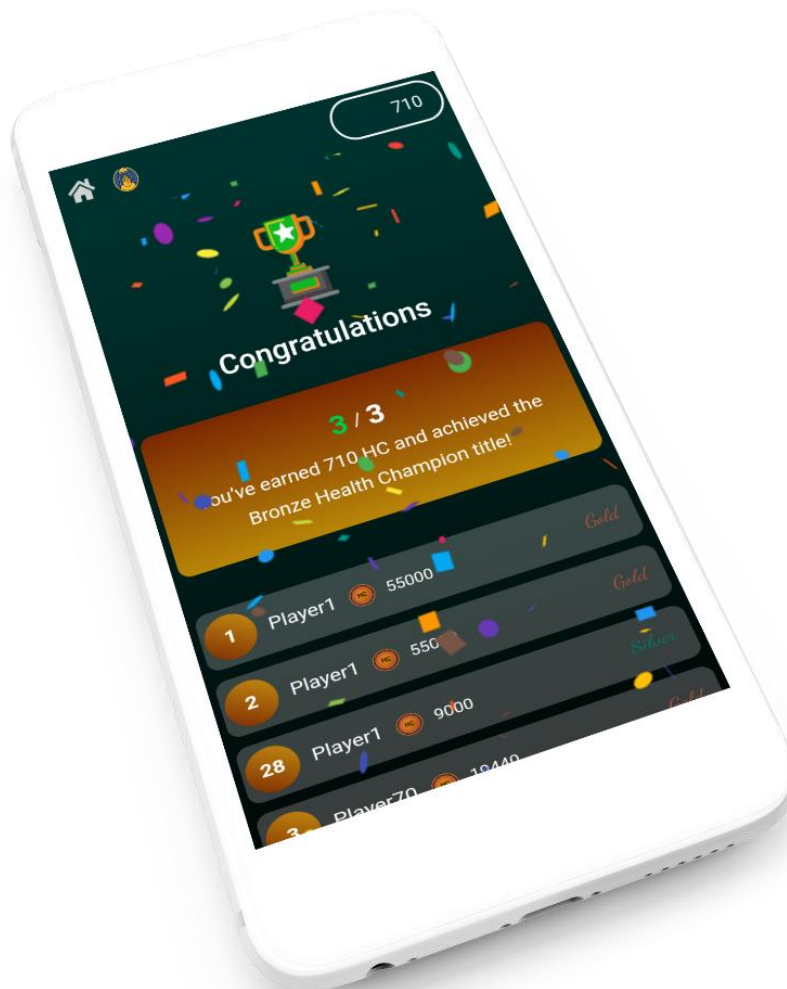
MINDTHESALT Game Homepage Across Devices



Note. A mock-up showing the game's homepage on desktop, laptop, tablet, and smartphone screens, featuring the "MINDTHESALT" logo, level navigation, and coin balance indicator.

Figure 5.6

MINDTHESALT Game Leaderboard



Note. A mobile screenshot showing a trophy-celebration banner with confetti for achieving “Bronze Health Champion,” alongside a ranked leaderboard listing and players’ HC balance.

5.7 Ethical Considerations

The development of MINDTHESALT adhered to the ethical guidelines outlined in the Declaration of Helsinki and received institutional ethical approval from Sheffield Hallam University Ethical Review Committee through the Converis system (Appendix D).

Focus group participants received comprehensive information about the study's goals, potential risks, and their right to withdraw at any point during the research. They provided digital consent, indicating that they understood the principles of anonymity, confidentiality, and data security measures. Review Panel communications on WhatsApp were monitored, adhering to strict confidentiality protocols. Participants were regularly reminded that their feedback was solely for research and development purposes, ensuring their identities remained confidential in all reports and publications.

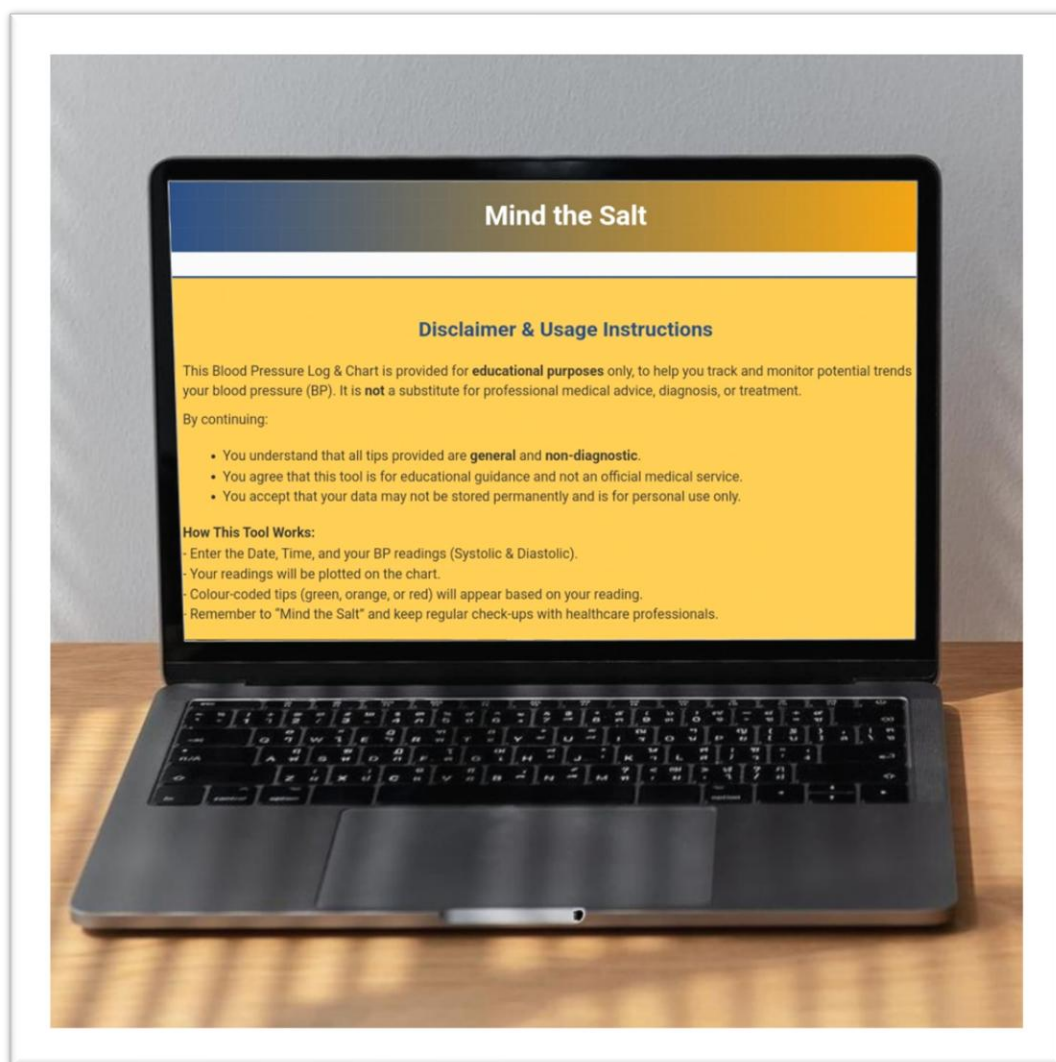
Ethical issues related to cultural sensitivity underscore the importance of respecting, rather than overlooking, the culinary traditions of PoAD. MINDTHESALT adopts a gradual change approach rather than outrightly condemning high-salt dishes. This method respects communal heritage and culinary identity, recognising the strong emotional connections that PoAD have with their cultural dishes. The platform avoids moral judgment by including fun and interactive elements. This strategy aligns with the principles of cultural humility in public health, aiming to engage with PoAD on their terms rather than advocating for drastic changes (Greenhalgh et al., 2016).

Disclaimers (Figure 5.7) and terms of use were frequently updated to remove legal jargon, presenting information in simple English about data storage, the rationale for aggregating specific usage analytics, and users' right to opt out. The platform states that anonymised usage data may be used for academic research, while ensuring that no personal identifiers are shared. This commitment to transparency fosters a sense of security, reducing participants' concerns regarding potential data harvesting or misuse. Furthermore, the co-creation model required regular check-ins with the Review Panel to confirm that new features or expansions aligned with the users' comfort levels. Although the platform is designed as a public health

intervention, respecting users' autonomy remains fundamental, reinforcing broader calls for user-centred, respectful health research within ethnic minority groups (Chauhan et al., 2020; Owens & Cribb, 2013).

Figure 5.7

Disclaimer and Instructions for Blood Pressure Log & Chart



Note. Screenshot of the MINDTHESALT disclaimer screen for the blood pressure log, outlining that the tool is for educational use only, non-diagnostic, and providing step-by-step instructions for entering and interpreting blood pressure readings.

5.8 Future Directions and Improvements

MINDTHESALT has completed initial testing (Chapter Seven) to assess usability and early engagement, laying the foundation for a comprehensive pilot study. A future pilot testing phase will feature a longitudinal feasibility trial employing a randomised or quasi-experimental design to investigate user retention and potential clinical outcomes, such as dietary salt intake, blood pressure, or sodium excretion (Taylor et al., 2011; Yuan et al., 2023). Conducting this study over six to twelve months will potentially yield insights into long-term engagement beyond the initial novelty phase (Auza-Santiváñez et al., 2024). This trial could pave the way for endorsement of healthcare organisations and policy integration, establishing MINDTHESALT as a credible and evidence-based digital health intervention.

5.9 Chapter Conclusion

The development of MINDTHESALT demonstrates how culturally sensitive co-design can turn a broad public health goal into a practical, user-centred digital tool. Informed by literature, focus group insights, and continual feedback from a Review Panel, the platform incorporates familiar cooking practices, privacy preferences, and engagement-driven features into its design, recipe library, game mechanics, and data policies. By integrating the culinary practices of PoAD with gradual salt reduction strategies, MINDTHESALT bridges the gap between knowledge and action in ways that traditional health initiatives often miss. The willingness to adopt salt reduction behaviours, enthusiasm about gamified features, and strong preferences for data security underscore the potential of MINDTHESALT for sustained engagement. Building on this foundation, Chapter Six transitions from design to primary testing, assessing MINDTHESALT's initial usability, engagement, and feasibility ahead of a full-scale pilot study.

CHAPTER SIX

Primary Testing of MINDTHESALT

6.0 Introduction

Digital health solutions are emerging as promising and scalable solutions to enhance health outcomes, including dietary habits (Goodyear et al., 2021; Joseph et al., 2021; Seid et al., 2024). MINDTHESALT was conceived and designed as a web application aimed at reducing dietary salt intake through education, self-monitoring tools, gamification, and culturally sensitive content tailored to communities of PoAD.

This chapter outlines the primary testing of MINDTHESALT, presenting both qualitative and quantitative components of this preliminary assessment. The goal of this chapter is to assess MINDTHESALT's preliminary feasibility, acceptability, and initial effectiveness in improving salt-related knowledge and fostering user engagement. Three data sources informed this assessment. The first is pre-post intervention questionnaires that assessed changes in salt-related knowledge following participants' engagement with a short educational module named "Salt 101." The second source is a modified UTAUT2 survey, a framework for assessing user acceptance, usability, and behavioural intention to use new technologies (Venkatesh et al., 2012). The third data source is a post-intervention focus group, designed to gain qualitative insights into the participants' experiences.

6.1 Background and Rationale

The high rates of hypertension among PoAD underscore the need for culturally tailored salt-reduction initiatives for the population (Elijovich et al., 2016; Jeong et al., 2023; Svetkey et al.,

1996). Many existing public health resources on salt reduction are not sufficiently adapted to the traditions, dietary habits, and cultural preferences of PoAD. MINDTHESALT has the potential to fill this gap by providing tailored, culturally sensitive, and readily accessible resources. Despite the promise of digital technology in health promotion (Joseph et al., 2021; Seid et al., 2024), interventions must be thoroughly tested to examine their relevance, usability, and sustainability prior to implementation (Craig et al., 2008; Skivington et al., 2021).

6.2 Methods

6.2.1 Study Design and Rationale

This research utilised a convergent mixed-methods approach (Creswell & Plano Clark, 2018) to evaluate the short-term educational impact, acceptability, and user perceptions of MINDTHESALT. It collected quantitative data (pre- and post-knowledge surveys, UTAUT2 measures) alongside qualitative data (focus group transcripts), thereby triangulating the findings. The rationale for mixed methods in the primary testing is twofold. First, a short pre-post assessment of salt-related knowledge provides a direct and quantifiable measure of MINDTHESALT's immediate educational impact. Second, the UTAUT2 framework provides a structured perspective for understanding user experiences and acceptance, shedding light on areas that might otherwise remain unexplored if only knowledge scores were analysed. Lastly, the focus group enabled a detailed exploration of how successful MINDTHESALT integrates into users' daily routines, cultural expectations, and technical capabilities. These three data sources captured a holistic picture of MINDTHESALT's initial strengths, limitations, and opportunities for improvement in preparation for a comprehensive pilot test.

6.2.2 Participant Recruitment and Inclusion Criteria

Recruitment followed best practices for engaging underrepresented populations in health research (George et al., 2014). It took place through social media (Facebook and WhatsApp) and word-of-mouth referrals within communities of PoAD. These recruitment methods are commonly used in community-based research to enhance trust and encourage participation (Sadler et al., 2010).

The inclusion criteria were:

- Self-identification as PoAD, ensuring cultural relevance.
- Aged 18 or above.
- Proficient in English to navigate digital content, as the intervention materials were provided in English.
- Access to a smartphone or computer to ensure access to the digital platform and study resources.
- Willingness to complete the pre-post knowledge surveys and the UTAUT2 survey, with the possibility of joining a focus group for further feedback.

The recruitment materials highlighted that participation in the study was voluntary and ensured the safeguarding of participants' privacy. All interested individuals underwent a screening process to assess their eligibility for the study. Before the study commenced, participants were sent an electronic informational sheet (Appendix E) outlining the study's goals, procedures, and confidentiality protocols. Consent forms (Appendix F) were also sent electronically before the study started, which participants filled out and returned as scanned documents to the researcher. During the session, participants were reminded of their right to

withdraw at any time. Additionally, participants were reassured that they would be assigned anonymous identifiers during transcription and analysis to safeguard their privacy (Cantín, 2014; Creswell & Plano Clark, 2018).

6.2.3 Data Collection Procedures

Participants were asked to first complete a Pre-Intervention Knowledge Questionnaire (Appendix K), which consisted of 20 multiple-choice questions covering dietary salt guidelines, common sources of hidden salt, and the cardiovascular effects of excessive salt intake. They were then granted access to MINDTHESALT, which included the Salt 101 module (Appendix J) and all the features of the platform. Over the course of two weeks, participants were encouraged to explore the platform, study the Salt 101 module, complete the Post-Intervention Knowledge Questionnaire (Appendix K), and the UTAUT2 survey (a 22-item survey measuring technology acceptance and usability constructs, Appendix H). The Post-Intervention Knowledge Questionnaire consisted of the same 20 items that were completed before the intervention. Subsequently, nine of the participants volunteered to participate in the post-intervention focus group, sharing their experiences, suggestions, and cultural perspectives in greater detail.

6.2.4 Ethical Considerations

The preliminary testing adhered to the ethical guidelines of the Declaration of Helsinki (Cantín, 2018) and obtained institutional ethical approval from Sheffield Hallam University Ethical Review Committee through the Converis system (Appendix D). Participants were regularly reminded that their input was strictly for research and development purposes; therefore, any quotes used in this chapter have been pseudonymised to protect their identities.

Furthermore, the focus group transcript was kept confidential, reinforcing ethical integrity throughout the research process.

6.2.5 Data Analysis Strategies

Reflective thematic analysis (Braun & Clarke, 2006) was employed to make sense of the qualitative data collected from the focus group. This analysis involved reading the transcript, coding for significant themes, and iterative refinement of thematic categories.

The quantitative data from the pre- and post-knowledge assessments and UTAUT2 questionnaires were analysed using IBM SPSS (Version 30.0.0; 2024). Descriptive statistics, including means and standard deviations (SD), were calculated to summarise the participants' performance before and after studying the SALT 101 module (Appendix J). Cohen's *d* was calculated as a measure of effect size to determine the magnitude of change in knowledge pre-post intervention.

This research utilised Cohen's *d* as the effect size measure due to its robustness. Cohen's *d* provides valuable insights into the practical importance of observed changes by standardising the mean difference in relation to the pooled SD (Sullivan & Feinn, 2012), whereas *p*-values solely reflect statistical significance. Additionally, Cohen's *d* is not influenced by sample size, allowing meaningful comparisons across different studies and contexts (Lakens, 2013).

The Wilcoxon Signed-Rank Test was used to compare pre- and post-intervention scores due to the small sample size ($N = 25$), the ceiling effect in the scores, and the non-normal distribution of the scores, as confirmed using the Shapiro-Wilk test (Shapiro & Wilk, 1965). The reliability (internal consistency) of the modified UTUUT2 questionnaire was assessed using Cronbach's alpha (Cronbach, 1951).

6.3 Results

A total of 32 participants were purposefully recruited, with 25 completing the study. The participants represented a diverse range of professional backgrounds, age groups, and geographical locations across the UK. A purposive sampling strategy was employed to ensure diverse representation from fields such as healthcare, education, technology, and other relevant sectors. Given the mixed-methods approach, the demographic makeup of participants was designed to enrich the depth and reliability of both qualitative and quantitative data. Table 6.1 summarises the demographic characteristics of the participants.

Table 6.1

Demographic characteristics of the participants

Participant	Age (Years)	Gender	Occupation	Location
Participant 1	29	Female	Housewife	Birmingham
Participant 2	36	Male	Web Developer	Manchester
Participant 3	45	Female	Teacher	London
Participant 4	47	Male	Specialty Doctor	Leeds
Participant 5	50	Male	Lawyer	Sheffield
Participant 6	68	Female	Care Home Nurse	Glasgow
Participant 7	40	Female	Social Worker	Nottingham
Participant 8	38	Female	Healthcare Worker	Leicester
Participant 9	22	Male	University Student	Liverpool
Participant 10	33	Female	Factory Worker	London
Participant 11	41	Male	Nursery Worker	Bristol
Participant 12	39	Male	Chef	Manchester
Participant 13	30	Female	Domestic Worker	Edinburgh
Participant 14	52	Male	Civil Servant	Birmingham
Participant 15	35	Female	Accountant	Glasgow

Participant 16	49	Female	Care Assistant	Newcastle
Participant 17	46	Female	Pharmacist	Sheffield
Participant 18	44	Male	Construction Worker	Leeds
Participant 19	55	Male	Physiotherapist	London
Participant 20	42	Male	Care Home Manager	Manchester
Participant 21	37	Female	University Lecturer	Cardiff
Participant 22	34	Female	Midwife	Birmingham
Participant 23	29	Male	Research Nurse	Oxford
Participant 24	51	Male	Taxi Driver	Leicester
Participant 25	28	Female	Personal Trainer	Liverpool

Note. This table summarises participants' demographic information, including age distribution, gender, ethnicity, education level, and other relevant characteristics.

The age of the participants ranged from 22 to 68, with a mean of 40.8 years ($SD = 10.25$). The gender ratio was balanced, with 13 females (52%) and 12 males (48%). The participants were recruited from 14 cities across the UK, with the highest representation from Birmingham, Manchester, and London, each with three individuals. This broad geographical representation ensured a diversity of narratives, especially about digital health accessibility and community engagement (Kim & Backonja, 2024). Moreover, the demographic diversity increases the relevance of the findings and ensures that insights from both qualitative and quantitative data reflect the experiences of a broad cross-section of PoAD in the UK.

6.3.1 Pre-Post Salt 101 Knowledge Scores

The Salt 101 module (Appendix J) aimed to improve user awareness regarding daily salt recommendations, identify common sources of hidden salt, and highlight the link between excessive salt intake and cardiovascular risks. Consistent with previous studies indicating that brief educational interventions can significantly improve nutrition-related knowledge (Mogre

et al., 2023; Raut et al., 2024), the pre-post questionnaire was designed to assess the success of MINDTHESALT in meeting this objective.

All participants responded to 20 multiple-choice questions at both the baseline (pre-intervention) and follow-up (post-intervention) assessments, scoring 1 for correct answers and 0 for incorrect ones. Total scores were calculated for both the pre-and post-intervention phases, which were subsequently used to compute the descriptive statistics.

Descriptive Statistics

Table 6.1 presents a summary of the descriptive statistics of correct answers out of 20.

Table 6.2

Descriptive Statistics for Pre–Post Salt Knowledge (n = 25)

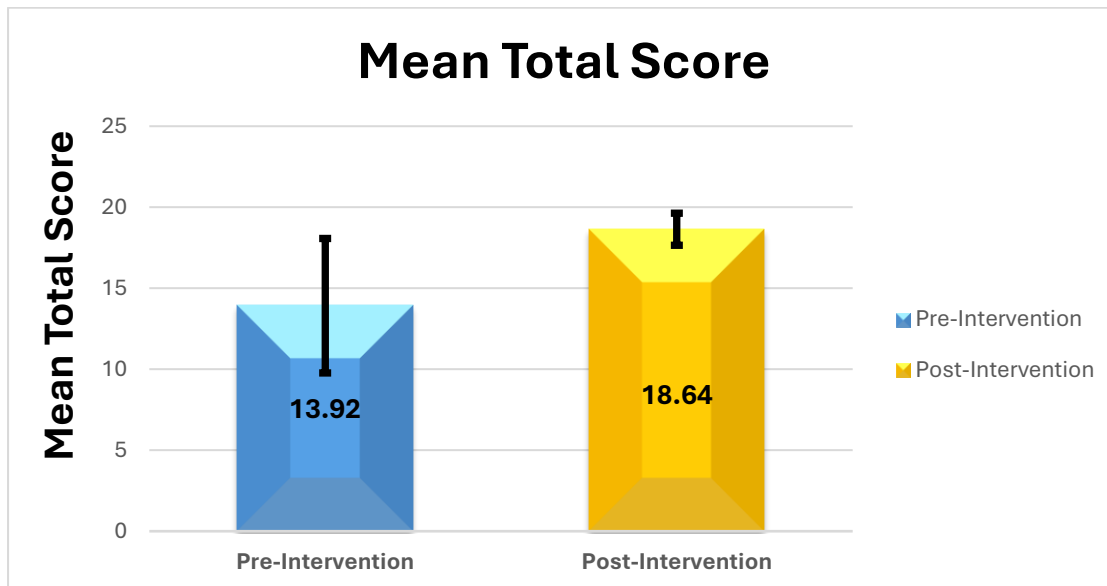
			Statistic	Standard Error
Pre	Mean		13.92	.831
	95% Confidence Interval for	Lower Bound	12.21	
	Mean	Upper Bound	15.63	
	Median		14.00	
	Standard Deviation		4.153	
	Minimum		6	
	Maximum		19	
	Range		13	
Post	Mean		18.64	.199
	95% Confidence Interval for	Lower Bound	18.23	
	Mean	Upper Bound	19.05	
	Median		19.00	
	Standard Deviation		.995	
	Minimum		17	
	Maximum		20	
	Range		3	

Note: This table presents the pre- and post-intervention salt knowledge scores (mean ± SD). Higher scores indicate a significant improvement in participants' knowledge following the intervention.

The mean score increased from 13.92 (SD = 4.15) to 18.64 (SD = 0.99) (Figure 6.1), the median increased from 14 to 19, and the minimum score increased from 6 to 17. The 25th and 75th percentiles also increased, suggesting an overall improvement in knowledge across performance levels. The decrease in SD (from 4.15 to 0.99) suggests a change from high variability in pre-test scores to more consistent knowledge levels post-intervention. This decrease in variability (reduction in SD) demonstrates the potential effectiveness of the intervention in closing knowledge gaps and standardising learning outcomes (Figure 6.1). The larger SD in the pre-test implies a varied baseline knowledge among participants, probably due to differences in prior education or awareness. On the other hand, the lower SD post-intervention suggests that participants converged towards similar levels of understanding after the intervention. Furthermore, the narrow score range (0 to 1) implies a possible ceiling effect, where scores may be nearing the maximum total score of 20.

Figure 6.1

Mean Total Salt-Knowledge Scores Pre- and Post-Intervention



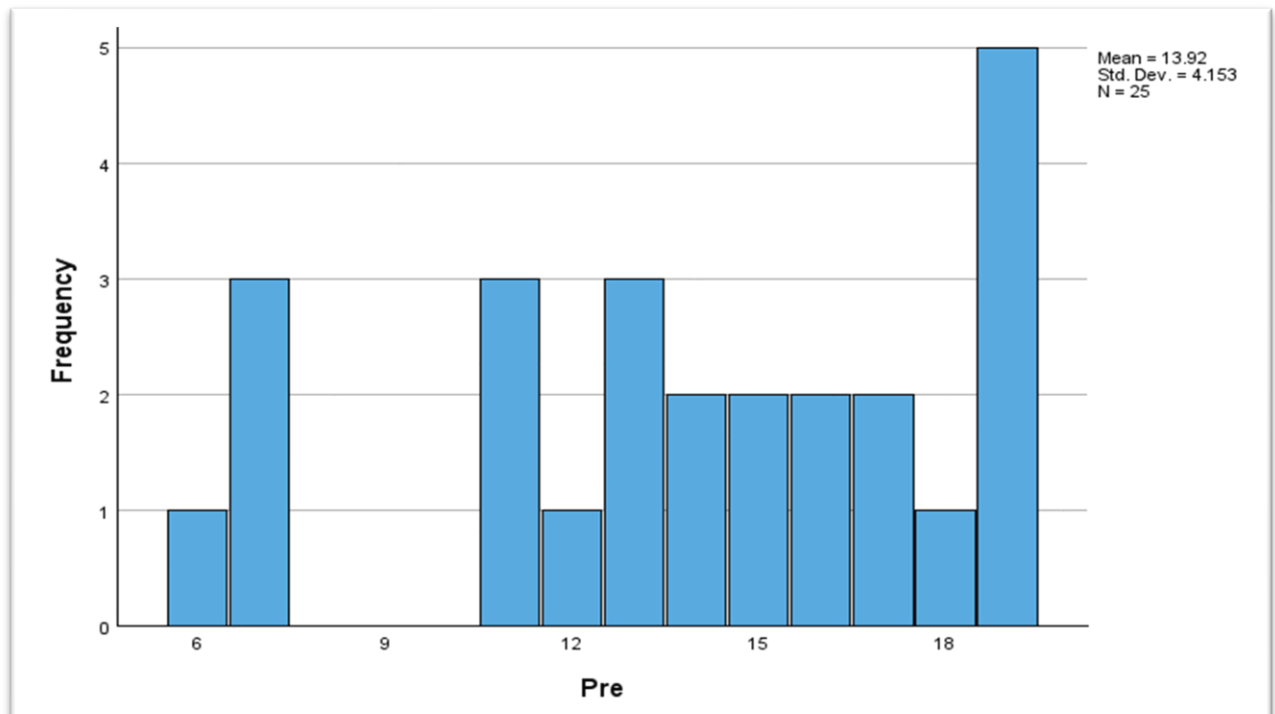
Note. A bar chart showing participants' mean salt-knowledge scores pre- and post the MINDTHESALT intervention (n = 25). A marked increase in correct responses post-intervention suggests that even a brief educational intervention can significantly promote dietary salt knowledge.

Normality Testing

Normality was initially tested separately for pre- and post-intervention scores using histograms. The histogram of Pre-Test Scores (Figure 6.2) indicates a negatively skewed non-normal distribution with multiple peaks and gaps, suggesting clustering of responses at various score ranges. The mean score was 13.92 (SD = 4.15, N = 25), showing variability across participant scores.

Figure 6.2

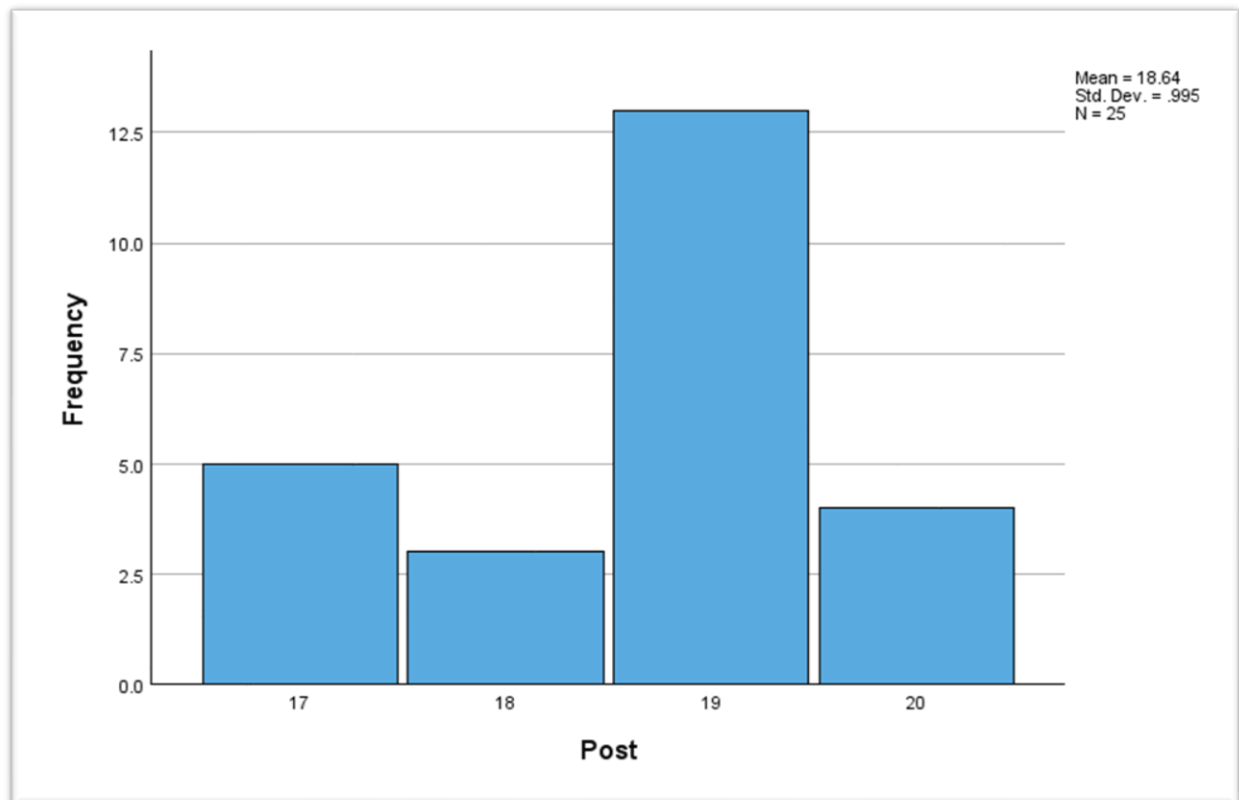
Frequency Distribution of Pre-Test Salt-Knowledge Scores



Note. Histogram showing the distribution of participants' salt knowledge scores on the pre-test (n = 25), highlighting the non-parametric spread pre-intervention.

Similarly, the histogram for Post-Test Scores (Figure 6.3) shows a more concentrated distribution, with most participants scoring between 17 and 20. The mean score increased to 18.64 (SD = 0.99, N = 25), and a ceiling effect is observed around a score of 20, suggesting that most participants achieved near-maximum scores. The reduced variability compared to the pre-test signals improved knowledge retention but also raised questions about the normality of the distribution. This irregular distribution indicated that further statistical tests were needed to verify the assumption of normality.

Figure 6.3
Frequency Distribution of Post-Test Salt-Knowledge Scores



Note. A histogram depicting the distribution of participants' salt-knowledge scores post-intervention ($n = 25$), illustrating a non-parametric distribution of the post-test scores.

The Shapiro-Wilk test

The Shapiro-Wilk test calculates the statistic (w) to determine how closely the sample distribution resembles a normal distribution, with the corresponding p -value indicating if deviations from normality are statistically significant (Shapiro & Wilk, 1965).

For the pre-intervention scores, the test yielded $w = 0.916$ ($p = 0.043$). The post-intervention scores produced $w = 0.822$ ($p < 0.001$). Since both p -values are less than the 0.05 significance threshold, the null hypothesis that the data follows a normal distribution was rejected. This indicates that both the pre-and post-intervention scores were not normally distributed,

necessitating the use of a non-parametric alternative test to compare the scores pre- and post-intervention.

The Wilcoxon Signed-Rank Test

This test was chosen due to the non-normality of the data and the sample size. This non-parametric test ranks the differences between paired observations and measures whether the median difference significantly deviates from zero. Unlike the paired t-test, the Wilcoxon test does not require normality and is more robust to skewed distributions and outliers (Gibbons & Chakraborti, 2020). Furthermore, this test is suitable for small sample sizes or data bound at an upper limit (ceiling effect), where many participants attained nearly perfect scores (Gibbons & Chakraborti, 2020).

The Wilcoxon test determined whether the MINDTHESALT intervention significantly improved participant performance. The analysis yielded a test statistic (w) of 0.0 and a p -value of 0.000018. Given that $p < 0.05$, the null hypothesis was rejected, indicating that post-intervention scores were significantly higher than pre-intervention scores.

Effect Size (Cohen's d)

Cohen's d was calculated to determine the magnitude of the impact of MINDTHESALT on dietary salt-related knowledge. Cohen (2013) classified effect sizes as small ($d = 0.2$), medium ($d = 0.5$), or large ($d = \geq 0.8$).

In this study, Cohen's d was determined to be 1.56. Since this value exceeds 0.8, it indicates that the intervention largely improved participants' salt-related knowledge. The large effect size implies that the improvements in knowledge were not only statistically significant but also

practically meaningful, underscoring the potential effectiveness of MINDTHESALT in improving salt-related knowledge (Cohen, 2013; Garcia & Cohen, 2013).

6.4 UTAUT2 Survey Findings

This study utilised a modified UTAUT2 survey comprising 22 items (Q1 - Q22) distributed across eight constructs:

- Performance Expectancy (Q1, Q2, & Q3)
- Effort Expectancy (Q4, Q5 & Q6)
- Social Influence (Q7, Q8 & Q9)
- Facilitating Conditions (Q10, Q11 & Q12)
- Hedonic Motivation (Q13, Q14 & Q15)
- Price Value (Q16 & Q17)
- Habit (Q18, Q19 & Q20)
- Behavioural Intention (Q21 & Q22)

Respondents rated each item using a 5-point Likert scale from “1” (strongly disagree) to “5” (strongly agree). By analysing means, SD, and reliability metrics, the study examined how participants viewed MINDTHESALT in terms of utility, ease of use, cultural resonance, and its potential to be embedded into their daily routines.

6.4.1 Descriptive Statistics

All 25 participants completed the modified UTAUT2 survey after engaging with MINDTHESALT. The descriptive statistics for each item, summarised in Table 6.3, reveal the mean, SD, and the percentage of participants who agreed or strongly agreed (selected response values 4 or 5).

Table 6.3*Selected Descriptive Statistics for UTAUT2 Items (n = 22)*

Item	Mean	Standard Deviation	% Agreement (≥ 4)
Q1	4.64	0.86	96.00%
Q2	4.72	0.46	100.00%
Q3	4.44	0.51	100.00%
Q4	4.60	0.50	100.00%
Q5	4.64	0.49	100.00%
Q6	4.44	0.77	92.00%
Q7	4.28	0.68	88.00%
Q8	4.16	0.80	84.00%
Q9	4.60	0.50	100.00%
Q10	4.28	0.74	84.00%
Q11	4.40	0.50	100.00%
Q12	4.40	0.71	88.00%
Q13	4.64	0.57	96.00%
Q14	4.68	0.48	100.00%
Q15	4.40	0.50	100.00%
Q16	4.28	0.61	92.00%
Q17	4.24	0.60	92.00%
Q18	3.32	1.03	48.00%
Q19	3.40	0.82	36.00%
Q20	3.60	0.76	52.00%
Q21	4.64	0.49	100.00%
Q22	4.72	0.46	100.00%

Note. This table presents the mean, standard deviation, and possible score range for each UTAUT2 construct (Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Hedonic Motivation, Price Value, Habit) as measured in the study (n = 22). Higher scores indicate stronger agreement with the item statements.

Several items, specifically Q2, Q3, Q4, Q5, Q9, Q11, Q14, Q15, Q21, and Q22, achieved a 100% agreement level. This suggests that participants strongly endorsed the statements regarding MINDTHESALT's perceived utility, enjoyment, and willingness to continue using the platform. In contrast, items such as Q18, Q19, and Q20 had lower mean scores (3.32 - 3.60), reflecting modest satisfaction or potential reservations.

6.4.2 Construct-Level Averages

The items in the UTAUT2 questionnaire (Appendix H) were categorised into eight UTAUT2 constructs. For each construct, the average mean scores were calculated from the means of the individual items. Table 6.4 presents the final mean scores and standard deviations for each construct.

Table 6.4

UTAUT2 Construct-Level Descriptive Statistics

Construct	Mean	Standard Deviation
Performance Expectancy (PE = Q1, Q2 & Q3)	4.60	0.14
Effort Expectancy (EE = Q4, Q5 & Q6)	4.56	0.11
Social Influence (SI = Q7, Q8 & Q9)	4.35	0.23
Facilitating Conditions (FC = Q10, Q11 & Q12)	4.36	0.07
Hedonic Motivation (HM = Q13, Q14 & Q15)	4.57	0.15
Price Value (PV = Q16 & Q17)	4.26	0.03
Habit (HT = Q18, Q19 & Q20)	3.44	0.14
Behavioural Intention (BI = Q21 & Q22)	4.68	0.06

Note. Means (M), standard deviations (SD), and score ranges for each UTAUT2 construct based on participant responses (n = 22). Higher values reflect stronger endorsement of each construct.

Participants largely perceived MINDTHESALT as beneficial for their health goals (PE = 4.60, SD = 0.14) and considered the platform relatively easy to navigate (EE = 4.56, SD = 0.11). Hedonic Motivation (mean = 4.57, SD = 0.15) and Behavioural Intention (mean = 4.68, SD = 0.06) also scored highly, indicating strong enjoyment and intention to continue using MINDTHESALT. However, Habit (HT = 3.44) was noticeably lower, suggesting that while participants plan to continue using the platform, the short two-week intervention period may not have been sufficient for MINDTHESALT to develop into a habitual practice.

6.4.3 Reliability Analysis

Cronbach's alpha (α) measures internal consistency by assessing how reliably a set of items measures a single construct. The values range from 0 to 1, with higher numbers indicating greater reliability. An α value of 0.90 or higher indicates excellent reliability, implying that the items in a scale show high consistency. Scores ranging from 0.80 to 0.89 indicate good reliability, while those between 0.70 and 0.79 are considered acceptable. If α drops below 0.70, reliability is considered questionable or poor, suggesting that the scale may require refinement or additional items to improve consistency (Taber, 2017; Tavakol & Dennick, 2011).

Table 6.5 summarises the Cronbach's alpha values for each construct. The results indicate that all constructs demonstrate good internal consistency, with Cronbach's Alpha values exceeding 0.80, which supports the robustness of the questionnaire. The "good" internal consistency suggests that the questionnaire reliably examined MINDTHESALT's usability and acceptability. Performance Expectancy (PE, $\alpha = 0.827$) and Social Influence (SI, $\alpha = 0.829$) showed the most substantial internal consistency, indicating a more reliable measurement of these constructs (Tavakol & Dennick, 2011). Habit (HT, $\alpha = 0.804$) and Hedonic Motivation (HM, $\alpha = 0.818$) showed the least reliability, indicating variation in participant responses to the items. These

variations may arise due to factors such as a small sample size, limited item counts, or differences in how participants interpret social support and perceived ease of use (Venkatesh et al., 2012a, 2012b).

Table 6.5

Cronbach's Alpha by UTAUT2 Construct

Construct	Questions	Cronbach's Alpha per Question	Final Cronbach's Alpha (lowest in this group)
Performance Expectancy	Q1, Q2, Q3	0.840, 0.834, 0.827	0.827
Effort Expectancy	Q4, Q5, Q6	0.834, 0.825, 0.835	0.825
Social Influence	Q7, Q8, Q9	0.839, 0.860, 0.829	0.829
Facilitating Conditions	Q10, Q11, Q12	0.819, 0.831, 0.835	0.819
Hedonic Motivation	Q13, Q14, Q15	0.826, 0.829, 0.818	0.818
Price Value	Q16, Q17	0.823, 0.823	0.823
Habit	Q18, Q19, Q20	0.808, 0.814, 0.804	0.804
Behavioural Intention	Q21, Q22	0.825, 0.825	0.825

Note. Cronbach's α values indicate the internal consistency reliability of each UTAUT2 construct scale (n = 22). Higher values (≥ 0.70) reflect acceptable to excellent reliability.

6.5 Focus Group Findings

Quantitative findings from the knowledge questionnaire and UTAUT2 survey suggest a promising level of acceptance and effectiveness. However, they do not entirely capture how participants engage with the platform in everyday contexts, especially in terms of cultural resonance, content length, and design consistency. Nine participants (out of 25) engaged in a 60-minute online post-intervention focus group, facilitated by the researcher, to address these gaps. The group consisted of four males and five females, aged 29 to 68, representing various professions, including teaching, healthcare, law, and web development. Their insights provided a deeper understanding of participants' motivations, frustrations, and suggestions for improvement. Table 6.6 presents the demographic characteristics of the focus group participants.

Table 6.6

Focus Group Demographics

Participant	Age (Years)	Gender	Occupation
1	29	Female	Housewife
2	36	Male	Web Developer
3	45	Female	Teacher
4	47	Male	Specialty Doctor
5	50	Male	Lawyer
6	68	Female	Nurse
7	40	Female	Social Worker
8	38	Female	Healthcare Worker
9	22	Male	University Student

Note. This table summarises key demographic characteristics of focus group participants.

6.5.1 Data Analysis Method

The focus group discussion was recorded, transcribed verbatim, and subsequently analysed thematically following the Reflexive Thematic Analysis approach (Braun & Clarke, 2006).

6.5.2 Key Themes

The discussion revealed five overarching themes:

- Overall Impressions and Initial Reactions
- Usability and Navigation
- Design and Content
- Engagement and Gamification
- Future Features and Sustainability

Each theme is explored in detail in the subsequent sections, featuring representative participant quotes (with pseudonyms).

Theme One: Overall Impressions and Initial Reactions

Participants shared mostly positive experiences, with many stating that MINDTHESALT surpassed their expectations. Participant 4 (Doctor, 47 Years Old, Male) noted, *“I would say it exceeded my expectations. I did not expect it to be ready this fast. It was user-friendly and has some interesting and innovative features.”* Similarly, Participant 9 (Student, 22 Years Old, Male) remarked, *“I expected yet another dull health app, but it was actually enjoyable.”* These comments align with the high Performance Expectancy and Hedonic Motivation scores from the UTAUT2 survey, indicating that participants found the platform functional and enjoyable.

Healthcare professionals also gained new insights from using MINDTHESALT. Participant 6 (Nurse, 68 Year Old, Female) said, *“As a nurse, I thought I knew a lot about salt, but I clearly didn’t. I have learnt many new things about salt and the benefits of reducing salt in my food.”* This aligns with the results from the pre-post Salt 101 questionnaire, indicating significant learning improvements among users.

However, some participants expressed concerns regarding the length of the content. Participant 5 (Lawyer, 50 Years Old, Male) remarked, *“I am happy with the platform, though I felt some of the educational modules was a bit lengthy but this is just my opinion.”* This emphasises the necessity for concise content to cater to users with varying literacy levels, time constraints, and preferences.

Theme Two: Usability and Navigation

The platform’s usability was well-received. More specifically, Participant 8 (Healthcare Worker, 38 Years Old, Female) mentioned, *“I didn’t require instructions; it was very straightforward to navigate.”* However, some users reported navigation difficulties. Participant 3 (Teacher, 45 Years Old, Female) reported, *“I struggled to find the educational materials. I did not know that you had to log in to find them.”* This suggests a need for clearer prompts on the homepage to ensure users understand how to access important features.

Some issues around mobile navigation were also raised. Participant 7 (Social Worker, 40 Years Old, Female) pointed out that *“Some pages have a white background and minimal text, while other pages have numerous colours and smaller fonts.”* Similarly, Participant 4 (Doctor, 47 Years Old, Male) noted that *“some buttons were quite small on my phone so I had to zoom in or tap carefully to ensure I was clicking the right ones.”* This suggests that adjustments to scalability across different devices are necessary.

Participant 9 (Student, 22 Years Old, Male) recommended the implementation of reminders to promote ongoing engagement, stating, *“Having reminders or notifications to complete the blood pressure log and the salt intake tracker would be fantastic.”* This mirrors behavioural science recommendations that digital nudges improve adherence to health interventions (Murray et al., 2016).

Theme Three: Design and Content

Some participants commended the platform’s colour scheme and layout, describing it as “bright.” However, some noted some inconsistencies. Participant 2 (Web Developer, 36 Years Old, Male) remarked, *“Some pages feature a white background with large fonts, while others display multiple colours with smaller fonts. It should be consistent.”* This highlights the importance of a consistent design across all pages, including quizzes, recipes, and educational modules.

The users highly appreciated cultural relevance. Participant 1 (Housewife, 29 years old, Female) said, *“I like the idea of a forum for exchanging our Afro-Caribbean recipes.”* In addition, Participant 6 (Nurse, 68 Years Old, Female) suggested further expansion, stating, *“We need more visuals of traditional cooking methods.”*

Theme Four: Engagement and Gamification

Gamification was an important engagement driver. Participant 6 (Nurse, 68 Years Old, Female) stated, *“I enjoyed the quiz, the game and the learning module.”* This parallels high Hedonic Motivation values, indicating that interactive elements enhanced user enjoyment.

Self-monitoring tools proved particularly effective. Participant 7 (Social Worker, 40 Years Old, Female) shared, *“My favourite features were the weekly progress tracker and the blood*

pressure log and chart. Seeing my blood pressure charts kept me committed to reducing my salt intake.” Similarly, Participant 4 (Doctor, 47 Years Old, Male) stated, *“My favourite features were the weekly progress tracker and the blood pressure log and chart. Seeing my blood pressure charts kept me committed to reducing my salt intake.”*

Some participants suggested integrating leaderboards or group competitions. Participant 4 (Doctor, 47 Years Old, Male) proposed, *“I like the leaderboard for the game, but the web app should have a leaderboard too. This could encourage more people to engage more with the website.”* However, Participant 1 (Housewife, 29, Female) cautioned, *“Not everyone wants their results public. There should be an option for privacy.”* This underscores the importance of opt-in privacy settings, enabling users to choose to engage in public challenges or not.

Theme Five: Future Features and Sustainability

Participants recommended several features to sustain adoption and engagement. Regular reminders and notifications were frequently suggested, with Participant 9 (Student, 22 Years Old, Male) stating, *“I think notifications or reminders to revisit the app would be helpful. People can forget to use the platform for days, but a reminder could help them stay connected.”*

Similarly, Participant 8 (Healthcare Worker, 38 Years Old, Female) recommended including a summary of dashboard features on the homepage: *“I’d like to see an introduction to some of the features we have in the dashboard on the homepage so these important features are not just hidden away there. People need to know that the platform offers from the homepage.”*

Some participants also suggested that some audio content be included on the platform. Participant 3 (Teacher, 45 Years Old, Female) proposed, *“You can have a podcast about this. It could be convenient for people who are commuting or doing chores.”*

Cultural elements remained a priority for many users. Participant 6 (Nurse, 68 Years Old, Female) recommended regularly updating Afro-Caribbean recipes: *“I would like to see more of our recipes and pictures related to African on the platform.”* Furthermore, sharing personal success stories was recommended as a motivational strategy. Participant 5 (Lawyer, 50 Years Old, Male) remarked, *“Hearing about someone who has successfully reduced their salt intake through this platform would feel relatable and inspiring.”*

6.6 Discussion

The combined insights from the pre-post questionnaire, UTAUT2 survey, and focus group present a multifaceted picture of MINDTHESALT’s preliminary performance. The quantitative findings show that Salt 101 significantly improved participants’ salt-related knowledge, with average scores increasing from around 14 to nearly 19 correct answers out of 20. The UTAUT2 findings indicate significant Performance Expectancy, Effort Expectancy, and Hedonic Motivation, alongside a strong intention to continue using MINDTHESALT. However, the comparatively lower Habit score highlights the difficulty of incorporating daily usage into participants’ routines during a brief two-week pilot.

Participants provided detailed, context-rich insights that support these quantitative findings. Many described MINDTHESALT as enjoyable and culturally resonant, reflecting the high Hedonic Motivation in the UTAUT2 results. The calls for notifications and consistent design suggest that while MINDTHESALT is liked, it has not yet become a part of their daily life. Although dietary salt-related knowledge significantly improved, the next phase might focus on intensifying retention strategies to transform that knowledge into sustained behaviour change.

The preliminary success of MINDTHESALT aligns with prior studies highlighting the necessity of culturally tailored interventions for minority groups (Joo & Liu, 2020). A study on psychosocial interventions for ethnic minority groups revealed that culturally tailored initiatives were effective, highlighting the critical role of cultural adaptation in enhancing outcomes for these populations (Miranda et al., 2005). The strong emphasis on Afro-Caribbean recipes and narratives reflected participants' preferences, indicating that culturally relevant interventions can improve both engagement and knowledge retention. Furthermore, the significant increase in salt-related knowledge aligns with broader research suggesting that brief, thoughtfully designed educational resources can significantly improve nutrition awareness (Mogre et al., 2023; Raut et al., 2024).

The UTAUT2 results support earlier findings in digital health research that users' enjoyment perception (Hedonic Motivation) is a critical factor influencing sustained usage. This is especially relevant in digital health, where users' perceived enjoyment of health applications can affect their sustained usage. For example, a study utilising the UTAUT2 model for mHealth intervention found that Hedonic Motivation significantly predicted users' intentions to engage with both lifestyle and therapy mobile health applications. The research concluded that enjoyment is fundamental to the acceptance and ongoing engagement of mHealth applications (Schomakers et al., 2022). Similarly, a study exploring patients' intentions to use mobile health education websites found that Hedonic Motivation is a crucial factor in shaping such intentions (Yu et al., 2021). The results suggest that the more enjoyable users perceive a technology, the more inclined they are to keep using it.

6.6.1 Strengths and Limitations

A major strength of this preliminary testing lies in its mixed-methods approach, which enabled the validation and enrichment of quantifiable, statistically significant results through user narratives. The cultural specificity of MINDTHESALT's content also addresses a recognised gap in salt-reduction efforts. The impact of the brief educational module, assessed by pre- and post-knowledge questionnaires, is also a promising indication that even minimal digital interventions can improve user awareness.

Although the study's findings are promising, it is important to acknowledge the limitations. The sample size of 25 participants and the two-week testing period may be insufficient to ascertain whether new habits were adopted. However, this study serves as a preliminary test to assess the engagement, usability, and acceptance of MINDTHESALT. To strengthen the findings, a thorough pilot test with a larger sample and an extended duration will be conducted in the future.

6.6.2 Future Implementation Strategy

To evolve from preliminary testing into a complete, large-scale intervention, MINDTHESALT requires further refinements. These would include consistent design elements (across its website, mobile application, and interactive quizzes), an expanded variety of culturally relevant recipes, ongoing updates to quizzes or educational modules, community-led challenges, and an optional notification system. Once these improvements have been implemented, a more extensive feasibility study or an RCT lasting several months could provide more insights into health and clinical outcomes, such as changes in actual reduction in salt intake or changes in blood pressure levels. Adhering to the MRC framework for

developing complex interventions would further position MINDTHESALT as a robust, evidence-based approach for addressing excessive salt intake and salt-sensitive hypertension among PoAD (Craig et al., 2008; Skivington et al., 2021).

6.7 Chapter Conclusion

This chapter has demonstrated that MINDTHESALT is a promising digital tool for reducing salt intake among PoAD, with considerable short-term success in enhancing users' salt-related knowledge. The UTAUT2 survey indicated a strong perception of its usefulness, ease of use, enjoyment, and intention to continue using MINDTHESALT. The focus group presented deeper insights into user interactions with the platform, underscoring the value of quizzes, cultural relevance, and the importance of consistent design and practical reminders. These results suggest that digital interventions can be both feasible and well-received when they address the cultural nuances of the target audience. However, further efforts are required to ensure that initial knowledge gains translate into lasting changes in dietary behaviour. Specifically, bridging the gap between early engagement and true habit formation will require a careful combination of user interface improvements, regularly updated content, community-driven challenges, and push notifications.

The implications of this primary testing extend beyond salt reduction alone. By emphasising co-creation, iterative design, and user-centred strategies, MINDTHESALT can serve as a model for other digital health interventions targeting minority communities with unique cultural and dietary practices. The success of such interventions may depend on combining reliable health education with interactive, engaging, enjoyable, and culturally relevant features, thereby facilitating sustained changes in lifestyle habits.

CHAPTER SEVEN

Conclusion and Future Directions

7.0 Overview

This chapter weaves together the elements from the preceding chapters to address three fundamental questions. First, it examines how the thesis has achieved its aims and objectives, demonstrating that interventions grounded in cultural awareness and community-driven innovations can reframe public health strategies for ethnic minority populations. Second, it examines how the results and lessons from MINDTHESALT might inform broader public health policies, highlighting the importance of culturally tailored digital health solutions for various behavioural challenges. Lastly, the chapter outlines some recommendations for future research. While plans for a comprehensive pilot test and deployment are outside the immediate focus of the thesis, the logical next steps for the project include refining MINDTHESALT and assessing its long-term effectiveness in reducing salt intake and blood pressure among PoAD.

7.1 Summary of the Research and Key Findings

This section provides an overview of the key findings of the thesis, recapping its aims and objectives. It reflects on the research journey and the main insights gained, particularly regarding dietary salt literacy, cultural influences, and the effectiveness of digital health solutions for PoAD.

7.1.1 Recap of Aims and Objectives

This thesis primarily set out to develop and test MINDTHESALT. The project was driven by the growing epidemiological evidence highlighting the disproportionate burden of hypertension among PoAD, despite national initiatives to reduce dietary salt intake (Agyemang & Bhopal, 2003; Jeong et al., 2020; Ji & Cappuccio, 2014). This is primarily because existing public health strategies often fail to effectively engage minority communities, as they tend to overlook the cultural, social, and structural factors that influence dietary habits (Cappuccio et al., 2008; Usman et al., 2024b).

The thesis objectives were structured around four main aims; each aligned with distinct research phases. The first aim focused on reviewing existing digital interventions for preventing and managing CVD among PoAD. A systematic review of Ibls was conducted to evaluate their effectiveness and identify best practices. This review highlighted essential engagement strategies and culturally relevant design elements that promote the success of digital health solutions (Usman et al., 2022). These findings played a crucial role in shaping the design of MINDTHESALT, ensuring it met the unique needs of the target population.

The second aim was to understand how PoAD access and engage with online health information, especially concerning hypertension and salt intake. This phase explored the online health-seeking behaviours of PoAD, identifying barriers and facilitators that shape the use of online health resources (Usman et al., 2024a). Insights from this study informed the design of MINDTHESALT, ensuring that it remained accessible, user-friendly, and aligned with the digital literacy levels of PoAD.

The third aim explored the knowledge, attitudes, and cultural influences surrounding salt intake among PoAD. This phase assessed the awareness of health risks associated with

excessive dietary salt consumption and examined how culinary traditions, social norms, and environmental factors influence dietary behaviours (Usman et al., 2024b). The insights gained were incorporated into MINDTHESALT's educational materials, ensuring the dietary guidance was culturally attuned, engaging, and practical.

The fourth aim was the development and primary testing of MINDTHESALT, applying the UTAUT2 framework and co-design principles to create a culturally appropriate, interactive, and engaging intervention. A preliminary evaluation was conducted to gauge the intervention's initial usability, acceptability, and short-term effectiveness. Participant feedback was collected to refine and improve the platform, ensuring MINDTHESALT is ready for future large-scale pilot testing and implementation.

This research was designed to address the knowledge-action gap prevalent in traditional public health interventions, where ethnic minority groups often feel marginalised or underserved by the one-size-fits-all approach. Rather than simply promoting "less salt" messages, this thesis aims to embed culturally sensitive health guidance into the culinary practices of PoAD, employing interactive, user-centred engagement methods such as gamification and community-led recipe libraries.

7.1.2 Key Lessons

Over six chapters, several lessons were learnt. The baseline knowledge of PoAD regarding the health risks of excessive salt intake is often overshadowed by deep-rooted culinary practices, taste preferences, and limited engagement with mainstream health initiatives. For example, some participants in preliminary qualitative studies (Chapter Four) acknowledged that excessive salt intake is linked to hypertension. However, their understanding of specific

guidelines for daily salt intake was limited (Usman et al., 2024b). Cultural attachment to salted meats, fish, and seasoning powders implies that simple recommendations to "reduce salt" can be perceived as a threat to cultural identity or met with scepticism, especially in this community that has historically faced systemic biases (Nazroo et al., 2019).

The literature review (Chapter Two) and systematic analysis of digital health interventions (Chapter Four) revealed that culturally tailored eHealth tools show promise for health behaviour change (Naderbagi et al., 2024; Usman et al., 2022). However, interventions specifically targeting dietary salt reduction in the population are still scarce (Usman et al., 2022). This gap presents an opportunity for MINDTHESALT to introduce culturally aware initiatives that reduce salt intake, blending technology with the culinary traditions of PoAD.

The communal cooking practices and varying levels of digital literacy within PoAD influenced every aspect, from the design of the interface to the content of the low-salt recipe libraries, navigation, and gamification elements. Preliminary testing indicates that when PoAD see their everyday cooking realities reflected in an eHealth platform, they are more likely to consider incremental behaviour changes. The primary testing study also suggested that many participants found the gamification elements enjoyable and educational, as well as effective strategies for reducing salt in their everyday dishes.

These findings demonstrate that interventions targeting PoAD must respect their cultural norms, demonstrate practical low-sodium cooking methods, present information clearly, and ensure robust data privacy standards (Nazroo et al., 2019). The integration of tailored recipes, iterative user feedback, and primary testing provides a solid foundation for further refinement and expansion of MINDTHESALT.

7.2 Implications of Findings for Public Health Practice

This section explores the broader potential impact of the study's findings on public health practice; particularly how culturally tailored digital interventions can improve dietary salt literacy among PoAD. It discusses the study's contributions to public health, explores its practical applications, and highlights the role of digital health interventions in addressing health disparities and encouraging behaviour change.

7.2.1 Contribution to Public Health

This thesis contributes to the discussion on digital health solutions for minority communities by operationalising the concept of “cultural tailoring” in a critical domain: salt-sensitive hypertension among PoAD. Although population-level salt reduction strategies in the UK have lowered national sodium intake over the past decade (He & MacGregor, 2011; Song et al., 2023), it appears that ethnic minority groups have not benefited equally. This is likely due to deep-rooted culinary norms, limited awareness regarding daily sodium recommendations, and an overarching belief that mainstream campaigns do not address their unique dietary needs (Ji & Cappuccio, 2014; Millett et al., 2012; Usman et al., 2024b). MINDTHESALT takes a user-centred approach, moving away from one-size-fits-all messaging by integrating common Afro-Caribbean recipes and a culturally relevant learning environment. This approach helps to address the disconnect between users' everyday dietary reality and relevant health messages.

Moreover, digital solutions can overcome many logistical barriers associated with group or clinic-based interventions, from scheduling challenges to limited funding for in-person sessions (Kepper et al., 2024). By functioning as a smartphone-optimised web application, MINDTHESALT leverages the widespread use of mobile devices among PoAD (Prescott, 2019,

2020; Usman et al., 2024a), offering immediate access and opportunities for re-engagement throughout the day. This blend of cultural sensitivity and flexible digital accessibility underscores MINDTHESALT's broader potential for expansion across multiple communities facing similar chronic disease risks.

7.2.2 Practical Applications

Practically, a wider public health strategy based on the MINDTHESALT initiative can be implemented in local community centres, faith-based gatherings, markets, and restaurants frequented by PoAD. This strategy would connect user curiosity with a direct demonstration of using the platform's recipe library or engaging with educational games and quizzes. The post-prototype primary testing findings indicate that quick acceptance may depend on participants seeing immediate references to dishes such as Jollof Rice, Ndole, Ackee, or Cassava-based soups, which are likely absent from standard salt-tracking applications developed with Western diets in mind.

Moreover, the prospect of integrating MINDTHESALT into General Practice (GP) or nurse-led services within the NHS could prove viable. Health professionals could encourage patients who are PoAD to engage with MINDTHESALT as part of their interventions for hypertension and CVD prevention and management. MINDTHESALT could also be tested in several GP clinics in areas with high numbers of PoAD to capture usage metrics and assess how healthcare providers can embed digital health solutions in routine consultations.

From a policy perspective, local health charities focused on hypertension prevention, such as the British Heart Foundation, could consider MINDTHESALT as a cost-effective complement, once it is validated through robust evaluation studies.

7.2.3 Role of Digital Health Interventions

Digital interventions have become popular tools for encouraging behaviour change (Kassim et al., 2022; Sediva et al., 2022). However, many of these interventions are often culturally neutral or centred around Western foods. MINDTHESALT demonstrates how recognising the complex generational cooking norms, preferences, and identities can improve acceptance and engagement among users who might otherwise feel sceptical or minimally engaged. MINDTHESALT also highlights that digital interventions should not simply apply an Afro-Caribbean “aesthetic” to a Western-centric interface. The collaborative approach to interface design offers a blueprint for overcoming digital literacy gaps. MINDTHESALT acknowledges the structural and cultural realities that shape dietary choices, thereby increasing the likelihood of moving beyond the typical novelty usage cycle observed in many eHealth tools (Boucher & Raiker, 2024; Olson et al., 2024).

7.3 Recommendations for Future Research

This section highlights key areas for further research based on the findings of this thesis. It presents opportunities to expand studies on dietary salt literacy, conduct longitudinal or larger-scale research, extend interventions to diverse populations, and investigate other factors that influence engagement and behaviour change in digital health interventions.

7.3.1 Building on the Thesis Findings

This thesis has explored various aspects of how PoAD approach their salt intake and the potential for co-designing digital health interventions to support dietary behaviour changes. Additional research is needed to explore the psychosocial, behavioural, and cultural factors that shape the acceptance and long-term effectiveness of such interventions. A critical area

for future research is the role of family gatekeepers, especially older or matriarchal figures involved in communal cooking. In many PoAD households, food choices are shaped by social and familial hierarchies, with leaders substantially shaping meal preparation practices (Morales et al., 2021; Olamide, 2024). Their acceptance or scepticism toward digital interventions could influence the adoption of healthier dietary habits. Future qualitative studies could provide valuable insights into how these gatekeepers affect salt-related behaviours. Understanding these dynamics may inform the development of tailored messaging strategies that promote engagement and encourage long-term adoption of salt-reduction practices.

There is a need to investigate how age, gender, and socioeconomic status affect engagement and adherence to digital health initiatives (Usman et al., 2024a). Future research could incorporate quantitative methods to examine variations in salt consumption among different subgroups within PoAD. For example, younger individuals might be more likely to use MINDTHESALT independently, while older PoAD individuals might need additional support. Similarly, the roles of gender in meal preparation can influence the adoption of the intervention, with women, who often handle most cooking responsibilities (Olamide, 2024; Usman et al., 2024b), potentially engaging with the intervention differently than men. Investigating these subgroup dynamics could inform the development of more tailored messaging that better meets the diverse needs of PoAD, thereby improving the long-term adoption of Ibls.

The long-term effectiveness of MINDTHESALT is also an area for further research. Although the intervention promotes salt substitution strategies, whether these behaviours persist beyond the initial engagement stage remains unclear. Studies indicate that many digital

interventions struggle to sustain adherence after the novelty wears off (Webb et al., 2010). Future studies could utilise longitudinal designs, observational studies, and ethnographic approaches to evaluate whether the behaviour change is maintained over time. Additionally, there is a need to understand whether social reinforcement mechanisms, such as peer support or community initiatives, can help sustain behaviour change. These insights would be essential for refining MINDTHESALT, ensuring cultural relevance, and ultimately boosting its effectiveness in supporting long-term sodium reduction among PoAD.

7.3.2 Implementing Longitudinal or Larger-Scale Studies

Although this thesis primarily tested MINDTHESALT, future research will conduct comprehensive feasibility trials to evaluate the intervention before full-scale implementation. Following the MRC framework (Craig et al., 2008; Skivington et al., 2021), future research will assess both self-reported salt consumption and quantitative measures, such as 24-hour urinary sodium excretion or validated blood pressure readings, over six to twelve months. A longer study duration is warranted, as salt consumption is a deeply ingrained habit and taste preferences often adapt over time (Bobowski, 2015; Usman et al., 2024b). More robust consumption analytics can be combined with user interviews to explore which intervention features successfully drive behaviour change. Likewise, health economic analyses could be conducted to determine whether the costs associated with maintaining and updating MINDTHESALT are commensurate with savings in hypertension-related healthcare costs. This inquiry is especially important for organisations or charities looking to adopt or support the intervention.

7.3.3 Expansion to Other Populations

MINDTHESALT is tailored to PoAD; however, its approach can be adapted to other minority groups with diets rich in salt. Translating the web application's framework, recipe-tailoring features, and user-friendly interface for other cultural contexts could help advance culturally resonant eHealth solutions. Nonetheless, careful co-design with each new group is essential, as culinary traditions, trust issues, and identity markers can vary significantly. This highlights both the flexibility of MINDTHESALT's architecture and the risks associated with a simplistic cut-and-paste approach in eHealth design. Each community's heritage and local conditions must influence the final product.

7.4 Plans for Implementation and Evaluation Under the MRC Framework

This section outlines the next steps for MINDTHESALT. While this thesis has navigated the initial two stages of the MRC's framework, the latter phases remain prospective.

7.4.1 Implementation Plans

For MINDTHESALT to be successfully implemented on a large scale, it will be crucial to build deeper partnerships with communities and organisations of PoAD, local health authorities, and potentially the NHS. One opportunity could be to integrate MINDTHESALT into GP or nurse-led services, where a direct referral to the web application could help normalise engagement among PoAD. Another approach is to collaborate with non-government organisations (NGOs) or philanthropic organisations that can fund ongoing platform iteration and content updates, ensuring that new recipes and cultural references are aligned with the evolving needs and preferences of PoAD. Implementation should also be adapted to the target population's cooking styles, cultural events, and language preferences (Livingstone et al.,

2023; Vincze et al., 2021). Although a national-level rollout is beyond the scope of this thesis, these strategies lay a solid foundation for connecting PoAD with healthcare systems and accessible technology.

7.4.2 Evaluation Plans

The evaluation phase typically involves RCT designs or, at least, well-structured quasi-experiments, incorporating a carefully selected control or comparison group (Craig et al., 2008; Skivington et al., 2021). The primary measure for a comprehensive MINDTHESALT evaluation would be whether participants show reductions in objective sodium indicators, typically assessed through 24-hour urinary sodium excretion or repeated blood pressure measurements (Sonuch et al., 2024; Welsh et al., 2019). Such studies might be conducted for at least six months to a year to determine if short-term salt-reduction behaviours continue or revert to baseline levels (Liu et al., 2024). Additional secondary outcomes may involve cost-effectiveness analyses and qualitative evaluations to explore the factors that shape user retention, usability, and engagement (Li et al., 2022; Rosewarne et al., 2021).

7.5 Policy Implications

This section presents how the findings of this thesis can inform public health policy, providing recommendations for policymakers to enhance efforts to reduce salt intake. It highlights the importance of culturally tailored interventions in addressing health disparities and ensuring more inclusive and successful health policies for underserved groups.

7.5.1 Informing Public Health Policy

National bodies, such as the UK Health Security Agency and the Office for Health Improvement and Disparities, have actively promoted voluntary targets for salt reduction. Their goal is to

bring the average population-level salt intake down to the recommended 6 grams per day for individuals 11 years and older (Public Health England, 2020). However, the adoption of these targets among deprived subpopulations remains largely uneven, possibly due to the lack of culturally resonant messages in mainstream campaigns (Cheng et al., 2024; Contreras Navarro et al., 2024; Usman et al., 2024b). MINDTHESALT provides an alternative, culturally relevant approach that could improve the participation and adherence of PoAD. The platform could exemplify cultural micro-targeting for future efforts aimed at reducing salt intake and preventing hypertension if scaled and validated. Instead of one-size-fits-all messages such as “Adults should consume under 6 grams of salt daily,” policymakers could tailor guidelines to individual ethnic groups in the UK. For example, they could suggest practical modifications that resonate with traditional cooking methods while encouraging healthier habits, such as “Rinse canned beans, chickpeas, vegetables, and tuna under running water to remove excess sodium” or “Instead of using a whole bouillon cube, use half and enhance the taste with your spice blends.”

7.5.2 Recommendations for Policymakers

Community Endorsement and Cultural Adaptation

National salt reduction strategies primarily rely on voluntary compliance from the industry; however, ethnic minority groups exhibit inconsistent participation. Engagement can be achieved through community endorsement, where policymakers partner with religious organisations, local health boards, celebrities, and cultural ambassadors to promote gradual salt reduction rather than enforcing abrupt dietary changes. This community-led approach maintains cultural authenticity while promoting sustainable dietary behaviour change (Christoforou et al., 2016; Moore, 2016; Moore et al., 2019). By embedding MINDTHESALT

within trusted and respected community networks, public health solutions can become more resonant and practical for PoAD.

Improving Digital Accessibility Through Policy and Funding

Another critical aspect is enhancing digital accessibility for low-income households facing connectivity or financial challenges. Although the UK's 2024 Salt Reduction Targets focus on industry-led reformulation (Public Health England, 2020), they do not provide consumer-facing interventions that address dietary literacy and behaviour change. To bridge this gap, policymakers should invest in creating offline or lower-data versions of MINDTHESALT, ensuring broad accessibility without needing high-speed internet or costly data plans. Furthermore, subsidising mobile-friendly health tools could foster equitable access, enabling underserved communities to benefit from culturally tailored digital health resources (Shah, 2024; Widjaja et al., 2024).

Integration into Public Health and Primary Care Strategies

In addition to community and digital access, MINDTHESALT should be incorporated into public health and primary care strategies. Considering the features of MINDTHESALT, integrating the platform into GP-led health checks, nurse-led hypertension services, or NHS digital health initiatives would ensure a strong link between clinical guidance and digital self-management tools. Embedding MINDTHESALT in hypertension care pathways could enable healthcare professionals to deliver consistent, culturally resonant interventions, enhancing patient engagement and adherence to dietary recommendations. This approach aligns with broader NHS initiatives to reduce health inequalities by addressing cultural and structural barriers to effective chronic disease management (Alderwick et al., 2024a, 2024b).

7.6 Concluding Remarks

This thesis presents a nuanced, context-based approach to addressing excessive salt intake and salt-sensitive hypertension among PoAD, culminating in the creation and primary testing of MINDTHESALT. The project emphasises the culinary practices of PoAD, such as the use of salted fish and bouillon cubes, and promotes manageable changes, including partial seasoning, rinsing, and substitutions. MINDTHESALT also demonstrates how merging nutritional science with cultural identity can yield a more engaging and better-tailored solution than traditional top-down approaches. The user-driven, co-creation methodology, guided by iterative focus groups and a dedicated Review Panel, underscores the importance of cultural sensitivity and reflective design in promoting acceptance and engagement within historically marginalised communities.

Although the primary evaluation findings are preliminary and cannot conclusively establish long-term reductions in salt intake or improvements in blood pressure control, early indications of user satisfaction, moderate adoption of new cooking practices, and continued engagement suggest promising outcomes for future feasibility and evaluation stages. Following the MRC framework, the journey from the initial concept to a validated public health initiative typically involves methodological expansions and alignment with local health systems. Should the evaluation and implementation phases yield robust evidence of effectiveness, MINDTHESALT could emerge as a cost-effective and culturally relevant intervention to reduce a major modifiable CVD risk factor among PoAD.

The importance of this thesis transcends dietary salt reduction. It highlights that digital interventions are not solely about technology but about understanding the cultural contexts, socio-economic realities, and family networks that shape health behaviours. For PoAD,

embracing partial salt reduction strategies that preserve flavour is vital due to the significance of cultural identity. By thoughtfully integrating the population's references into quizzes and recipe libraries, MINDTHESALT avoids the common pitfalls of mainstream health messaging that often overlooks minority diets, needs, and preferences. Thus, the platform can serve as a model for culturally resonant, user-centred eHealth strategies that might address a range of dietary and lifestyle inequalities. Whether addressing sugary foods, trans fats, or mental health issues, the core principle remains that communities must feel validated and involved at every intervention planning and design stage.

Finally, MINDTHESALT emerges from this thesis not as a finished product but as a compelling example of how co-design and community involvement can create a culturally relevant, functional, and compassionate platform for reducing dietary salt intake. There is a pressing need for ongoing research funding, multi-layered feasibility trials, and potential policy integration to ensure the intervention flourishes in community contexts. The persistent health disparities in hypertension among PoAD necessitate culturally sensitive initiatives, and MINDTHESALT symbolises an optimistic step towards meaningful advancements in bridging the gap between tradition and technology. As this thesis concludes, the journey of implementing, evaluating, and scaling MINDTHESALT remains to be explored, inviting researchers, practitioners, and communities to collaborate in advancing the fight against hypertension and its disproportionate burden on PoAD.

REFERENCES

- Adogame, A. (2014). Reinventing Africa? The negotiation of ethnic identities in the new African religious diaspora. In S. Grodz & G. G. Smith (Eds.), *Religion, ethnicity and transnational migration between West Africa and Europe* (pp. 12–36). Brill. https://doi.org/10.1163/9789004271562_003.
- Affret, A., Severi, G., Dow, C., Rey, G., Delpierre, C., Boutron-Ruault, M.-C., Clavel-Chapelon, F., & Fagherazzi, G. (2017). Socio-economic factors associated with a healthy diet: Results from the E3N study. *Public Health Nutrition*, 20(9), 1574–1583. <https://doi.org/10.1017/S1368980017000222>.
- Agyemang, C., & Bhopal, R. (2003). Is the blood pressure of people from African origin adults in the UK higher or lower than that in European origin white people? A review of cross-sectional data. *Journal of Human Hypertension*, 17(8), 523–534. <https://doi.org/10.1038/sj.jhh.1001586>.
- Aigner, C., Hofmann, G., Winkler, S., Baranyi, R., & Grechenig, T. (2023). Nutrition Garden: A gamified mobile app for motivating people to eat specific food to prevent non-communicable diseases. In *Proceedings of the 7th International Conference on Medical and Health Informatics (ICMHI 2023)* (pp. 203–207). Association for Computing Machinery. <https://doi.org/10.1145/3608298.3608336>.
- Alderwick, H., Hutchings, A., & Mays, N. (2024a). Cross-sector collaboration to reduce health inequalities: A qualitative study of local collaboration between health care, social services, and other sectors under health system reforms in England. *BMC Public Health*, 24, Article 20089. <https://doi.org/10.1186/s12889-024-20089-5>.
- Alderwick, H., Hutchings, A., & Mays, N. (2024b). Solving poverty or tackling healthcare inequalities? Qualitative study exploring local interpretations of national policy on health inequalities under new NHS reforms in England. *BMJ Open*, 14(4), e081954. <https://doi.org/10.1136/bmjopen-2023-081954>.
- Ali, R., Shah, R., Purohit, P., & Commission on Race and Ethnic Disparities Team. (2021). Ethnic disparities in the major causes of mortality and their risk factors: A rapid review. *GOV.UK*. Retrieved February 10, 2024, from <https://www.gov.uk/government/publications/the-report-of-the-commission-on-race-and-ethnic-disparities-supporting-research/ethnic-disparities-in-the-major-causes-of-mortality-and-their-risk-factors-by-dr-raghib-ali-et-al>.
- Almalki, S. (2016). Integrating quantitative and qualitative data in mixed methods research—Challenges and benefits. *Journal of Education and Learning*, 5(3), 288–296. <https://doi.org/10.5539/jel.v5n3p288>.
- Alzghoul, B. (2024). The effectiveness of gamification in changing health-related behaviors: A systematic review and meta-analysis. *The Open Public Health Journal*, 17, e18749445234806. <https://doi.org/10.2174/0118749445234806240206094335>.

- Anderson, E., Koss, M., Castro Luque, A. L., Garcia, D., Lopez, E., & Ernst, K. (2021). WhatsApp-based focus groups among Mexican-origin women in Zika risk area: Feasibility, acceptability, and data quality. *JMIR Formative Research*, 5(10), e20970. <https://doi.org/10.2196/20970>.
- Anderson, K., Gall, A., Butler, T., Ngampromwongse, K., Hector, D., Turnbull, S., Lucas, K., Nehill, C., Boltong, A., Keefe, D., & Garvey, G. (2022). Development of key principles and best practices for co-design in health with First Nations Australians. *International Journal of Environmental Research and Public Health*, 20(1), 147. <https://doi.org/10.3390/ijerph20010147>.
- Apekey, T. A., Moore, S. G., & Maynard, M. J. (2024). Co-designing recipe resources to support healthy eating in African-Caribbeans in the United Kingdom: An academic and community partnership approach. *Journal of Human Nutrition and Dietetics*, 38(1), e13412. <https://doi.org/10.1111/jhn.13412>.
- Archer, N. S., Cochet-Broch, M., Mihnea, M., Garrido-Banuelos, G., Lopez-Sanchez, P., Lundin, L., & Frank, D. (2022). Sodium reduction in bouillon: Targeting a food staple to reduce hypertension in Sub-Saharan Africa. *Frontiers in Nutrition*, 9, Article 746018. <https://doi.org/10.3389/fnut.2022.746018>.
- Aspinall, P. J., & Chinouya, M. J. (2016). *The African Diaspora population in Britain: Migrant identities and experiences*. Palgrave Macmillan. <https://doi.org/10.1057/978-1-137-45654-0>.
- Auza-Santiváñez, J. C., Carías Díaz, J. A., Vedia Cruz, O. A., Robles-Nina, S. M., Sánchez Escalante, C., & Apaza Huanca, B. (2024). Gamification in personal health management: A focus on mobile apps. *Gamification and Augmented Reality*, 2, 31. <https://doi.org/10.56294/gr202431>.
- Bailey, M. A., & Dhaun, N. (2024). Salt sensitivity: Causes, consequences, and recent advances. *Hypertension*, 81(3), 476–489. <https://doi.org/10.1161/HYPERTENSIONAHA.123.17959>.
- Barrera, M., Berkel, C., & Castro, F. G. (2017). Directions for the advancement of culturally adapted preventive interventions: Local adaptations, engagement, and sustainability. *Prevention Science*, 18(6), 640–648. <https://doi.org/10.1007/s11121-016-0705-9>.
- Bartolomé, N. A., Zorrilla, A. M., & Zapirain, B. G. (2013). User-centred design eHealth system for chronic disease monitoring. In *Proceedings of the IASTED International Conference on Biomedical Engineering* (Paper 791-007). ACTA Press. <https://doi.org/10.2316/P.2013.791-007>.
- Bashi, N., Fatehi, F., Fallah, E., Walters, D., Jimenez-Ruiz, A., & Nourbakhsh, N. (2020). Digital health interventions for chronic diseases: A scoping review of evaluation frameworks. *BMJ Health & Care Informatics*, 27(1), e100066. <https://doi.org/10.1136/bmjhci-2019-100066>.
- Berardi, C., Antonini, M., Jordan, Z., Wechtler, H., Paolucci, F., & Hinwood, M. (2024). Barriers and facilitators to the implementation of digital technologies in mental health systems: A qualitative systematic review to inform a policy framework. *BMC Health Services Research*, 24, 243. <https://doi.org/10.1186/s12913-023-10536-1>.

- Berger, M., & Jung, C. (2024). Gamification preferences in nutrition apps: Toward healthier diets and food choices. *Digital Health*, 10, 20552076241260482. <https://doi.org/10.1177/20552076241260482>.
- Berger, R. (2013). Now I see it, now I don't: Researcher's position and reflexivity in qualitative research. *Qualitative Research*, 15(2), 219-234. <https://doi.org/10.1177/1468794112468475>.
- Bergeria, C. L., Oberleitner, L., Sokolovsky, A., & Kurti, A. N. (2024). Virtual focus groups among individuals with use disorders: Assessing feasibility and acceptability in an underserved clinical population. *Frontiers in Psychiatry*, 15, Article 1352300. <https://doi.org/10.3389/fpsyt.2024.1352300>.
- Bhaskar, S. M. M. (2023). Editorial: Digital strategies to reduce salt consumption. *Frontiers in Public Health*, 11, 1244216. <https://doi.org/10.3389/fpubh.2023.1244216>.
- Birru, M. S., & Steinman, R. A. (2004). Online health information and low-literacy African Americans. *Journal of Medical Internet Research*, 6(3), e26. <https://doi.org/10.2196/jmir.6.3.e26>.
- Bobowski, N. (2015). Shifting human salty taste preference: Potential opportunities and challenges in reducing dietary salt intake of Americans. *Chemosensory Perception*, 8(3), 112–116. <https://doi.org/10.1007/s12078-015-9179-6>.
- Borysova, S., Borysov, V., Kochergina, S., Spasskova, O., & Kushnarova, N. (2024). Involvement of interactive educational platforms in the training of graphic design students using the Figma platform as an example. *International Journal of Education and Information Technologies*, 18, 119–132. <https://doi.org/10.46300/9109.2024.18.12>.
- Boucher, E. M., & Raiker, J. S. (2024). Engagement and retention in digital mental health interventions: A narrative review. *BMC Digital Health*, 2, 52. <https://doi.org/10.1186/s44247-024-00105-9>.
- Bramble, J., Cornelius, L. J., & Simpson, G. (2009). Eating as a cultural expression of caring among Afro-Caribbean and African American women: Understanding the cultural dimensions of obesity. *Journal of Health Care for the Poor and Underserved*, 20(2A), 53–68. <https://doi.org/10.1353/hpu.0.0158>.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>.
- Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*, 11(4), 589–597. <https://doi.org/10.1080/2159676X.2019.1628806>.
- Braun, V., & Clarke, V. (2022). Conceptual and design thinking for thematic analysis. *Qualitative Psychology*, 9(1), 3–26. <https://doi.org/10.1037/qup0000196>.
- Briazu, R. A., Masood, F., Hunt, L., Pettinger, C., Wagstaff, C., & McCloy, R. (2024). Barriers and facilitators to healthy eating in disadvantaged adults living in the UK: A scoping review. *BMC Public Health*, 24, 1770. <https://doi.org/10.1186/s12889-024-19259-2>.

- Brown, A. G. M., Houser, R. F., Mattei, J., Lichtenstein, A. H., & Folta, S. C. (2019). Qualitative exploration of cultural factors influencing diet among African-, Caribbean- and US-born Blacks living in the Northeast USA. *Journal of Nutritional Science*, 8, e23. <https://doi.org/10.1017/jns.2019.19>.
- Bryman, A. (2012). *Social research methods* (4th ed.). Oxford University Press.
- Cantín, M. (2014). World Medical Association Declaration of Helsinki: Ethical principles for medical research involving human subjects. Reviewing the latest version. *International Journal of Medical and Surgical Sciences*, 1(4), 339–346. <https://doi.org/10.32457/ijmss.2014.042>.
- Cappuccio, F. P. (1997). Ethnicity and cardiovascular risk: Variations in people of African ancestry and South Asian origin. *Journal of Human Hypertension*, 11(9), 571–576. <https://doi.org/10.1038/sj.jhh.1000516>.
- Cappuccio, F. P. (2013). Cardiovascular and other effects of salt consumption. *Kidney International Supplements*, 3(4), 312–315. <https://doi.org/10.1038/kisup.2013.65>.
- Cappuccio, F. P., Kerry, S. M., Adeyemo, A., Luke, A., Amoah, A. G. B., Bovet, P., ... Cooper, R. S. (2008). Body size and blood pressure: An analysis of Africans and the African diaspora. *Epidemiology*, 19(1), 38–46. <https://doi.org/10.1097/ede.0b013e31815c4d2c>.
- Cappuccio, F. P., Kerry, S. M., Micah, F. B., Plange-Rhule, J., & Eastwood, J. B. (2006). A community programme to reduce salt intake and blood pressure in Ghana [ISRCTN88789643]. *BMC Public Health*, 6, 13. <https://doi.org/10.1186/1471-2458-6-13>.
- Charlton, K. E., Steyn, K., Levitt, N. S., Zulu, J. V., Jonathan, D., Veldman, F. J., & Nel, J. H. (2005). Diet and blood pressure in South Africa: Intake of foods containing sodium, potassium, calcium, and magnesium in three ethnic groups: Intake of foods containing sodium, potassium, calcium, and magnesium in three ethnic groups. *Nutrition*, 21(1), 39-50. <https://doi.org/10.1016/j.nut.2004.09.007>.
- Chauhan, A., Walton, M., Manias, E., Walpola, R. L., Seale, H., Latanik, M., Leone, D., Mears, S., & Harrison, R. (2020). The safety of health care for ethnic minority patients: a systematic review. *International journal for equity in health*, 19(1), 118. <https://doi.org/10.1186/s12939-020-01223-2>.
- Cheng, C., & Ebrahimi, O. V. (2023). Gamification: A novel approach to mental health promotion. *Current Psychiatry Reports*, 25(11), 577–586. <https://doi.org/10.1007/s11920-023-01453-5>.
- Cheng, J., Thorndike, A. N., & Yi, S. (2024). Racial and ethnic differences in sodium sources and sodium reduction behaviors among US adults: NHANES 2017–2020 pre-pandemic. *medRxiv*. <https://doi.org/10.1101/2024.08.27.24312681>.
- Chib, A., Li, C., & Lin, S. (2023). Health wearable tools and health promotion. *Oxford Research Encyclopedia of Global Public Health*. <https://doi.org/10.1093/acrefore/9780190632366.013.510>.

- Christoforou, A., Trieu, K., Land, M. A., Bolam, B., & Webster, J. (2016). State-level and community-level salt reduction initiatives: A systematic review of global programmes and their impact. *Journal of Epidemiology and Community Health*, 70(11), 1140–1150. <https://doi.org/10.1136/jech-2015-206997>.
- Cohen, J. (2013). *Statistical power analysis for the behavioral sciences* (2nd ed.). Elsevier.
- Collins, M., Mason, H., O'Flaherty, M., Guzman-Castillo, M., Critchley, J., Capewell, S., & Love-Koh, J. (2014). An economic evaluation of salt reduction policies to reduce coronary heart disease in England: A policy modeling study. *Value in Health*, 17(5), 517–524. <https://doi.org/10.1016/j.jval.2014.03.1722>.
- Contreras Navarro, A., Gallagher, K., Griffin, S., Leydon, C. L., Perry, I. J., & Harrington, J. M. (2025). Systematic review on the impact of salt-reduction initiatives by socioeconomic position to address health inequalities in adult populations. *Nutrition Reviews*, 83(3), e1090–e1100. <https://doi.org/10.1093/nutrit/nuae088>.
- Copas, A., Burkill, S., Conrad, F., Couper, M. P., & Erens, B. (2020). An evaluation of whether propensity score adjustment can remove the self-selection bias inherent to web panel surveys addressing sensitive health behaviours. *BMC medical research methodology*, 20(1), 251. <https://doi.org/10.1186/s12874-020-01134-4>.
- Cordell, A., Qualls, A., & Oxford, J. (2021). The focus group must go on: Lessons learned from conducting virtual focus groups. *Innovation in Aging*, 5(Suppl. 1), 837–838. <https://doi.org/10.1093/geroni/igab046.3067>.
- Corsini, L., Jagtap, S., & Moultrie, J. (2022). Design with and by marginalized people in humanitarian makerspaces. *International Journal of Design*, 16(2), 91–105. <https://doi.org/10.57698/v16i2.07>.
- Craig, P., Dieppe, P., Macintyre, S., Michie, S., Nazareth, I., & Petticrew, M. (2008). Developing and evaluating complex interventions: The new Medical Research Council guidance. *BMJ*, 337, a1655. <https://doi.org/10.1136/bmj.a1655>.
- Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). SAGE.
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16(3), 297–334. <https://doi.org/10.1007/bf02310555>.
- Cumpston, M., Li, T., Page, M. J., Chandler, J., Welch, V., Higgins, J. P. T., & Thomas, J. (2019). Updated guidance for trusted systematic reviews: A new edition of the Cochrane Handbook for Systematic Reviews of Interventions. *Cochrane Database of Systematic Reviews*. <https://doi.org/10.1002/14651858.ed000142>.
- D'Elia, L., Rossi, G., Ippolito, R., Cappuccio, F. P., & Strazzullo, P. (2012). Habitual salt intake and risk of gastric cancer: a meta-analysis of prospective studies. *Clinical nutrition (Edinburgh, Scotland)*, 31(4), 489–498. <https://doi.org/10.1016/j.clnu.2012.01.003>.
- Daley, P. O. (1998). Black Africans in Great Britain: Spatial concentration and segregation. *Urban Studies*, 35(10), 1703–1724. <https://doi.org/10.1080/0042098984114>.

- de Mestral, C., Mayén, A. L., Petrovic, D., Marques-Vidal, P., Bochud, M., & Stringhini, S. (2017). Socioeconomic Determinants of Sodium Intake in Adult Populations of High-Income Countries: A Systematic Review and Meta-Analysis. *American journal of public health, 107*(4), e1–e12. <https://doi.org/10.2105/AJPH.2016.303629>.
- Earland, J., Campbell, J. L., & Srivastava, A. (2010). Dietary habits and health status of African Caribbean adults. *Journal of Human Nutrition and Dietetics, 23*(3), 264–271. <https://doi.org/10.1111/j.1365-277X.2009.01030.x>.
- Elijovich, F., Weinberger, M. H., Anderson, C. A. M., Appel, L. J., Bursztyn, M., Cook, N. R., Dart, R. A., Newton-Cheh, C. H., Sacks, F. M., & Laffer, C. L. (2016). Salt sensitivity of blood pressure: A scientific statement from the American Heart Association. *Hypertension, 68*(3), e7–e46. <https://doi.org/10.1161/HYP.0000000000000047>.
- Evwierhoma, C., Moore, A. P., Goff, L. M., Aghili, A., Comegna, S., Begum, G., & Adegboye, A. R. A. (2019). Nutritional factors and cardiovascular disease risk in Black African and Black Caribbean women: A cross-sectional study. *Proceedings of the Nutrition Society, 78*(OCE1), E34. <https://doi.org/10.1017/S0029665119000387>.
- Farquhar, W. B., Edwards, D. G., Jurkowitz, C. T., & Weintraub, W. S. (2015). Dietary sodium and health. *Journal of the American College of Cardiology, 65*(10), 1042–1050. <https://doi.org/10.1016/j.jacc.2014.12.039>.
- Fryar, C. D., Afful, J., Carroll, M. D., Kuo, T., & Kit, B. (2023). Hypertension prevalence, treatment, and control among adults: Los Angeles County and the United States, 2015–2018. *NCHS Health, United States*. <https://doi.org/10.15620/cdc:134503>.
- Garcia, J., & Cohen, G. L. (2013). A social psychological approach to educational intervention. In E. Shafir (Ed.), *The behavioral foundations of public policy* (pp. 329–348). Princeton University Press. <https://doi.org/10.2307/j.ctv550cbm.25>.
- George, S., Duran, N., & Norris, K. (2014). A systematic review of barriers and facilitators to minority research participation among African Americans, Latinos, Asian Americans, and Pacific Islanders. *American Journal of Public Health, 104*(2), e16–e31. <https://doi.org/10.2105/AJPH.2013.301706>.
- Ghamari, H., & Amor, C. (2016). The role of color in healthcare environments: Emergent bodies of evidence-based design approach. *Sociology and Anthropology, 4*(11), 1020–1029. <https://doi.org/10.13189/sa.2016.041109>.
- Gibbons, J. D., & Chakraborti, S. (2020). *Nonparametric statistical inference* (6th ed.). Chapman & Hall/CRC. <https://doi.org/10.1201/9781315119125>.
- Gillespie, D. O. S., Allen, K., Guzman-Castillo, M., Bandosz, P., Moreira, P., McGill, R., Anwar, E., Lloyd-Williams, F., Bromley, H., Diggle, P. J., Capewell, S., & O’Flaherty, M. (2015). The health equity and effectiveness of policy options to reduce dietary salt intake in England: Policy forecast. *PLOS ONE, 10*(7), e0127927. <https://doi.org/10.1371/journal.pone.0127927>.
- Göbl, L., Jokisch, M. R., Wahl, H.-W., Leopold, D., & Doh, M. (2024). eHealth literacy among older adults: The role of digital literacy and self-efficacy. *Innovation in Aging, 8*(Suppl. 1), 1060. <https://doi.org/10.1093/geroni/igae098.3408>.

- Goff, L. M., Timbers, L., Style, H., & Knight, A. (2015). Dietary intake in Black British adults: An observational assessment of nutritional composition and the role of traditional foods in UK Caribbean and West African diets. *Public Health Nutrition*, 18(12), 2191–2201. <https://doi.org/10.1017/S1368980014002584>.
- Goodyear, V. A., Wood, G., Skinner, B., & Thompson, J. L. (2021). The effect of social media interventions on physical activity and dietary behaviours in young people and adults: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity*, 18, 72. <https://doi.org/10.1186/s12966-021-01138-3>.
- Green, T., & Brandon, K. (2024). Learning the Figma interface. In *UX design with Figma: User-centered interface design and prototyping with Figma* (pp. 1–52). Apress. <https://doi.org/10.1007/979-8-8688-0324-6>.
- Greenhalgh, T., Jackson, C., Shaw, S., & Janamian, T. (2016). Achieving research impact through co-creation in community-based health services: Literature review and case study. *The Milbank Quarterly*, 94(2), 392–429. <https://doi.org/10.1111/1468-0009.12197>.
- Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 105–117). Sage.
- Halvorsrud, K., Kucharska, J., Adlington, K., Rüdell, K., Brown Hajdukova, E., Nazroo, J., Haarmans, M., Rhodes, J., & Bhui, K. (2021). Identifying evidence of effectiveness in the co-creation of research: A systematic review and meta-analysis of the international healthcare literature. *Journal of Public Health*, 43(1), 197–208. <https://doi.org/10.1093/pubmed/fdz126>.
- Hamari, J., Shernoff, D. J., Rowe, E., Coller, B., Asbell-Clarke, J., & Edwards, T. (2016). Challenging games help students learn: An empirical study on engagement, flow and immersion in game-based learning. *Computers in Human Behavior*, 54, 170–179. <https://doi.org/10.1016/j.chb.2015.07.045>.
- Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does gamification work? A literature review of empirical studies on gamification. In *Proceedings of the 47th Hawaii International Conference on System Sciences* (pp. 3025–3034). IEEE. <https://doi.org/10.1109/HICSS.2014.377>.
- He, F. J., & MacGregor, G. A. (2003). How far should salt intake be reduced? *Hypertension*, 42(6), 1093–1099. <https://doi.org/10.1161/01.HYP.0000102864.05174.E8>
- He, F. J., & MacGregor, G. A. (2011). Salt reduction lowers cardiovascular risk: meta-analysis of outcome trials. *Lancet (London, England)*, 378(9789), 380–382. [https://doi.org/10.1016/S0140-6736\(11\)61174-4](https://doi.org/10.1016/S0140-6736(11)61174-4).
- He, F. J., Brinsden, H. C., & MacGregor, G. A. (2013a). Salt reduction in the United Kingdom: A successful experiment in public health. *Journal of Human Hypertension*, 28(6), 345–352. <https://doi.org/10.1038/jhh.2013.105>

- He, F. J., Li, J., & MacGregor, G. A. (2013). Effect of longer-term modest salt reduction on blood pressure. *Cochrane Database of Systematic Reviews*, 2013(4), CD004937. <https://doi.org/10.1002/14651858.CD004937.pub2>
- He, Z. (2023). From privacy-enhancing to health data utilisation: The traces of anonymisation and pseudonymisation in EU data protection law. *Digital Society*, 2, Article 17. <https://doi.org/10.1007/s44206-023-00043-5>.
- Higgins, J. P. T., & Green, S. (Eds.). (2008). *Cochrane handbook for systematic reviews of interventions* (Version 5.0.0). Wiley-Blackwell.
- Hilton, S., Vaczy, C., Buckton, C., Patterson, C., & Smith, M. J. (2023). Expert views on high fat, salt and sugar food marketing policies to tackle obesity and improve dietary behaviours in the UK: A qualitative study. *BMC Public Health*, 23, 1951. <https://doi.org/10.1186/s12889-023-16821-2>.
- Hosseini, M.-S., Jahanshahloo, F., Akbarzadeh, M. A., Zarei, M., & Vaez-Gharamaleki, Y. (2024). Formulating research questions for evidence-based studies. *Journal of Medicine, Surgery, and Public Health*, 2, Article 100046. <https://doi.org/10.1016/j.glmedi.2023.100046>.
- IBM Corp. (2024). *IBM SPSS Statistics for Windows* (Version 30.0.0) [Computer software]. IBM Corp.
- Ikuomola, O. B., & Airhihenbuwa, C. O. (2021). Cultural perspectives on sodium intake reduction among Nigerians in the US: An application of the PEN-3 model. *Preventing Chronic Disease*, 18, 210159. <https://doi.org/10.5888/PCD18.210159>.
- Imamoto, M., Takada, T., Sasaki, S., & Onishi, Y. (2024). Development of a Culinary Intervention (Cooking Class) for Salt Reduction in Japanese Home Cooking: Strategies and Assessment. *AJPM focus*, 3(3), 100227. <https://doi.org/10.1016/j.focus.2024.100227>.
- Information Commissioner's Office. (2022). *Guide to the General Data Protection Regulation (UK GDPR)*. <https://ico.org.uk/media/for-organisations/guide-to-data-protection/guide-to-the-general-data-protection-regulation-gdpr-1-1.pdf> (Accessed 22 January 2025)
- Jadad, A. R., Moore, R. A., Carroll, D., Jenkinson, C., Reynolds, D. J., Gavaghan, D. J., & McQuay, H. J. (1996). Assessing the quality of reports of randomized clinical trials: is blinding necessary?. *Controlled clinical trials*, 17(1), 1–12. [https://doi.org/10.1016/0197-2456\(95\)00134-4](https://doi.org/10.1016/0197-2456(95)00134-4).
- Janatabadi, F., Newing, A., & Ermagun, A. (2024). Social and spatial inequalities of contemporary food deserts: A compound of store and online access to food in the United Kingdom. *Applied Geography*, 163, 103184. <https://doi.org/10.1016/j.apgeog.2023.103184>.
- Jeon, Y. (2024). Deception and racism in the Tuskegee Syphilis Study. *International Journal of Information Sciences and Techniques*, 14(1-3), 1–5. <https://doi.org/10.5121/ijist.2024.14301>.

- Jeong, S., Hunter, S. D., Cook, M. D., Grosicki, G. J., & Robinson, A. T. (2023). Salty Subjects: Unpacking Racial Differences in Salt-Sensitive Hypertension. *Current hypertension reports*, 26(1), 43–58. <https://doi.org/10.1007/s11906-023-01275-z>.
- Jeong, S., Kim, J. Y., Cho, Y., Koh, S. B., Kim, N., & Choi, J. R. (2020). Genetically, Dietary Sodium Intake Is Causally Associated with Salt-Sensitive Hypertension Risk in a Community-Based Cohort Study: a Mendelian Randomization Approach. *Current hypertension reports*, 22(7), 45. <https://doi.org/10.1007/s11906-020-01050-4>.
- Ji, C., & Cappuccio, F. P. (2014). Socioeconomic inequality in salt intake in Britain 10 years after a national salt reduction programme. *BMJ open*, 4(8), e005683. <https://doi.org/10.1136/bmjopen-2014-005683>.
- Johnson, C., Praveen, D., Pope, A., Raj, T. S., Pillai, R. N., Land, M. A., & Neal, B. (2017). Mean population salt consumption in India: a systematic review. *Journal of hypertension*, 35(1), 3–9. <https://doi.org/10.1097/HJH.0000000000001141>.
- Johnson, D., Deterding, S., Kuhn, K. A., Staneva, A., Stoyanov, S., & Hides, L. (2016). Gamification for health and wellbeing: A systematic review of the literature. *Internet interventions*, 6, 89–106. <https://doi.org/10.1016/j.invent.2016.10.002>.
- Johnston, R., Poulsen, M., & Forrest, J. (2015). Ethnic residential patterns in urban England and Wales, 2001–2011: A system-wide analysis. *Tijdschrift voor Economische en Sociale Geografie*, 107(1), 1–15. <https://doi.org/10.1111/tesg.12128>.
- Jones, E., & Rayner, B. (2020). The importance of the epithelial sodium channel in determining salt sensitivity in people of African origin. *Pediatric nephrology (Berlin, Germany)*, 36(2), 237–243. <https://doi.org/10.1007/s00467-019-04427-z>.
- Joo, J. Y., & Liu, M. F. (2020). Culturally tailored interventions for ethnic minorities: A scoping review. *Nursing Open*, 8(5), 2078–2090. <https://doi.org/10.1002/nop2.733>.
- Joseph, R. P., Ainsworth, B. E., Hollingshead, K., Todd, M., & Keller, C. (2021). Results of a Culturally Tailored Smartphone-Delivered Physical Activity Intervention Among Midlife African American Women: Feasibility Trial. *JMIR mHealth and uHealth*, 9(4), e27383. <https://doi.org/10.2196/27383>.
- Kassim, P. S. J., Muhammad, N. A., Rahman, N. F. A., Sidik, S. M., Essau, C. A., & Shah, S. A. (2022). Digital behaviour change interventions to promote physical activity in overweight and obese adolescents: a systematic review protocol. *Systematic reviews*, 11(1), 188. <https://doi.org/10.1186/s13643-022-02060-w>.
- Kepper, M. M., Fowler, L. A., Kusters, I. S., Davis, J. W., Baqer, M., Sagui-Henson, S., Xiao, Y., Tarfa, A., Yi, J. C., Gibson, B., Heron, K. E., Alberts, N. M., Burgermaster, M., Njie-Carr, V. P., & Klesges, L. M. (2024). Expanding a behavioral view on digital health access: Drivers and strategies to promote equity. *Journal of Medical Internet Research*, 26, e51355. <https://doi.org/10.2196/51355>.
- Kerry, S. M., Emmett, L., Micah, F. B., Martin-Peprah, R., Antwi, S., Phillips, R. O., Plange-Rhule, J., Eastwood, J. B., & Cappuccio, F. P. (2005). Rural and semi-urban differences in salt intake, and its dietary sources, in Ashanti, West Africa. *Ethnicity & disease*, 15(1), 33–39.

- Khan, N., Keck, L., Sykes, C., Rowden, C., Simister, J., Fenlon, S., Mccallum, E., Bell, M., Whiting, D., Shelton, C., Wells, G., Giles, R., Howard, J., & Peckham, S. (2024). Diversity, community engagement and co-design in research: a rapid review. *BMJ leader*, leader-2024-001046. Advance online publication. <https://doi.org/10.1136/leader-2024-001046>.
- Khatri, R. B., & Assefa, Y. (2022). Access to health services among culturally and linguistically diverse populations in the Australian universal health care system: Issues and challenges. *BMC Public Health*, 22, 880. <https://doi.org/10.1186/s12889-022-13256-z>.
- Kim, K. K., & Backonja, U. (2024). Perspectives of community-based organizations on digital health equity interventions: A key informant interview study. *Journal of the American Medical Informatics Association*, 31(4), 929–939. <https://doi.org/10.1093/jamia/ocae020>.
- King, D., Greaves, F., Exeter, C., & Darzi, A. (2013). “Gamification”: Influencing health behaviours with games. *Journal of the Royal Society of Medicine*, 106(3), 76–78. <https://doi.org/10.1177/0141076813480996>.
- Klaic, M., Kapp, S., Hudson, P., Chapman, W., Denehy, L., Story, D., & Francis, J. J. (2022). Implementability of healthcare interventions: an overview of reviews and development of a conceptual framework. *Implementation science : IS*, 17(1), 10. <https://doi.org/10.1186/s13012-021-01171-7>.
- Krawczyk, H., Paterson, K. G., & Wee, H. (2013). On the security of the TLS protocol: A systematic analysis. In *Advances in Cryptology – CRYPTO 2013* (Lecture Notes in Computer Science, Vol. 8042, pp. 429–448). Springer. https://doi.org/10.1007/978-3-642-40041-4_24.
- Kreuter, M. W., Lukwago, S. N., Bucholtz, R. D. C., Clark, E. M., & Sanders-Thompson, V. (2003). Achieving cultural appropriateness in health promotion programs: Targeted and tailored approaches. *Health Education & Behavior*, 30(2), 133–146. <https://doi.org/10.1177/1090198102251021>.
- Kypridemos, C., Guzman-Castillo, M., Hyseni, L., Hickey, G. L., Bandosz, P., Buchan, I., Capewell, S., & O'Flaherty, M. (2017). Estimated reductions in cardiovascular and gastric cancer disease burden through salt policies in England: an IMPACTNCD microsimulation study. *BMJ open*, 7(1), e013791. <https://doi.org/10.1136/bmjopen-2016-013791>.
- Lakens, D. (2013). Calculating and reporting effect sizes to facilitate cumulative science: A practical primer for t-tests and ANOVAs. *Frontiers in Psychology*, 4, 863. <https://doi.org/10.3389/fpsyg.2013.00863>.
- Law, M. R., Frost, C. D., & Wald, N. J. (1991). By how much does dietary salt reduction lower blood pressure? III—Analysis of data from trials of salt reduction. *BMJ*, 302(6780), 819–824. <https://doi.org/10.1136/bmj.302.6780.819>.
- Lawrence, J. M., Devlin, E., Macaskill, S., Kelly, M., Chinouya, M., Raats, M. M., Barton, K. L., Wrieden, W. L., & Shepherd, R. (2007). Factors that affect the food choices made by girls and young women, from minority ethnic groups, living in the UK. *Journal of*

- human nutrition and dietetics : the official journal of the British Dietetic Association*, 20(4), 311–319. <https://doi.org/10.1111/j.1365-277X.2007.00766.x>.
- Li, K. C., Huang, L., Tian, M., Di Tanna, G. L., Yu, J., Zhang, X., Yin, X., Liu, Y., Hao, Z., Zhou, B., Feng, X., Li, Z., Zhang, J., Sun, J., Zhang, Y., Zhao, Y., Zhang, R., Yu, Y., Li, N., Yan, L. L., ... Si, L. (2022). Cost-Effectiveness of a Household Salt Substitution Intervention: Findings From 20 995 Participants of the Salt Substitute and Stroke Study. *Circulation*, 145(20), 1534–1541. <https://doi.org/10.1161/CIRCULATIONAHA.122.059573>.
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Sage.
- Lip, G. Y., Barnett, A. H., Bradbury, A., Cappuccio, F. P., Gill, P. S., Hughes, E., Imray, C., Jolly, K., & Patel, K. (2007). Ethnicity and cardiovascular disease prevention in the United Kingdom: a practical approach to management. *Journal of human hypertension*, 21(3), 183–211. <https://doi.org/10.1038/sj.jhh.1002126>.
- Liu, M., Xu, J., Li, Y., He, F. J., Zhang, P., Song, J., Gao, Y., Yan, S., Yan, W., Jin, D., Chang, X., Xu, Z., Bai, Y., Ji, N., Pan, N., & Wu, J. (2024). Long-Term Effects of a Comprehensive Intervention Strategy for Salt Reduction in China: Scale-Up of a Cluster Randomized Controlled Trial. *Nutrients*, 16(23), 4092. <https://doi.org/10.3390/nu16234092>.
- Liu, S., Dunford, S. D., Leung, Y. W., Brooks, D., Thomas, S. G., Eysenbach, G., & Nolan, R. P. (2013). Reducing blood pressure with Internet-based interventions: a meta-analysis. *The Canadian journal of cardiology*, 29(5), 613–621. <https://doi.org/10.1016/j.cjca.2013.02.007>.
- Livingstone, K. M., Love, P., Mathers, J. C., Kirkpatrick, S. I., & Olstad, D. L. (2023). Cultural adaptations and tailoring of public health nutrition interventions in Indigenous peoples and ethnic minority groups: Opportunities for personalised and precision nutrition. *Proceedings of the Nutrition Society*, 82(4), 478–486. <https://doi.org/10.1017/S002966512300304X>.
- Lumivero. (2024). NVivo (Version 14.23.3) [Computer software]. <https://lumivero.com/products/nvivo/>.
- Mair, J. L., Salamanca-Sanabria, A., Augsburg, M., Frese, B. F., Abend, S., Jakob, R., Kowatsch, T., & Haug, S. (2023). Effective Behavior Change Techniques in Digital Health Interventions for the Prevention or Management of Noncommunicable Diseases: An Umbrella Review. *Annals of behavioral medicine : a publication of the Society of Behavioral Medicine*, 57(10), 817–835. <https://doi.org/10.1093/abm/kaad041>.
- Makri, A. (2019). Bridging the digital divide in health care. *The Lancet Digital Health*, 1(5), e204–e205. [https://doi.org/10.1016/S2589-7500\(19\)30111-6](https://doi.org/10.1016/S2589-7500(19)30111-6).
- Malott, M. E., & Glenn, S. S. (2006). Targets of intervention in cultural and behavioral change. *Behavior and Social Issues*, 15(1), 31–57. <https://doi.org/10.5210/bsi.v15i1.344>.

- Mangai, M., de Vries, M. S., & de Kruijf, J. A. (2018). Case study-Co-production of secondary health services in Nigeria and Ghana. In T. Brandsen, B. Verschuere, & T. Steen (Eds.), *Co-Production and Co-Creation: Engaging Citizens in Public Services* (pp. 164–166). Routledge. <https://doi.org/10.4324/9781315204956-24>.
- Masango, M., & Khokhar, S. (2009). Domestic use of salt shows high salt consumption in Black Africans and Indian Asians associated with a very low awareness level of national salt guidelines. *Proceedings of the Nutrition Society*, 68(OCE3), E153. <https://doi.org/10.1017/S0029665110000078>.
- McIntosh, E., Horspool, M., Levesley, M., Logan, P., & Klonizakis, M. (2023). The co-design of an exercise-based, lifestyle intervention for people with venous leg ulcers: A self-care, expert-supported strategy for a chronic condition. *International Wound Journal*, 20(7), 2528–2539. <https://doi.org/10.1111/iwj.14117>.
- McManus, R. J., Little, P., Stuart, B., Morton, K., Raftery, J., Kelly, J., Bradbury, K., Zhang, J., Zhu, S., Murray, E., May, C. R., Mair, F. S., Michie, S., Smith, P., Band, R., Ogburn, E., Allen, J., Rice, C., Nuttall, J., Williams, B., ... HOME BP investigators (2021). Home and Online Management and Evaluation of Blood Pressure (HOME BP) using a digital intervention in poorly controlled hypertension: randomised controlled trial. *BMJ (Clinical research ed.)*, 372, m4858. <https://doi.org/10.1136/bmj.m4858>.
- Medhi, I., Ratan, A., & Toyama, K. (2009). Mobile-banking adoption and usage by low-literate, low-income users in the developing world. In N. Aykin (Ed.), *Internationalization, Design and Global Development* (Lecture Notes in Computer Science, Vol. 5623, pp. 485–494). Springer. https://doi.org/10.1007/978-3-642-02767-3_54.
- Microsoft Corporation. (2024). *Microsoft Teams* (Version 24010419130) [Web application]. <https://teams.microsoft.com>.
- Miller, A. S., Cafazzo, J. A., & Seto, E. (2016). A game plan: Gamification design principles in mHealth applications for chronic disease management. *Health Informatics Journal*, 22(2), 184–193. <https://doi.org/10.1177/1460458214537511>
- Millett, C., Laverty, A. A., Stylianou, N., Bibbins-Domingo, K., & Pape, U. J. (2012). Impacts of a national strategy to reduce population salt intake in England: Serial cross sectional study. *PLOS ONE*, 7(1), e29836. <https://doi.org/10.1371/journal.pone.0029836>.
- Miranda, J., Bernal, G., Lau, A., Kohn, L., Hwang, W.-C., & LaFromboise, T. (2005). State of the science on psychosocial interventions for ethnic minorities. *Annual Review of Clinical Psychology*, 1, 113–142. <https://doi.org/10.1146/annurev.clinpsy.1.102803.143822>.
- Mogre, V., Amoores, B. Y., & Gaa, P. K. (2023). A scoping review of nutrition education interventions to improve competencies, lifestyle and dietary habits of medical students and residents. *Journal of Nutritional Science*, 12, e31. <https://doi.org/10.1017/jns.2023.16>.
- Mohamed Ibrahim, O., Al Mazrouei, N., Elnour, A. A., Ibrahim, R., Abdel-Qader, D. H., Hamid, R. M. E. A., ... Alsulami, F. T. (2024). Randomized controlled trial parallel-group on optimizing community pharmacist's care for the elderly: The influence of

- WhatsApp-Email delivered clinical case scenarios. *PLOS ONE*, 19(10), e0308448. <https://doi.org/10.1371/journal.pone.0308448>.
- Moore, A. P., Rivas, C., Stanton-Fay, S., Harding, S., & Goff, L. M. (2019). Designing the Healthy Eating and Active Lifestyles for Diabetes (HEAL-D) self-management and support programme for UK African and Caribbean communities: A culturally tailored, complex intervention under-pinned by behaviour change theory. *BMC Public Health*, 19, 1146. <https://doi.org/10.1186/s12889-019-7411-z>.
- Moore, L. (2016). Partnering with faith-based organizations to enhance positive outcomes for home-bound seniors. *Journal of Community & Public Health Nursing*, 2(1), 110. <https://doi.org/10.4172/2471-9846.1000110>.
- Morales, S., Brashears, M. T., Boren-Alpizar, A., Meyers, C., & Oldewage-Theron, W. (2021). Gatekeepers of food and nutritional security projects in South Africa. *Journal of Agricultural Education and Extension*, 27(4), 463–480. <https://doi.org/10.1080/1389224X.2021.1873154>.
- Morgan, D. L. (2009). *Focus groups as qualitative research* (3rd ed.). Sage.
- Morgan, D. L. (2014). Pragmatism as a paradigm for social research. *Qualitative Inquiry*, 20(8), 1045–1053. <https://doi.org/10.1177/1077800413513733>.
- Mozaffarian, D., Fahimi, S., Singh, G. M., Micha, R., Khatibzadeh, S., Engell, R. E., Lim, S., Danaei, G., Powles, J., Ezzati, M., & Global Burden of Diseases Nutrition and Chronic Diseases Expert Group (NutriCoDE). (2014). Global sodium consumption and death from cardiovascular causes. *The New England Journal of Medicine*, 371(7), 624–634. <https://doi.org/10.1056/NEJMoa1304127>.
- Mumtaz, H., Riaz, M. H., Wajid, H., Saqib, M., Zeeshan, M. H., Khan, S. E., Chauhan, Y. R., Sohail, H., & Vohra, L. I. (2023). Current challenges and potential solutions to the use of digital health technologies in evidence generation: a narrative review. *Frontiers in digital health*, 5, 1203945. <https://doi.org/10.3389/fdgth.2023.1203945>.
- Murray, E., Hekler, E. B., Andersson, G., Collins, L. M., Doherty, A., Hollis, C., Rivera, D. E., West, R., & Wyatt, J. C. (2016). Evaluating digital health interventions: Key questions and approaches. *American Journal of Preventive Medicine*, 51(5), 843–851. <https://doi.org/10.1016/j.amepre.2016.06.008>.
- Muvuka, B., Combs, R. M., Ayangeakaa, S. D., Ali, N. M., Wendel, M. L., & Jackson, T. H. (2020). Health literacy in African American communities: Barriers and strategies. *HLRP: Health Literacy Research and Practice*, 4(3), e138–e151. <https://doi.org/10.3928/24748307-20200617-01>.
- Naderbagi, A., Loblay, V., Zahed, I. U. M., Ekambareshwar, M., Poulsen, A., Song, Y. J. C., Ospina-Pinillos, L., Krausz, M., Mamdouh Kamel, M., Hickie, I. B., & LaMonica, H. M. (2024). Cultural and Contextual Adaptation of Digital Health Interventions: Narrative Review. *Journal of medical Internet research*, 26, e55130. <https://doi.org/10.2196/55130>.

- Nam, S., Jung, S., Whittemore, R., Latkin, C., Kershaw, T., Redeker, N. S., Jeon, S., & Vlahov, D. (2019). Social network structures in African American churches: Implications for health promotion programmes. *Journal of Urban Health*, 96(2), 300–310. <https://doi.org/10.1007/s11524-018-00339-9>.
- Nazroo, J. Y. (2003). The structuring of ethnic inequalities in health: Economic position, racial discrimination, and racism. *American Journal of Public Health*, 93(2), 277–284. <https://doi.org/10.2105/AJPH.93.2.277>.
- Nazroo, J. Y., Bhui, K. S., & Rhodes, J. (2019). Where next for understanding race/ethnic inequalities in severe mental illness? Structural, interpersonal and institutional racism. *Sociology of Health & Illness*, 42(2), 262–276. <https://doi.org/10.1111/1467-9566.13001>.
- Nie, T., Huang, S., Yang, Y., Hu, A., Wang, J., Cheng, Z., & Liu, W. (2024). A review of the world's salt reduction policies and strategies – preparing for the upcoming year 2025. *Food & Function*, 15(6), 2836–2859. <https://doi.org/10.1039/D3FO03352J>.
- Nilson, E. A. F., da Silva, E. N., & Jaime, P. C. (2020). Developing and applying a costing tool for hypertension and related cardiovascular disease: Attributable costs to salt/sodium consumption. *The Journal of Clinical Hypertension*, 22(4), 642–648. <https://doi.org/10.1111/jch.13836>.
- Nittas, V., Daniore, P., Chavez, S. J., & Wray, T. B. (2024). Challenges in implementing cultural adaptations of digital health interventions. *Communications Medicine*, 4, Article 7. <https://doi.org/10.1038/s43856-023-00426-2>.
- Noorbergen, T. J., Adam, M. T. P., Teubner, T., & Collins, C. E. (2021). Using co-design in mobile health system development: A qualitative study with experts in co-design and mobile health system development. *JMIR mHealth and uHealth*, 9(11), e27896. <https://doi.org/10.2196/27896>.
- Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods*, 16, 1609406917733847. <https://doi.org/10.1177/1609406917733847>.
- Nutbeam, D. (2023). Improving health literacy: How to succeed. *Public Health Research & Practice*, 33(1), e3312301. <https://doi.org/10.17061/phrp3312301>.
- O’Cathain, A., Murphy, E., & Nicholl, J. (2010). Three techniques for integrating data in mixed methods studies. *BMJ*, 341, c4587. <https://doi.org/10.1136/bmj.c4587>.
- Ocloo, J., & Matthews, R. (2016). From tokenism to empowerment: Progressing patient and public involvement in healthcare improvement. *BMJ Quality & Safety*, 25(8), 626–632. <https://doi.org/10.1136/bmjqs-2015-004839>.
- Odeh, A., Abdelfattah, E., & Salameh, W. (2024). Privacy-preserving data sharing in telehealth services. *Applied Sciences*, 14(23), 10808. <https://doi.org/10.3390/app142310808>.
- Office for National Statistics. (2020). *Internet use: Ethnicity facts and figures*. GOV.UK. <https://www.ethnicity-facts-figures.service.gov.uk/culture-and-community/digital/internet-use/latest/> (Accessed 4 January 2025).

- Office for National Statistics. (2021). *Population estimates*.
<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates> (Accessed 2 January 2025).
- Oh, S.-R., Seo, Y.-D., Lee, E., & Kim, Y.-G. (2021). A comprehensive survey on security and privacy for electronic health data. *International Journal of Environmental Research and Public Health*, 18(18), 9668. <https://doi.org/10.3390/ijerph18189668>.
- Olamide, O. (2024). Household food and nutrition security in Nigeria. *Journal of Medical Case Studies*, 2(1), 1–9. <https://doi.org/10.23880/jmcs-16000124>.
- Olatunji, I. E., Rauch, J., Katzensteiner, M., & Khosla, M. (2024). A Review of Anonymization for Healthcare Data. *Big data*, 12(6), 538–555.
<https://doi.org/10.1089/big.2021.0169>.
- Oliveira, W., Hamari, J., Shi, L., Toda, A. M., Rodrigues, L., Palomino, P. T., & Isotani, S. (2023). Tailored gamification in education: A literature review and future agenda. *Education and Information Technologies*, 28, 373–406. <https://doi.org/10.1007/s10639-022-11122-4>.
- Olmos-Vega, F. M., Martínez García, A., & Malgosa Martí, S. M. (2023). A practical guide to reflexivity in qualitative research: AMEE Guide No. 149. *Medical Teacher*, 45(3), 241–251. <https://doi.org/10.1080/0142159X.2022.2057287>.
- Olson, J. L., Palumbo, A., Desjardins, C., Wicks, C., Bhopa, S., Cheyne, K., D'Silva, A., Graff, L. A., Narula, N., Rodrigues, D. M., Fernandes, A., Marshall, D. A., Moayyedi, P., & Presseau, J. (2024). Perspectives on the sustained engagement with digital health tools: protocol for a qualitative interview study among people living with Inflammatory Bowel Disease or irritable bowel syndrome. *BMJ open*, 14(11), e089220. <https://doi.org/10.1136/bmjopen-2024-089220>.
- Orte, S., Migliorelli, C., Sistach-Bosch, L., Gómez-Martínez, M., & Boqué, N. (2023). A Tailored and Engaging mHealth Gamified Framework for Nutritional Behaviour Change. *Nutrients*, 15(8), 1950. <https://doi.org/10.3390/nu15081950>.
- Owens, J., & Cribb, A. (2013). Beyond choice and individualism: Understanding autonomy for public health ethics. *Public Health Ethics*, 6(3), 262–271.
<https://doi.org/10.1093/phe/pht038>.
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., McGuinness, L. A., ... Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *PLoS medicine*, 18(3), e1003583.
<https://doi.org/10.1371/journal.pmed.1003583>.
- Pagoto, S. L., Schneider, K. L., Oleski, J. L., Luciani, J. M., Bodenlos, J. S., & Whited, M. C. (2012). Male inclusion in randomized controlled trials of lifestyle weight loss interventions. *Obesity (Silver Spring, Md.)*, 20(6), 1234–1239.
<https://doi.org/10.1038/oby.2011.140>.

- Partarakis, N., Kaplanidi, D., Doulgeraki, P., Karuzaki, E., Petraki, A., Metilli, D., Bartalesi, V., Adami, I., Meghini, C., & Zabulis, X. (2021). Representation and presentation of culinary tradition as cultural heritage. *Heritage*, 4(2), 612–640. <https://doi.org/10.3390/heritage4020036>.
- Pastorino, A. J., Hansen, C. L., & McMahon, D. J. (2003). Effect of salt on structure–function relationships of cheese. *Journal of Dairy Science*, 86(1), 60–69. [https://doi.org/10.3168/jds.S0022-0302\(03\)73584-X](https://doi.org/10.3168/jds.S0022-0302(03)73584-X).
- Payne Riches, S., Piernas, C., Aveyard, P., Sheppard, J. P., Rayner, M., Albury, C., & Jebb, S. A. (2021). A mobile health salt reduction intervention for people with hypertension: Results of a feasibility randomised controlled trial. *JMIR mHealth and uHealth*, 9(10), e26233. <https://doi.org/10.2196/26233>.
- Ruiz, A. M. P., Lima, M. G., Medina, L. P. B., Pinto, R. L., Barros, M. B. A., & Filho, A. A. B. (2020). Can Meals Outside Homes Impact Sodium Intake?. *Current developments in nutrition*, 4(6), nzaa091. <https://doi.org/10.1093/cdn/nzaa091>.
- Plano Clark, V. L., & Ivankova, N. V. (2016). *Mixed methods research: A guide to the field*. SAGE.
- Prescott, C. (2019). *Internet users, UK: 2019*. Office for National Statistics. <https://www.ons.gov.uk/businessindustryandtrade/itandinternetindustry/bulletins/internetusers/2019> (Accessed 22 January 2025).
- Public Health England. (2020). *Salt reduction targets for 2024*. https://assets.publishing.service.gov.uk/media/5f5618c8d3bf7f4d75de6ff1/2024_salt_reduction_targets_070920-FINAL-1.pdf (Accessed 16 January 2023).
- Raut, S., Kc, D., Singh, D. R., Dhungana, R. R., Pradhan, P. M. S., & Sunuwar, D. R. (2024). Effect of nutrition education intervention on nutrition knowledge, attitude, and diet quality among school-going adolescents: a quasi-experimental study. *BMC nutrition*, 10(1), 35. <https://doi.org/10.1186/s40795-024-00850-0>.
- Raza, M. M., Venkatesh, K. P., & Kvedar, J. C. (2023). Promoting racial equity in digital health: Applying a cross-disciplinary equity framework. *NPJ Digital Medicine*, 6, Article 3. <https://doi.org/10.1038/s41746-023-00747-5>.
- Reicks, M., Gold, A., Tran, N., & LeBlanc, K. (2022). Impacts of A Taste of African Heritage: A Culinary Heritage Cooking Course. *Journal of nutrition education and behavior*, 54(5), 388–396. <https://doi.org/10.1016/j.jneb.2021.11.008>.
- Reverby, S. M. (2022). The Tuskegee Syphilis Study. In *Oxford Research Encyclopedia of American History*. <https://doi.org/10.1093/acrefore/9780199329175.013.1032>.
- Rosewarne, E., Chislett, W. K., McKenzie, B., Reimers, J., Jolly, K. A., Corben, K., Trieu, K., & Webster, J. (2021). Stakeholder perspectives on the effectiveness of the Victorian Salt Reduction Partnership: a qualitative study. *BMC nutrition*, 7(1), 12. <https://doi.org/10.1186/s40795-021-00414-6>.
- Sadler, G. R., Lee, H. C., Lim, R. S., & Fullerton, J. (2010). Recruitment of hard-to-reach population subgroups via adaptations of the snowball sampling strategy. *Nursing & health sciences*, 12(3), 369–374. <https://doi.org/10.1111/j.1442-2018.2010.00541.x>.

- Sanders, E. B.-N., & Stappers, P. J. (2014). Probes, toolkits and prototypes: Three approaches to making in codesigning. *CoDesign*, 10(1), 5–14. <https://doi.org/10.1080/15710882.2014.888183>.
- Santos, J. A., Tekle, D., Rosewarne, E., Flexner, N., Cobb, L., Al-Jawaldeh, A., Kim, W. J., Breda, J., Whiting, S., Campbell, N., Neal, B., Webster, J., & Trieu, K. (2021). A Systematic Review of Salt Reduction Initiatives Around the World: A Midterm Evaluation of Progress Towards the 2025 Global Non-Communicable Diseases Salt Reduction Target. *Advances in nutrition (Bethesda, Md.)*, 12(5), 1768–1780. <https://doi.org/10.1093/advances/nmab008>.
- Satia-Abouta, J., Patterson, R. E., Neuhouser, M. L., & Elder, J. (2002). Dietary acculturation: applications to nutrition research and dietetics. *Journal of the American Dietetic Association*, 102(8), 1105–1118. [https://doi.org/10.1016/s0002-8223\(02\)90247-6](https://doi.org/10.1016/s0002-8223(02)90247-6).
- Saxton, J. M., Pickering, K., Wane, S., Humphreys, H., Crank, H., Anderson, A. S., Cain, H., Cohen, J., Copeland, R. J., Gray, J., Hargreaves, J., McNally, R. J. Q., & Wilson, C. (2022). Co-designed weight management intervention for women recovering from oestrogen-receptor positive breast cancer. *BMC cancer*, 22(1), 1202. <https://doi.org/10.1186/s12885-022-10287-y>.
- Schomakers, E. M., Lidynia, C., Vervier, L. S., Calero Valdez, A., & Ziefle, M. (2022). Applying an Extended UTAUT2 Model to Explain User Acceptance of Lifestyle and Therapy Mobile Health Apps: Survey Study. *JMIR mHealth and uHealth*, 10(1), e27095. <https://doi.org/10.2196/27095>.
- Sediva, H., Cartwright, T., Robertson, C., & Deb, S. K. (2022). Behavior Change Techniques in Digital Health Interventions for Midlife Women: Systematic Review. *JMIR mHealth and uHealth*, 10(11), e37234. <https://doi.org/10.2196/37234>.
- Seid, A., Fufa, D. D., & Bitew, Z. W. (2024). The use of internet-based smartphone apps consistently improved consumers' healthy eating behaviors: a systematic review of randomized controlled trials. *Frontiers in digital health*, 6, 1282570. <https://doi.org/10.3389/fdgth.2024.1282570>.
- Senga, J., Moidu, N., Parvez, M., Bui, T., & Banerjee, A. (2023). Community-led initiatives bridging the gap to provide linguistically and culturally tailored health and social services in Parc-Extension, Montréal. *University of Toronto Journal of Public Health*, 4(1), Article 40617. <https://doi.org/10.33137/utjph.v4i1.40617>.
- Shah, S. D. (2024). From innovation to inclusion—Tackling digital equity needs in health care. *JAMA Network Open*, 7(11), e245334. <https://doi.org/10.1001/jamanetworkopen.2024.45334>.
- Shankar, B., Brambila-Macias, J., Traill, B., Mazzocchi, M., & Capacci, S. (2013). An evaluation of the UK Food Standards Agency's salt campaign. *Health economics*, 22(2), 243–250. <https://doi.org/10.1002/hec.2772>.
- Shapiro, S. S., & Wilk, M. B. (1965). An analysis of variance test for normality (complete samples). *Biometrika*, 52(3-4), 591–611. <https://doi.org/10.2307/2333709>.

- Singer, B., Walsh, C. M., Gondwe, L., Reynolds, K., Lawrence, E., & Kasiya, A. (2023). WhatsApp as a medium to collect qualitative data among adolescents: Lessons learned and considerations for future use [Version 2]. *Gates Open Research*, 4, 130. <https://doi.org/10.12688/gatesopenres.13169.2>.
- Singh, R. I., Sumeeth, M., & Miller, J. (2013). A user-centric evaluation of the readability of privacy policies in popular web sites. *Information Systems Frontiers*, 15(3), 501–514. <https://doi.org/10.1007/s10796-010-9228-2>.
- Skivington, K., Matthews, L., Simpson, S. A., Craig, P., Baird, J., Blazeby, J. M., Boyd, K. A., Craig, N., French, D. P., McIntosh, E., Petticrew, M., Rycroft-Malone, J., White, M., & Moore, L. (2021). A new framework for developing and evaluating complex interventions: update of Medical Research Council guidance. *BMJ (Clinical research ed.)*, 374, n2061. <https://doi.org/10.1136/bmj.n2061>.
- Song, J., Tan, M., Wang, C., Brown, M. K., Pombo-Rodrigues, S., MacGregor, G. A., & He, F. J. (2023). Salt intake, blood pressure and cardiovascular disease mortality in England, 2003-2018. *Journal of hypertension*, 41(11), 1713–1720. <https://doi.org/10.1097/HJH.0000000000003521>.
- Sonuch, P., Aekplakorn, W., Pomsanthia, N., Boonyagarn, N., Makkawan, S., Thongchai, S., Tosamran, W., Kunjang, A., & Kantachuesiri, S. (2024). Community-based intervention for monitoring of salt intake in hypertensive patients: A cluster randomized controlled trial. *PloS one*, 19(11), e0311908. <https://doi.org/10.1371/journal.pone.0311908>.
- Stilson, B. (2019). A failure to care: Colonial power and healthcare in Africa, 1850–1939. *The Undergraduate Historical Journal at UC Merced*, 6(1), 46–57. <https://doi.org/10.5070/H361046187>.
- Sullivan, G. M., & Feinn, R. (2012). Using effect size—or why the P value is not enough. *Journal of Graduate Medical Education*, 4(3), 279–282. <https://doi.org/10.4300/JGME-D-12-00156.1>.
- Svetkey, L. P., McKeown, S. P., & Wilson, A. F. (1996). Heritability of salt sensitivity in Black Americans. *Hypertension*, 28(5), 854–858. <https://doi.org/10.1161/01.HYP.28.5.854>.
- Swargiary, K. (2024). An application of the UTAUT2 model [Preprint]. *OSF Preprints*. <https://doi.org/10.20944/preprints202405.0210.v2>.
- Swift, P. A., & MacGregor, G. A. (2004). Genetic variation in the epithelial sodium channel: A risk factor for hypertension in people of African origin. *Advances in Renal Replacement Therapy*, 11(1), 76–86. <https://doi.org/10.1053/j.arrt.2003.10.011>.
- Taber, K. S. (2017). The use of Cronbach’s alpha when developing and reporting research instruments in science education. *Research in Science Education*, 48(6), 1273–1296. <https://doi.org/10.1007/s11165-016-9602-2>.
- Tashakkori, A., & Teddlie, C. (Eds.). (2010). *SAGE handbook of mixed methods in social & behavioral research* (2nd ed.). SAGE.
- Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach’s alpha. *International Journal of Medical Education*, 2, 53–55. <https://doi.org/10.5116/ijme.4dfb.8dfd>

- Taylor, R. S., Ashton, K. E., Moxham, T., Hooper, L., & Ebrahim, S. (2011). Reduced dietary salt for the prevention of cardiovascular disease: a meta-analysis of randomized controlled trials (Cochrane review). *American journal of hypertension*, 24(8), 843–853. <https://doi.org/10.1038/ajh.2011.115>.
- Terry, R. F., & Lieungh, E. (2020). Democratizing health research. *Open Science Talk*, 25, e5308. <https://doi.org/10.7557/19.5308>.
- Thesen, T., Bahner, I., Belovich, A. N., Bonaminio, G., Brenneman, A., Brooks, W. S., Chinn, C., El-Sawi, N., Habal, S., Haight, M., Haudek, S. B., Ikonne, U., McAuley, R. J., McKell, D., Rowe, R., & Taylor, T. A. H. (2023). Not Just Fun and Games: Game-Based Learning in Health Professions Education. *Medical science educator*, 33(5), 1301–1306. <https://doi.org/10.1007/s40670-023-01859-z>.
- Tiwari, C. S., & Jha, V. K. (2024). An efficient signed SSL/TLS-based data security in the cloud using LTT-DDBM and TECC. *International Journal of Information Technology*, 16(2), 345–356. <https://doi.org/10.1007/s41870-024-02325-8>.
- Triberti, S., & Brivio, E. (2019). User centred design approaches and methods for P5 eHealth. In S. Triberti & E. Brivio (Eds.), *P5 eHealth: An agenda for the health technologies of the future* (pp. 155–171). Springer. https://doi.org/10.1007/978-3-030-27994-3_9.
- Trieu, K., Neal, B., Hawkes, C., Dunford, E., Campbell, N., Rodriguez-Fernandez, R., Legetic, B., McLaren, L., Barberio, A., & Webster, J. (2015). Salt reduction initiatives around the world: A systematic review of progress towards the global target. *PLOS ONE*, 10(7), e0130247. <https://doi.org/10.1371/journal.pone.0130247>.
- Truong, M., Paradies, Y., & Priest, N. (2014). Interventions to improve cultural competency in healthcare: A systematic review of reviews. *BMC Health Services Research*, 14, 99. <https://doi.org/10.1186/1472-6963-14-99>.
- Tsetsi, E., & Rains, S. A. (2017). Smartphone internet access and use: Extending the digital divide and usage gap. *Mobile Media & Communication*, 5(3), 239–255. <https://doi.org/10.1177/2050157917708329>.
- Udoewa, V. (2022). An introduction to radical participatory design: Decolonising participatory design processes. *Design Science*, 8, e24. <https://doi.org/10.1017/dsj.2022.24>.
- Usman, J. E., Childs, C., Rogerson, D., & Klonizakis, M. (2022). A Systematic Review of Internet-Based Interventions for the Prevention and Self-Management of Cardiovascular Diseases among People of African Descent. *International journal of environmental research and public health*, 19(14), 8872. <https://doi.org/10.3390/ijerph19148872>.
- Usman, J. E., Childs, C., Rogerson, D., & Klonizakis, M. (2024). Online Health Information-Seeking Behaviour among People of African Descent in the United Kingdom: A Qualitative Study. *Healthcare (Basel, Switzerland)*, 12(9), 897. <https://doi.org/10.3390/healthcare12090897>.

- Usman, J. E., Morley, A., Childs, C., Rogerson, D., & Klonizakis, M. (2024). Exploring Dietary Salt Knowledge, Attitude, and Practices among People of African Descent in the United Kingdom: A Qualitative Study. *Healthcare (Basel, Switzerland)*, 12(19), 1969. <https://doi.org/10.3390/healthcare12191969>.
- Uvhagen, H., Hasson, H., Hansson, J., & von Knorring, M. (2018). Leading top-down implementation processes: a qualitative study on the role of managers. *BMC health services research*, 18(1), 562. <https://doi.org/10.1186/s12913-018-3360-y>.
- van Dijk, J. (2020). *The network society* (4th ed.). SAGE.
- Van Velthoven, M. H., Smith, J., Wells, G., & Brindley, D. (2018). Digital health app development standards: a systematic review protocol. *BMJ open*, 8(8), e022969. <https://doi.org/10.1136/bmjopen-2018-022969>.
- Vargas, C., Whelan, J., Brimblecombe, J., & Allender, S. (2022). Co-creation, co-design, co-production for public health - a perspective on definition and distinctions. *Public health research & practice*, 32(2), 3222211. <https://doi.org/10.17061/phrp3222211>.
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3), 425–478. <https://doi.org/10.2307/30036540>
- Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS Quarterly*, 36(1), 157–178. <https://doi.org/10.2307/41410412>.
- Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Unified theory of acceptance and use of technology-Revised [Dataset]. APA *PsycTESTS*. <https://doi.org/10.1037/t57179-000>.
- Vilar-Compte, M., Burrola-Méndez, S., Lozano-Marrufo, A., Ferré-Eguiluz, I., Flores, D., Gaitán-Rossi, P., Teruel, G., & Pérez-Escamilla, R. (2021). Urban poverty and nutrition challenges associated with accessibility to a healthy diet: a global systematic literature review. *International journal for equity in health*, 20(1), 40. <https://doi.org/10.1186/s12939-020-01330-0>.
- Vincze, L., Barnes, K., Somerville, M., Littlewood, R., Atkins, H., Rogany, A., & Williams, L. T. (2021). Cultural adaptation of health interventions including a nutrition component in Indigenous peoples: a systematic scoping review. *International journal for equity in health*, 20(1), 125. <https://doi.org/10.1186/s12939-021-01462-x>.
- Wadi, N. M., Asantewa-Ampaduh, S., Rivas, C., & Goff, L. M. (2022). Culturally tailored lifestyle interventions for the prevention and management of type 2 diabetes in adults of Black African ancestry: a systematic review of tailoring methods and their effectiveness. *Public health nutrition*, 25(2), 422–436. <https://doi.org/10.1017/S1368980021003682>.
- Wallace, S., Nazroo, J., & Bécaries, L. (2016). Cumulative effect of racial discrimination on the mental health of ethnic minorities in the United Kingdom. *American Journal of Public Health*, 106(7), 1294–1300. <https://doi.org/10.2105/AJPH.2016.303121>.

- Wang, L., & Liu, C. (2021). Lost in mobile? Exploring the mobile internet digital divide among Chinese college students. *International Journal of Educational Technology in Higher Education*, 18, Article 27. <https://doi.org/10.1186/s41239-021-00267-w>.
- Webb, T. L., Joseph, J., Yardley, L., & Michie, S. (2010). Using the internet to promote health behavior change: a systematic review and meta-analysis of the impact of theoretical basis, use of behavior change techniques, and mode of delivery on efficacy. *Journal of medical Internet research*, 12(1), e4. <https://doi.org/10.2196/jmir.1376>.
- Welsh, C. E., Welsh, P., Jhund, P., Delles, C., Celis-Morales, C., Lewsey, J. D., Gray, S., Lyall, D., Iliodromiti, S., Gill, J. M. R., Sattar, N., & Mark, P. B. (2019). Urinary Sodium Excretion, Blood Pressure, and Risk of Future Cardiovascular Disease and Mortality in Subjects Without Prior Cardiovascular Disease. *Hypertension (Dallas, Tex. : 1979)*, 73(6), 1202–1209. <https://doi.org/10.1161/HYPERTENSIONAHA.119.12726>.
- Widjaja, A. M. N., Sanjaya, M. H., Fitriati, R., Fitriana, F. W., & Keloko, A. B. (2024). Digital health technologies in improving access to care for underserved populations. *The Journal of Academic Science*, 1(6), 738–747. <https://doi.org/10.59613/azka9r10>.
- Wilson, D. K., Sica, D. A., & Miller, S. B. (1999). Effects of potassium on blood pressure in salt-sensitive and salt-resistant Black adolescents. *Hypertension*, 34(2), 181–186. <https://doi.org/10.1161/01.HYP.34.2.181>.
- Wilson, J., Heinsch, M., Betts, D., Booth, D., & Kay-Lambkin, F. (2021). Barriers and facilitators to the use of e-health by older adults: A scoping review. *BMC Public Health*, 21, 1556. <https://doi.org/10.1186/s12889-021-11623-w>.
- Wiltshire, J., Sampson, C., Elder, K., & Musey, P. (2022). Affordability, perceived racism, and healthcare system distrust among African American women aged 45 and over. *Innovation in Aging*, 6(Suppl. 1), 794–795. <https://doi.org/10.1093/geroni/igac059.2868>.
- World Health Organization. (2021). *Implementing policies to restrict food marketing: A review of contextual factors*. <https://www.who.int/publications/i/item/9789240035041> (Accessed 19 January 2025).
- World Health Organization. (2025). *Sodium reduction* (Fact sheet). <https://www.who.int/news-room/fact-sheets/detail/sodium-reduction> (Accessed 22 February 2025).
- Wyness, L. A., Buttriss, J. L., & Stanner, S. A. (2011). Reducing the population's sodium intake: The UK Food Standards Agency's salt reduction programme. *Public Health Nutrition*, 15(2), 254–261. <https://doi.org/10.1017/S1368980011000966>.
- Wynn, D. C., & Maier, A. M. (2022). Feedback systems in the design and development process. *Research in Engineering Design*, 33(3), 273–306. <https://doi.org/10.1007/s00163-022-00386-z>.
- Yu, C.-W., Chao, C.-M., Chang, C.-F., Chen, R.-J., Chen, P.-C., & Liu, Y.-X. (2021). Exploring behavioural intention to use a mobile health education website: An extension of the

UTAUT 2 model. *SAGE Open*, 11(4), Article 21582440211055721.
<https://doi.org/10.1177/21582440211055721>.

Yuan, Y., Jin, A., Duan, P., Cao, L., Wang, H., Hu, S., Li, J., Feng, X., Qiao, Q., Zhang, H., Zhang, R., Li, H., Gao, P., Xie, G., Yuan, J., Cheng, L., Wang, S., Niu, W., Elliott, P., ... Wu, Y. (2023). Experience with 2 years' intervention to progressively reduce salt supply to kitchens in elderly care facilities—challenges and further research: Post hoc analysis of the DECIDE-Salt randomized clinical trial. *BMC Medicine*, 21, 416.
<https://doi.org/10.1186/s12916-023-03130-z>.

Yvonne Feilzer, M. (2010). Doing mixed methods research pragmatically: Implications for the rediscovery of pragmatism as a research paradigm. *Journal of Mixed Methods Research*, 4(1), 6–16. <https://doi.org/10.1177/1558689809349691>.

Zheng, X., Yang, Z., Liu, S., Li, Y., & Wang, A. (2024). Digital symptom management interventions for people with chronic kidney disease: A scoping review based on the UK Medical Research Council Framework. *BMC Public Health*, 24, Article 3534.
<https://doi.org/10.1186/s12889-024-20871-5>.

Zhou, E. S., Revette, A., Ritterband, L. M., Bethea, T. N., Delp, L., Simmons, P. D., & Rosenberg, L. (2023). Developing a culturally tailored digital health intervention for insomnia in Black women. *Translational Behavioral Medicine*, 14(2), 117–126.
<https://doi.org/10.1093/tbm/ibad056>.

APPENDICES

Appendix A: Study Types, Key Findings, Population, Methods, and Implications.

Study & Study Design	Population	Methods	Key Findings	Implications
Alzghoul (2024). A Systematic Review with Meta-Analysis	A diverse group consisting of both adults and children facing health and behavioural challenges.	Systematic review of 30 RCTs conducted between 2012 and 2023.	Gamification has shown beneficial effects on health-related behaviour changes, leading to notable improvements in physical activity, adherence to medications, and dietary habits. Some results revealed varying outcomes, which were influenced by the design of the gamification and the motivational elements adopted.	Gamification represents a promising approach for improving health-related behaviours. Tailored designs and long-term studies are required to validate its effectiveness and refine the strategies.
Collins et al. (2014). A Policy Modelling Study	General UK population	Simulation of cost-effectiveness for various salt reduction efforts.	Organised efforts to reduce salt intake can prevent a considerable	The study shows the public health and economic rationale for

			burden of CVDs and lead to cost savings in healthcare. The study emphasises the financial benefits of reducing sodium intake on a nationwide level.	reducing salt intake. Proposes that more tailored strategies can improve national initiatives for populations such as PoAD.
Earland, Campbell, & Srivastava, (2010).	39 African-Caribbean older adults in Staffordshire, UK	Utilised food frequency questionnaires and demographic/dietary recalls	Cultural dietary habits were found to affect the health status of adults of African-Caribbean descent in the UK.	The study highlights the importance of culturally sensitive efforts that specifically target the dietary practices of PoAD.
A Cross-sectional Survey				
Ewrierhoma et al. (2019).	44 women of Black African-Caribbean descent in the UK, ages 19-64.	Utilised cardiovascular risk assessments, 24-hour recalls, and anthropometric measures	Nutritional patterns among women of Black African-Caribbean descent contribute to an increased risk of CVDs.	Emphasises the need for culturally tailored dietary initiatives in this demographic, despite favourable blood pressure and lipid profiles.
A Cross-sectional Study				
Gillespie et al. (2015).	General UK population	Health equity modelling to analyse potential outcomes of salt reduction efforts.	Showed that salt reduction policies contributed to better cardiovascular outcomes	Highlights that policy-level successes do not automatically ensure
A Policy Forecast/Simulation.				

			overall and might reduce health inequalities, although minority ethnic groups might still need more tailored interventions.	equity. A focused intervention could help fill gaps in minority engagement.
Goff et al. (2014). An Observational Cross-sectional Study.	133 Black Caribbean & Black West African adults in London	Evaluation of dietary intake involved 24-hour recalls and analyses of nutrient composition.	Dietary acculturation was evident, indicating that a longer stay in the UK was associated with increased consumption of foods high in energy, fat, and sodium. Traditional foods made up approximately 39% of the energy intake for participants from the Caribbean and around 47% for those from West Africa. There was a notable increase in sodium intake with longer residency in the UK.	Emphasises the impact of dietary acculturation on increasing the risk of chronic diseases, such as hypertension, among PoAD. The study highlights the importance of culturally tailored interventions to address sodium intake from both traditional foods and acculturated dietary habits.
He, Brinsden & MacGregor (2013).	General UK population	A comprehensive assessment of the UK salt reduction program, including food	From 2003 to 2011, the UK salt reduction strategy reduced mean	The salt reduction model in the UK shows that a

An Evaluation of Public Health Intervention.		content monitoring and 24-hour urinary sodium analysis.	salt intake by 15% (9.5 g/day to 8.1 g/day). The stroke mortality decreased by 42%, and ischemic heart disease (IHD) mortality by 40%. A population-level reduction in blood pressure was also observed.	national salt reduction program can significantly enhance public health outcomes and provides a cost-effective framework for other countries to follow.
He, Pombo-Rodrigues & MacGregor (2014). An Analysis of the Data from the Health Survey for England.	Adults in England, aged ≥16 years	An examination of data from the Health Survey for England (2003-2011) and 24-hour urinary sodium surveys to assess the impact of salt reduction on BP, stroke, and IHD mortality.	Salt intake decreased by 15% (1.4 g/day), resulting in a blood pressure drop of 3/1.4 mmHg between 2003 and 2011. Also, mortality rates from stroke and ischemic heart disease were reduced by 42% and 40%, respectively.	The reduction of salt intake played a major role in lowering blood pressure and CVD mortality, supporting efforts for widespread dietary sodium reduction initiatives.
Hilton et al. (2023). A Qualitative Study.	42 stakeholders from commercial, advocacy, and policy sectors in the UK	Semi-structured interviews were conducted via Microsoft Teams to explore perspectives of the stakeholders on the UK 2020 obesity strategy, focusing on restrictions related to high fat,	The stakeholders had mixed opinions on the UK's 2020 obesity strategy. While there was general support for restrictions on the marketing of	This study emphasizes the need for comprehensive, multi-sector approaches to addressing obesity by combining HFSS marketing

		sugar, and/or salt (HFSS) marketing.	HFSS foods, some raised concerns about the implementation of these measures, as well as the broader factors that contribute to obesity, including inequality and the food system.	restrictions with policies that address affordability, systemic inequality, and public health education.
Johnson et al., (2016). A Systematic Review of Gamified Interventions for Health and Wellbeing.	Empirical studies (n =19) exploring gamified approaches for health and wellbeing.	A systematic literature review evaluating the impact of gamification in health interventions, focusing on results such as behavioural changes, cognitive effects, and user experiences.	Overall, 59% of studies showed positive outcomes, particularly in health-related behaviour change such as increased physical activity and reduced medication misuse. However, 41% of studies reported mixed or neutral results, particularly in cognitive outcomes such as motivation and user engagement. Gamification elements, such as rewards (points, badges) and leaderboards, were the most	Gamification has the potential to improve health behaviours, particularly when designed with accessible technologies such as mobile apps. However, mixed results in user experiences and cognitive outcomes indicate the need for careful design, avoiding overreliance on extrinsic motivators.

			frequently used features, and they showed the strongest evidence for promoting positive behavioural changes.	
King et al. (2013). A Conceptual/Analytical Paper	General population	Explored gamification strategies and examples in health initiatives. It also reviewed the impact of gamification elements such as points, badges, and leaderboards on health behaviours.	Highlighted the potential of gamification to enhance health behaviours through the incorporation of game elements into various interventions.	It demonstrates how gamification can positively shape health behaviours. It emphasises the importance of collaboration between developers and healthcare professionals in designing engaging and effective interventions tailored to the needs of users.
Kypridemos et al. (2017). A Microsimulation Study.	A synthetic population that mirrors the non-institutionalised population of England. The population was stratified based on age,	Employed the IMPACTNCD dynamic microsimulation model to evaluate the effects of existing (2003-2015) and future (2016-2030) salt reduction measures on	The existing salt reduction strategies led to a decrease of 52,000 CVD cases and 10,000 mortalities between 2003 and 2015. Implementing further	This study demonstrates the effectiveness of salt reduction policies in reducing the disease burden. It highlights the importance

	gender, and socioeconomic status.	CVDs and gastric cancer (GCa).	structural measures from 2016 could avert an additional 19,000 CVD cases and 3,600 deaths by the year 2030.	of structural changes to ensure fair health benefits and further diminish the disease burden.
Lawrence et al. (2007). A Qualitative Study.	33 young women (12-35 years) from minority ethnic groups in the UK (Somali, Zimbabwean, South Asian).	Focus group discussions were conducted in various regions across the UK to explore the factors influencing food choices. The topics discussed included attitudes, beliefs, availability, cultural influences, and intervention ideas.	It was found that dietary selections were shaped by factors such as time, expense, accessibility, and cultural traditions. Fast food was frequently chosen for its convenience. Respondents expressed a desire for culturally sensitive programmes that aim to enhance cooking abilities and encourage healthier eating behaviours.	The findings of this study underscore the need for culturally tailored interventions that focus on practical cooking skills and affordable access to nutritious food, while addressing cultural and socioeconomic barriers within the demographic.
Masango & Khokhar (2009). A Cross-sectional Study.	120 African-Caribbean and Indian-Asian populations in Leeds, UK.	A dietary survey was conducted with questionnaires to assess the use of salt in various households. Furthermore, 16 families (comprising 40	The study found that 90% of participants used salt while cooking, and 14% sprinkled extra salt at the table. The average daily salt	Reducing salt consumption at home within ethnic minority communities requires specific and culturally appropriate

		individuals) participated in a 2-week salt consumption evaluation by measuring the amount of salt supplied.	consumption was 7.24 grams, with 28% exceeding 8 grams daily. Eighty percent of participants did not know about the national salt intake guidelines.	public health interventions. Emphasising home-cooking habits and improving awareness of health risks associated with salt intake is essential.
Millett et al. (2012). A Serial Cross-Sectional Study.	The general population of adults in England.	An analysis of data from the Health Survey for England (2003-2007). Salt consumption was assessed through spot urine samples, while dietary habits and salt usage practices were self-reported by the participants.	The salt reduction strategy implemented in the UK was associated with a mean annual decline of 0.175 g/day in salt consumption, resulting in a total intake reduction from 5.53 g/day in 2003 to 4.55 g/day in 2007. Knowledge of the government's salt recommendations was greater among older individuals and women, while it remained comparatively lower among men and ethnic minority groups.	This study indicates that synchronised public health approaches can significantly reduce salt consumption. It also highlights the importance of targeted awareness initiatives for younger adults, males, and ethnic minority groups.

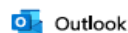
Payne Riches et al. (2021). A Feasibility Trial of a Digital Intervention.	The general adult population in the UK.	Users tracked their daily salt intake via an app, with “swaps” for lower-salt alternatives.	Found a moderate decrease in sodium intake and decent user engagement. Although it did not include cultural elements or gamification, it emphasised the possibility of health education through an app.	This study reinforces that digital interventions can help reduce salt intake. It further suggests that adding gamified elements and cultural tailoring may improve long-term adherence and outcomes.
Shankar et al. (2012). An Econometric Evaluation.	General UK population	Econometric evaluation utilising pseudo-panel data from the Health Survey for England. Spot urinary sodium measurements were employed to assess the effects of the campaign to reduce salt consumption in the UK.	The study found that the Food Standards Agency (FSA) salt campaign resulted in a 10% reduction in salt consumption from 2003 to 2007. Greater reductions were observed in older men and younger women. Factors related to socioeconomic status, such as income level, influenced campaign responsiveness.	This study demonstrates the effectiveness of public initiatives, combined with food industry reformulation , in reducing salt consumption. It also highlights the importance of targeted interventions in enhancing campaign effectiveness across diverse demographic groups.

Song et al. (2023). A National Survey Analysis	The general population of adults in England.	Analysis of trends in 24-hour urinary sodium excretion, BP data, and mortality.	Salt consumption decreased by 19% (from 9.38 g/d in 2003 to 7.58 g/d in 2014), accompanied by reductions in BP and CVD mortality. The progress stalled after 2014, coinciding with a rise in salt intake.	This study highlights the need to strengthen efforts to reduce salt intake.
Wyness, Butriss & Stanner (2011). An Evaluation of Public Health Intervention.	General UK population	Analysis of sodium consumption patterns utilising 24-hour urinary sodium excretion data obtained from national surveys. The study assessed the impact of the UK FSA salt reduction initiative from 2003 to 2010.	The average salt intake among adults decreased from 9.5 g/day in 2000-2001 to 8.6 g/day in 2008, with the reduction attributed to the reformulation of processed foods and public awareness campaigns. During the campaign, consumer awareness of the health concerns associated with excessive salt intake also significantly improved.	Demonstrates how a comprehensive strategy, which includes collaboration with the food industry, increased consumer awareness, and policy-driven reformulations, can effectively lower dietary salt intake. The study emphasises the importance of sustained efforts to achieve the goal of 6 g/day.

Appendix B: Study One Ethical Approval

Thesis Chapter (s)	Research Study	Ethics review reference	Approval date
Chapter Four	Study One (section 4.1)	ER41344840	Initial approval: 8/2/2022 Amendment approval: 07/06/2023

Appendix B1: Study Two Ethical Review Initial Approval



Converis - Ethics Review - Approval

From converis@shu.ac.uk <converis@shu.ac.uk>
Date Tue 2/8/2022 9:34 AM
To Usman, Jesse <Jesse.Usman@student.shu.ac.uk>

Status change comment
DO NOT WRITE ANYTHING IN THIS NOTES BOX AS IT CAN BE SEEN BY ALL OTHER USERS. Proceed to select the workflow status and click Done.

- Dear Jesse

Title of Ethics Review: [Internet-based Lifestyle Interventions for Cardiovascular Disease Prevention and Management Among Adults of African Caribbean Ancestry: A Scoping Review Protocol](#)
Ethic Review ID: ER41344840

The University has reviewed your ethics application named above and can confirm that the project has been approved.

You are expected to deliver the project in accordance with the University's research ethics and integrity policies and procedures <https://www.shu.ac.uk/research/ethics-integrity-and-practice>.

As the Principal Investigator you are responsible for monitoring the project on an ongoing basis and ensuring that the approved documentation is used. The project may be audited by the University during or after its lifetime.

Should any changes to the delivery of the project be required, you are required to submit an amendment for review.

Wishing you success you with your study

Kind regards,
Ethics Research Support

*** This is an automatically generated email, please do not reply ***

Appendix B2: Study One Ethical Review Amendment Approval

Help ▼

Student: Usman, Jesse - Jesse - Jesse.Usm... ▼

From: SYSTEM | **Sent:** 06/07/2023 16:38 | **Category:** INFORMATION

Subject: Converis - Ethics Review - Amendment Outcome

Dear Jesse

Title of Ethics Review: [Internet-based Lifestyle Interventions for Cardiovascular Disease Prevention and Management Among Adults of African Caribbean Ancestry: A Scoping Review Protocol](#)

Ethic Review ID: ER41344840

Amendment 1 Title: Changes to title of the study

The amendment to the Ethics Review named above has been reviewed and the outcome is:

Amendment Approved

Please log back into the P12 tab to see any feedback.

If you have a query regarding this, please contact your Faculty Ethics Administrator in the first instance.

HWB - hwbethics@shu.ac.uk

STA - STAfrec@shu.ac.uk

SBS - sbsethics@shu.ac.uk

SSH - SSH-ResearchEthics@shu.ac.uk

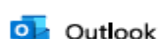
Kind regards,
Ethics Research Support

*** This is an automatically generated email, please do not reply ***

Appendix C: Study Two and Three Ethical Review Approval

Thesis Chapter (s)	Research Study	Ethics review reference	Approval date
Chapter Four	Study Two and Three (section 4.2 and 4.3)	ER45058101	Initial approval: 06/09/2022 Amendment approval: 06/07/2023

Appendix C1: Study Two Ethical Initial Ethical Review Approval



Converis - Ethics Review - Approval

From converis@shu.ac.uk <converis@shu.ac.uk>
Date Tue 9/6/2022 4:50 PM
To Usman, Jesse <Jesse.Usman@student.shu.ac.uk>

Status change comment

DO NOT WRITE ANYTHING IN THIS NOTES BOX AS IT CAN BE SEEN BY ALL OTHER USERS. Proceed to select the workflow status and click Done.

- Dear Jesse

Title of Ethics Review: [DEVELOPING AN INTERNET-BASED INTERVENTION TO PREVENT AND PROMOTE SELF-MANAGEMENT OF CARDIOVASCULAR DISEASES AMONG PEOPLE OF AFRICAN DESCENT](#)

Ethics Review ID: ER45058101

The University has reviewed your ethics application named above and can confirm that the project has been approved.

You are expected to deliver the project in accordance with the University's research ethics and integrity policies and procedures <https://www.shu.ac.uk/research/ethics-integrity-and-practice>.

As the Principal Investigator you are responsible for monitoring the project on an ongoing basis and ensuring that the approved documentation is used. The project may be audited by the University during or after its lifetime.

Should any changes to the delivery of the project be required, you are required to submit an amendment for review.

Wishing you success you with your study

Kind regards,
Ethics Research Support

*** This is an automatically generated email, please do not reply ***

Appendix C2: Study Two Amended Ethical Review Approval

Help ▼

Student: Usman, Jesse - Jesse - Jesse.Usm... ▼



From: SYSTEM | **Sent:** 06/07/2023 17:23 | **Category:** INFORMATION

Subject: Converis - Ethics Review - Amendment Outcome

Dear Jesse

Title of Ethics Review: [DEVELOPING AN INTERNET-BASED INTERVENTION TO PREVENT AND PROMOTE SELF-MANAGEMENT OF CARDIOVASCULAR DISEASES AMONG PEOPLE OF AFRICAN DESCENT](#)

Ethic Review ID: ER45058101

Amendment 3 Title: UPDATED PIS

The amendment to the Ethics Review named above has been reviewed and the outcome is:

Amendment Approved

Please log back into the P12 tab to see any feedback.

If you have a query regarding this, please contact your Faculty Ethics Administrator in the first instance.

HWB - hwbethics@shu.ac.uk

STA - STAfrec@shu.ac.uk

SBS - sbsethics@shu.ac.uk

SSH - SSH-ResearchEthics@shu.ac.uk

Kind regards,

Ethics Research Support

*** This is an automatically generated email, please do not reply ***

Appendix D: MINDTHESALT's Development and Primary Testing Ethical

Review Approval

Thesis Chapter (s)	Research Study	Ethics review reference	Approval date
Chapters Five and Six	Development (Chapter Five) and primary testing (Chapter Six).	ER64152829	Initial approval: 19/02/2024 Amendment approval: 08/05/2024

Appendix D1: MINDTHESALT's Initial Ethical Review Approval for Development and Primary

Testing

 Outlook

Converis - Ethics Review - Approval

From converis@shu.ac.uk <converis@shu.ac.uk>
Date Mon 2/19/2024 12:12 PM
To USMAN, JESSE <jesse.usman@student.shu.ac.uk>

You don't often get email from converis@shu.ac.uk. [Learn why this is important](#)

Dear Jesse

Title of Ethics Review: [Development and Feasibility Testing of "Low Salt Africa:" An Internet-Based Intervention for Dietary Salt Reduction](#)
Ethic Review ID: ER64152829

The University has reviewed your ethics application named above and can confirm that the project has been approved.

You are expected to deliver the project in accordance with the University's research ethics and integrity policies and procedures <https://www.shu.ac.uk/research/ethics-integrity-and-practice>.

As the Principal Investigator you are responsible for monitoring the project on an ongoing basis and ensuring that the approved documentation is used. The project may be audited by the University during or after its lifetime.

Should any changes to the delivery of the project be required, you are required to submit an amendment for review.

Wishing you success you with your study

Kind regards,
Ethics Research Support

*** This is an automatically generated email, please do not reply ***

Appendix D2: MINDTHESALT's Amended Ethical Review Approval for Development and

Primary Testing

Help ▼

Student: Usman, Jesse - Jesse - Jesse.Usm... ▼

From: SYSTEM | **Sent:** 08/05/2024 14:56 | **Category:** INFORMATION

Subject: Converis - Ethics Review - Amendment Outcome

Dear Jesse

Title of Ethics Review: [Development and Feasibility Testing of "Low Salt Africa:" An Internet-Based Intervention for Dietary Salt Reduction](#)

Ethic Review ID: ER64152829

Amendment 1 Title: Project Updates

The amendment to the Ethics Review named above has been reviewed and the outcome is:

Amendment Approved

Please log back into the P12 tab to see any feedback.

If you have a query regarding this, please contact your Faculty Ethics Administrator in the first instance.

HWB - hwbethics@shu.ac.uk

STA - STAfrec@shu.ac.uk

SBS - [sbsethics@shu.ac.uk](mailto:sbethics@shu.ac.uk)

SSH - SSH-ResearchEthics@shu.ac.uk

Kind regards,
Ethics Research Support

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Appendix F: Consent Form for All Studies

Consent Form (version: ____)



CONSENT FORM

Participant Identification Number:

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This form will be kept confidential and not be released to anyone outside of the research team

*If you agree, please **initial** box*

1. I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving reason, without my medical care or legal rights being affected. I also understand that if I withdraw, I can ask for all record of my contact details to be deleted but it will be impossible to withdraw any other data collected on me.	
3. I understand that if I am selected to take part in an interview, this will be audio recorded and that a member of the research team will listen to the tape to transcribe it. I give permission for the discussion to be audio recorded and for the research team to have access to the audio recording, or transcription of it, but understand that my confidentiality will be maintained, and any quotes used in research publications will be completely anonymised.	
4. I agree to this consent form and other data collected as part of this research study to be kept at Sheffield Hallam University.	

5. I understand that records relating to me will be kept confidential. No information will be released or printed that would identify me unless required by law.	
6. I agree to take part in the above study	
Additional:	
7. I agree to be contacted about ethically approved research studies for which I may be suitable. I understand that agreeing to be contacted does not oblige me to participate in any further studies.	

Name of participant
(*please print*)

Date

Signature of participant

Name of person taking consent
(*please print*)

Date

Signature of person taking consent

Original copy for Investigator Site File and a copy for participant.

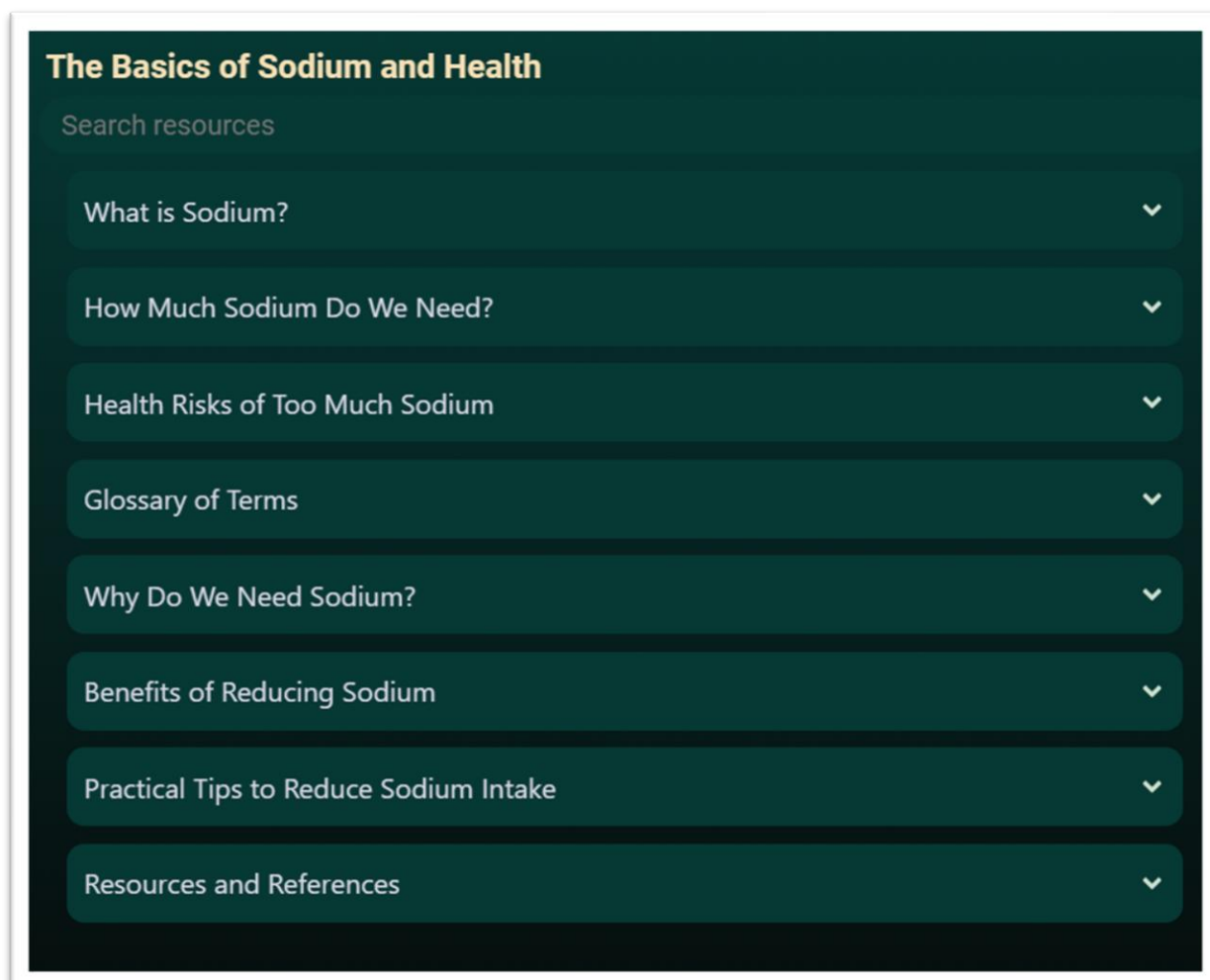
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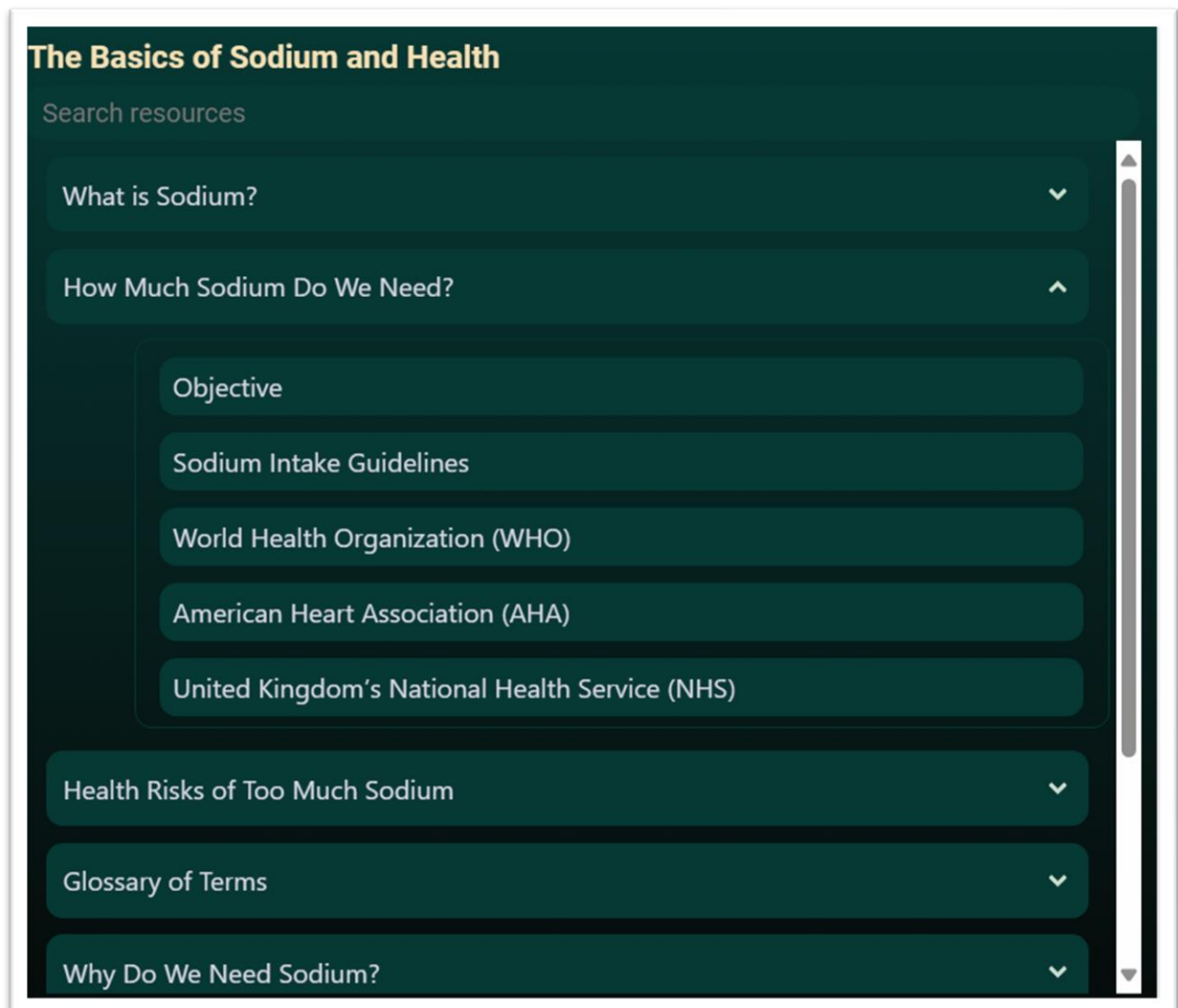
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Appendix J: Salt 101 Educational Module

Appendix J1: A Screenshot of the Salt 101 Educational Module



Appendix J2: A Screenshot of the Salt 101 Educational Module



The Basics of Sodium and Health

Search resources

← CONTENT LIST

Health Risks of Too Much Sodium

Objective

To learn about the serious health effects of consuming too much sodium.

Health Risks of High Sodium Intake

High Blood Pressure (Hypertension): Eating too much sodium causes the body to retain extra water, which raises blood pressure. This can damage blood vessels, increasing the risk of heart issues.

Heart Disease: High blood pressure from excess sodium can lead to heart disease, including heart attacks and heart failure.

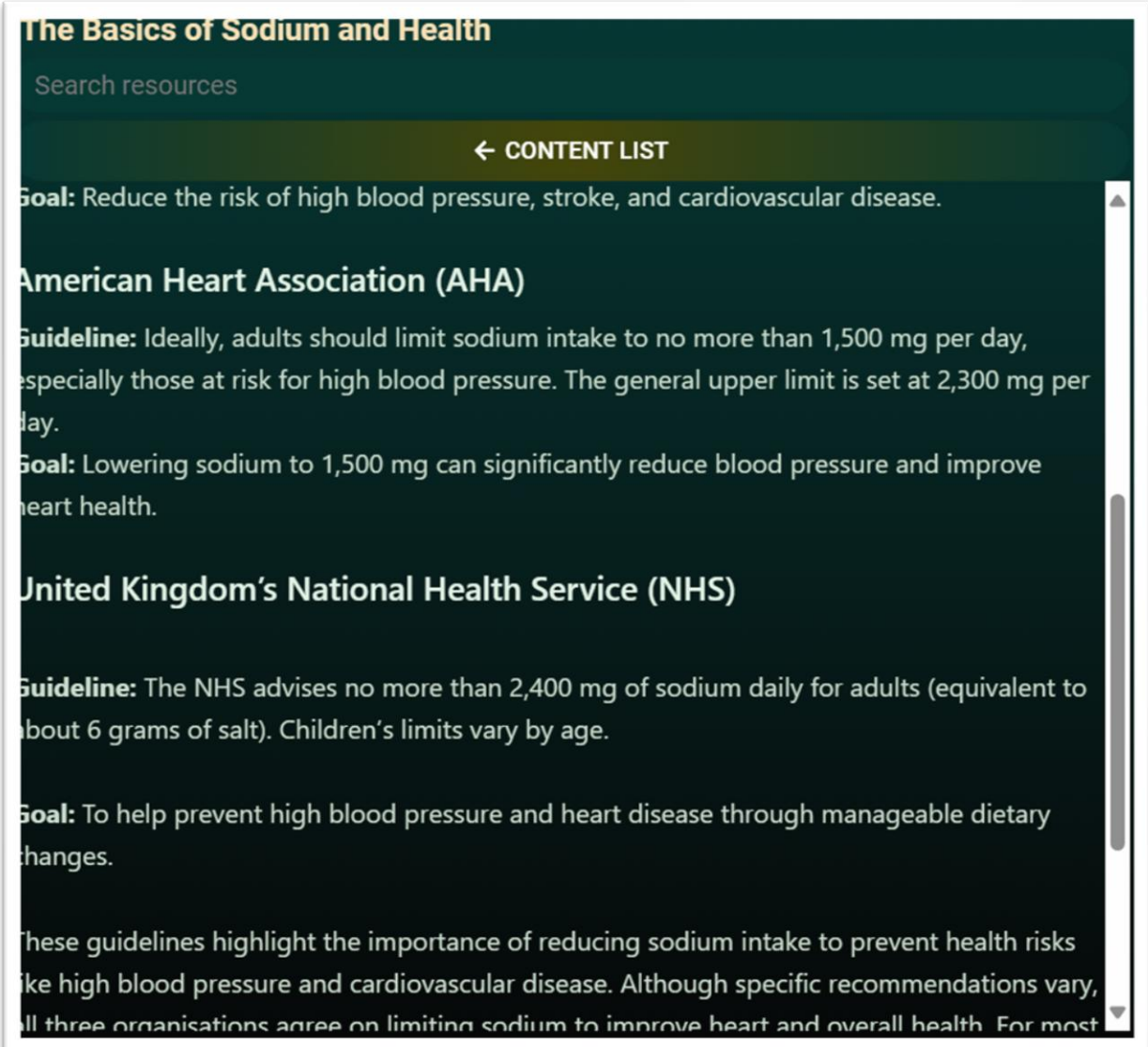
Kidney Damage: The kidneys filter out sodium. Too much sodium overworks them, which can lead to kidney disease or failure over time.

Bone Health (Osteoporosis): High sodium intake can cause the body to lose calcium, a key mineral for bone strength, potentially leading to osteoporosis, especially in older adults.

At-Risk Groups

Some people are more sensitive to sodium:

Appendix J4: A Screenshot of the Salt 101 Educational Module



The screenshot displays a digital interface for an educational module titled "The Basics of Sodium and Health". At the top, there is a search bar labeled "Search resources". Below this is a navigation bar with a left-pointing arrow and the text "CONTENT LIST". The main content area is divided into sections for different health organizations. The first section is for the American Heart Association (AHA), which includes a goal to reduce the risk of high blood pressure, stroke, and cardiovascular disease, followed by a guideline recommending a maximum sodium intake of 1,500 mg per day for adults at risk, and a general upper limit of 2,300 mg per day. The second section is for the United Kingdom's National Health Service (NHS), with a guideline advising no more than 2,400 mg of sodium daily for adults (equivalent to about 6 grams of salt) and a goal to help prevent high blood pressure and heart disease through dietary changes. A concluding paragraph states that these guidelines highlight the importance of reducing sodium intake to prevent health risks like high blood pressure and cardiovascular disease, and that although specific recommendations vary, all three organizations agree on limiting sodium to improve heart and overall health. The interface includes a vertical scrollbar on the right side.

The Basics of Sodium and Health

Search resources

← CONTENT LIST

Goal: Reduce the risk of high blood pressure, stroke, and cardiovascular disease.

American Heart Association (AHA)

Guideline: Ideally, adults should limit sodium intake to no more than 1,500 mg per day, especially those at risk for high blood pressure. The general upper limit is set at 2,300 mg per day.

Goal: Lowering sodium to 1,500 mg can significantly reduce blood pressure and improve heart health.

United Kingdom's National Health Service (NHS)

Guideline: The NHS advises no more than 2,400 mg of sodium daily for adults (equivalent to about 6 grams of salt). Children's limits vary by age.

Goal: To help prevent high blood pressure and heart disease through manageable dietary changes.

These guidelines highlight the importance of reducing sodium intake to prevent health risks like high blood pressure and cardiovascular disease. Although specific recommendations vary, all three organisations agree on limiting sodium to improve heart and overall health. For most

Removed