

**Do Coping Strategies Determine Denture Success to Improve Oral Health Related Quality of Life?**

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# ABSTRACT

Objectives: Cross-sectional data suggest a relationship between coping strategies and oral health related quality of life (OHQoL) in conventional denture wearers. The aim of this research was to observe if the coping strategies of patients determined denture success and to identify clinical and psychosocial determinants of successful subjective oral health outcomes in denture wearers.

Methods: Prospective cohort study of 191 patients receiving new conventional dentures in a university dental hospital based in India. Coping strategies (Brief COPE), OHQoL (OHIP-EDENT), denture satisfaction (de Liz Pocztaruk scale), chewing ability (Leake’s Chewing index), concern about oral health (scale based on Maslow’s hierarchy of needs), ageing expectations (ERA-12), stress (PSS-4) were measured at baseline and after a three month follow-up, together with clinical examination, subjective (McArthur SES) and objective socio-economic status (SES) (income, education, caste) at baseline. Analysis used lagged stepwise multiple regression analysis guided by the Wilson and Cleary model linking clinical variables to quality of life.

Results: Participants’ mean age was 58.5 years (range 27-85). 62.8% were males and most were from a lower socioeconomic background (65% < high school education; 60% unemployed/retired; 74.1% from lower castes). In the lagged analysis, denture wearers’ baseline clinical status: number of teeth present (OHQoL - β = -0.277) (Chewing ability -β = -0.163) and number of occluding pairs (Denture satisfaction- β = -0.239) predicted successful denture outcomes at 3 month follow- up. However, coping strategies was not significantly linked to any outcomes.

Conclusion: These data offer longitudinal evidence that certain clinical factors (number of teeth, occluding pairs) predict successful outcomes in patients receiving new dentures. Patient’s coping strategies was not associated with denture success.

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# LIST OF FIGURES

|  |
| --- |
| Figure 2‑1. Locker's conceptual model of oral health 24  Figure 2‑2. Wilson and Cleary model (1995) 27  Figure 2‑3. Flow chart of the search strategy – Conventional dentures and OHQoL 32  Figure 2‑4. Transactional model of stress and coping (Lazarus and Folkman, 1984) 48  Figure 2‑5. The WHO CSDH conceptual framework (Solar and Irwin, 2007) 67  Figure 2‑6. New conceptual model for oral health inequalities (Watt and Sheiham, 2012) 68  Figure 4‑1 Study framework adapted from Wilson and Cleary (1995) and Lazarus and Folkman (1984) 84  Figure 4‑2. Analytical strategy based on Wilson and Cleary (1995) model 97  Figure 5‑1. Scree plot of Brief COPE scale scores at T1 108  Figure 5‑2. Distribution of OHQoL scores at baseline (T1) and follow-up (T2) 113  Figure 5‑3. Summary of significant bivariate relationships between baseline and outcome variables 128  Figure 5‑4 Summary of significant bivariate relationships between baseline variables and coping strategies at follow-up 129  Figure 5‑5. Summary of predictors of denture outcomes at follow-up T2 136  Figure 5‑6. Summary of predictors of coping strategies at follow-up T2 137 |

# CONTENTS

[ABSTRACT i](#_Toc488655596)

[ACKNOWLEDGEMENTS ii](#_Toc488655597)

[LIST OF FIGURES iii](#_Toc488655598)

[CONTENTS iv](#_Toc488655599)

[LIST OF TABLES viii](#_Toc488655600)

[ABBREVIATIONS xi](#_Toc488655601)

[1 CHAPTER ONE INTRODUCTION 1](#_Toc488655602)

[2 CHAPTER TWO LITERATURE REVIEW 4](#_Toc488655603)

[INTRODUCTION 4](#_Toc488655604)

[2.1 DENTURE SUCCESS, ASSESSMENTS, DENTURE SATISFACTION 5](#_Toc488655605)

[2.1.1 Evaluating denture success using normative parameters 6](#_Toc488655606)

[2.1.2 Problems with normative assessments of dentures 7](#_Toc488655607)

[2.1.3 Evaluating denture success using patient reported outcomes 8](#_Toc488655608)

[2.1.4 Denture satisfaction 8](#_Toc488655609)

[2.1.5 Summary 13](#_Toc488655610)

[2.2 CONCEPT OF ORAL HEALTH RELATED QUALITY OF LIFE (OHQOL) 14](#_Toc488655611)

[2.2.1 Health 14](#_Toc488655612)

[2.2.2 Quality of life 17](#_Toc488655613)

[2.2.3 Health Related Quality of Life (HRQoL) 18](#_Toc488655614)

[2.2.4 Oral health 18](#_Toc488655615)

[2.2.5 Oral health related quality of life 19](#_Toc488655616)

[2.2.6 Theoretical Models and OHQoL 21](#_Toc488655617)

[2.2.7 Lockers conceptual model of Oral health (1988) 23](#_Toc488655618)

[2.2.8 Wilson and Cleary model (1995) 25](#_Toc488655619)

[2.2.9 Summary 29](#_Toc488655620)

[2.3 FACTORS INFLUENCING ORAL HEALTH RELATED QUALITY OF LIFE IN DENTURE WEARERS: A REVIEW 30](#_Toc488655621)

[2.3.1 Variables identified 43](#_Toc488655622)

[2.4 INDIVIDUAL FACTORS AND OHQOL IN DENTURE WEARERS 46](#_Toc488655623)

[2.4.1 Coping strategies 46](#_Toc488655624)

[2.4.2 Ageing expectations 54](#_Toc488655625)

[2.4.3 Concern about oral health 55](#_Toc488655626)

[2.4.4 Perceived stress 57](#_Toc488655627)

[2.4.5 Subjective Socio-Economic Status 61](#_Toc488655628)

[2.4.6 Summary 63](#_Toc488655629)

[2.5 ENVIRONMENTAL FACTORS AND OHQOL IN DENTURE WEARERS 64](#_Toc488655630)

[2.5.1 Socioeconomic status (SES) 64](#_Toc488655631)

[2.6 SUMMARY 74](#_Toc488655632)

[3 CHAPTER THREE AIM AND OBJECTIVES 77](#_Toc488655633)

[3.1 RATIONALE AND AIM 77](#_Toc488655634)

[3.2 OBJECTIVES 78](#_Toc488655635)

[4 CHAPTER FOUR MATERIALS and METHODS 79](#_Toc488655636)

[4.1 METHOD 79](#_Toc488655637)

[4.1.1 Sample 79](#_Toc488655638)

[4.1.2 Institution 79](#_Toc488655639)

[4.1.3 Selection of participants 79](#_Toc488655640)

[4.1.4 Recruitment 80](#_Toc488655641)

[4.1.5 Sampling 82](#_Toc488655642)

[4.1.6 Permission and Liaison 83](#_Toc488655643)

[4.2 VARIABLES 83](#_Toc488655644)

[4.2.1 Clinical Variables 85](#_Toc488655645)

[4.2.2 Independent variables 85](#_Toc488655646)

[4.3 CHALLENGES WITH THE MEASURES USED 91](#_Toc488655647)

[4.4 TRANSLATION OF THE MEASURES 92](#_Toc488655648)

[4.5 CONDUCT 92](#_Toc488655649)

[4.5.1 Pilot Study 92](#_Toc488655650)

[4.5.2 Data Collection 93](#_Toc488655651)

[4.5.3 Problems and Pitfalls 94](#_Toc488655652)

[4.5.4 Data transfer 95](#_Toc488655653)

[4.6 DATA MANAGEMENT 96](#_Toc488655654)

[4.7 DATA ANALYSIS 96](#_Toc488655655)

[4.7.1 Descriptive analysis 96](#_Toc488655656)

[4.7.2 Bivariate analysis 97](#_Toc488655657)

[4.7.3 Multiple regression Analysis 98](#_Toc488655658)

[5 CHAPTER FIVE RESULTS 99](#_Toc488655659)

[5.1 INTRODUCTION 99](#_Toc488655660)

[5.2 DESCRIPTIVE ANALYSIS 100](#_Toc488655661)

[5.2.1 Demographic information 100](#_Toc488655662)

[5.2.2 Clinical characteristics 100](#_Toc488655663)

[5.2.4 Coping strategies 105](#_Toc488655664)

[5.2.5 Individual factors 110](#_Toc488655665)

[5.2.6 Subjective outcomes 112](#_Toc488655666)

[5.2.7 Reliability of scales 114](#_Toc488655667)

[5.3 BIVARIATE ANALYSES 115](#_Toc488655668)

[5.3.1 Bivariate analyses between Brief COPE factors at baseline (T1) and OHQoL, Denture satisfaction and chewing ability at follow-up 116](#_Toc488655669)

[5.3.2 Bivariate analyses between clinical factors, coping strategies, individual variables, environmental variables, outcome variables at baseline (T1) and OHQoL at follow-up (T2) 117](#_Toc488655670)

[5.3.3 Bivariate analyses between clinical factors, coping strategies, individual variables, environmental variables, outcome variables at baseline (T1) and denture satisfaction at follow-up (T2) 119](#_Toc488655671)

[5.3.4 Bivariate analyses between clinical factors, coping strategies, individual variables, environmental variables, outcome variables at baseline (T1) and chewing ability at follow-up (T2) 122](#_Toc488655672)

[5.3.5 Associations between baseline clinical factors, coping strategies, individual variables, environmental variables with coping strategies at follow-up (T2) 125](#_Toc488655673)

[5.4 MULTIPLE REGRESSION ANALYSIS 130](#_Toc488655674)

[5.4.1 Regression analyses: Baseline predictors of outcome variables at follow-up (T2) 130](#_Toc488655675)

[5.4.2 Regression analyses: Baseline predictors of Brief COPE factors at follow-up (T2) 132](#_Toc488655676)

[5.4.3 Summary of key relationships 135](#_Toc488655677)

[6 CHAPTER SIX DISCUSSION 138](#_Toc488655678)

[6.1 INTRODUCTION 138](#_Toc488655679)

[6.2 DO COPING STRATEGIES DETERMINE DENTURE SUCCESS? 139](#_Toc488655680)

[6.2.1 Do coping strategies really matter? 139](#_Toc488655681)

[6.2.2 Study sample 142](#_Toc488655682)

[6.2.3 Conceptual, cross-cultural validity of coping in India and the Brief COPE questionnaire 145](#_Toc488655683)

[Summary 148](#_Toc488655684)

[6.3 VARIABLES HYPOTHESISED IN THE MODEL BUT SHOWED NO ASSOCIATIONS 149](#_Toc488655685)

[6.3.1 Expectations regarding ageing (ERA) 150](#_Toc488655686)

[6.3.2 Perceived stress 151](#_Toc488655687)

[6.3.3 Concern about oral health 152](#_Toc488655688)

[6.3.4 Objective SES 153](#_Toc488655689)

[6.4 ASSOCIATIONS FOUND IN THE STUDY 154](#_Toc488655690)

[6.4.1 Predictors of successful patient-reported denture outcomes 154](#_Toc488655691)

[6.4.2 Predictors of coping strategies 157](#_Toc488655692)

[6.5 METHODOLOGICAL ISSUES AND LIMITATIONS 160](#_Toc488655693)

[6.5.1 Methodological limitations 160](#_Toc488655694)

[6.6 STRENGTHS OF THE STUDY 165](#_Toc488655695)

[7 CHAPTER 7 CONCLUSION AND RECOMMENDATIONS 166](#_Toc488655696)

[7.1 CONCLUSIONS 166](#_Toc488655697)

[7.2 RECOMMENDATIONS 167](#_Toc488655698)

[7.2.1 Recommendations for research 167](#_Toc488655699)

[7.2.2 Recommendations for service 167](#_Toc488655700)

[CHAPTER EIGHT REFERENCES 168](#_Toc488655701)

[APPENDICES 210](#_Toc488655702)

[LIST OF APPENDICES 210](#_Toc488655703)

[APPENDIX A-RECRUITMENT FLYER 211](#_Toc488655704)

[APPENDIX B-PATIENT INFORMATION SHEET 212](#_Toc488655705)

[APPENDIX C-CONSENT FORM 215](#_Toc488655706)

[APPENDIX D-CLINICAL EXAMINATION 216](#_Toc488655707)

[APPENDIX F-BACK TRANSLATED VERSIONS IN TAMIL 230](#_Toc488655708)

[7.2.3 Recruitment flyer 230](#_Toc488655709)

[7.2.4 Patient information sheet 231](#_Toc488655710)

[7.2.5 Consent form 233](#_Toc488655711)

[7.2.6 Questionnaire booklet 234](#_Toc488655712)

[APPENDIX G-RECODED DATA 246](#_Toc488655713)

[Demographic data 246](#_Toc488655714)

[Clinical data 247](#_Toc488655715)

[APPENDIX H-DISTRIBUTIONS BEFORE AND AFTER RECODING 248](#_Toc488655716)

[Concern about oral health 248](#_Toc488655717)

[Ageing expectations 249](#_Toc488655718)

[Perceived stress 250](#_Toc488655719)

[Coping strategies 251](#_Toc488655720)

[Denture satisfaction 252](#_Toc488655721)

[Chewing index 253](#_Toc488655722)

[Oral Health related Quality of Life 254](#_Toc488655723)

# LIST OF TABLES

[Table ‎2‑1 Various inherent uses of HRQoL/ OHQoL measures 21](#_Toc488655524)

[Table ‎2‑2. Studies measuring OHQoL in conventional dentures 33](#_Toc488655525)

[Table ‎2‑3. OHQoL measures used in studies used in the systematic review 42](#_Toc488655526)

[Table ‎2‑4. Individual factors associated with OHQoL in denture wearers 44](#_Toc488655527)

[Table ‎2‑5. Environmental factors associated with OHQoL wearing dentures identified from the review 45](#_Toc488655528)

[Table ‎4‑1. List of variables used in the study at both stages 95](#_Toc488655529)

[Table ‎5‑1. Demographic characteristics of 201 participants at baseline (T1) 101](#_Toc488655530)

[Table ‎5‑2. Clinical data among 201 participants at baseline (T1) 102](#_Toc488655531)

[Table ‎5‑3. Prosthodontic status and treatment need of 201 participants at baseline (T1) 103](#_Toc488655532)

[Table ‎5‑4. Recoded demographic data of 201 participants 103](#_Toc488655533)

[Table ‎5‑5. Recoded clinical data among 201 participants 104](#_Toc488655534)

[Table ‎5‑6. Recoded prosthetic status and need in 201 participants 104](#_Toc488655535)

[Table ‎5‑7. Mean scores of Brief COPE overall and subscales at baseline (T1) and follow up (T2) 105](#_Toc488655536)

[Table ‎5‑8. Factor structure matrix of Brief COPE at T1 107](#_Toc488655537)

[Table ‎5‑9. Factor structure of Brief COPE at T1 after factor reduction 109](#_Toc488655538)

[Table ‎5‑10. Mean scores of extracted Brief COPE factors at both stages 110](#_Toc488655539)

[Table ‎5‑11. Outcome variable scores at baseline (T1) and follow-up (T2) 111](#_Toc488655540)

[Table ‎5‑12. Reliability of the scales used in the study 114](#_Toc488655541)

[Table ‎5‑13. Reliability of Brief COPE factors 115](#_Toc488655542)

[Table ‎5‑14. Lagged analysis: Bivariate associations between factors of Brief COPE scale at baseline (T1) and outcomes (OHQoL, Denture satisfaction and Chewing Ability) at follow-up (T2) 116](#_Toc488655543)

[Table ‎5‑15. Lagged analysis: Bivariate associations between coping strategies, individual factors, outcome variables at baseline (T1) and OHQoL at follow-up (T2) 117](#_Toc488655544)

[Table ‎5‑16. Bivariate associations between clinical status, demographic variables at baseline (T1) and OHQoL at follow up (T2) 118](#_Toc488655545)

[Table ‎5‑17. Bivariate association clinical status at baseline (T1) and OHQoL at follow-up (T2) 119](#_Toc488655546)

[Table ‎5‑18. Lagged analysis: Bivariate associations between coping strategies, individual factors, baseline (T1) outcome variables and denture satisfaction at follow-up (T2) 119](#_Toc488655547)

[Table ‎5‑19. Bivariate association between number of teeth present and denture satisfaction at follow-up (T2) 120](#_Toc488655548)

[Table ‎5‑20. Bivariate associations between clinical status, demographic variables at baseline (T1) and denture satisfaction at follow up (T2) 121](#_Toc488655549)

[Table ‎5‑21. Lagged analysis: Bivariate associations between coping strategies, individual factors, environmental factors, OHQoL, denture satisfaction, chewing ability, clinical factors at baseline (T1) and chewing ability at follow-up (T2) 122](#_Toc488655550)

[Table ‎5‑22. Bivariate association number of teeth present and chewing ability at follow-up (T2) 123](#_Toc488655551)

[Table ‎5‑23. Bivariate associations between clinical status, demographic variables at baseline (T1) and chewing-ability at follow-up (T2) 124](#_Toc488655552)

[Table ‎5‑24. Bivariate associations between clinical status at baseline (T1) and Brief COPE factors at follow-up (T2) 125](#_Toc488655553)

[Table ‎5‑25. Bivariate associations between Brief COPE factors and individual factors at baseline (T1) and Brief COPE factors at follow-up (T2) 126](#_Toc488655554)

[Table ‎5‑26. Bivariate associations between demographic and environmental factors and coping strategies at follow-up (T2) 126](#_Toc488655555)

[Table ‎5‑27. Stepwise forward multiple regression model for OHQoL at follow-up (T2) 130](#_Toc488655556)

[Table ‎5‑28. Stepwise forward multiple regression model for denture satisfaction at follow-up (T2) 131](#_Toc488655557)

[Table ‎5‑29. Stepwise multiple regression model for chewing ability at follow-up (T2) 131](#_Toc488655558)

[Table ‎5‑30. Stepwise forward multiple regression model for Inadequate/negative/avoidant Brief COPE factor at follow-up (T2) 132](#_Toc488655559)

[Table ‎5‑31. Stepwise forward multiple regression model for positive/ adequate Brief COPE factor follow-up (T2) 133](#_Toc488655560)

[Table ‎5‑32. Stepwise forward multiple regression model for self-blame factor at follow-up (T2) 134](#_Toc488655561)

[Table ‎5‑33. Stepwise forward multiple regression model for Religion factor at follow-up (T2) 134](#_Toc488655562)

# ABBREVIATIONS

|  |  |
| --- | --- |
| ACH | Alveolar Crestal Height |
| ADL | Activities of Daily Living |
| ADS | Asymptomatic Dental Score |
| ERA | Expectations Regarding Ageing |
| FAD | Functional Assessment of Dentures |
| DIDL | Dental Impact of Daily Living |
| GAS | General Adaptation Syndrome |
| GOHAI | Geriatric Oral Health Assessment Index |
| HRA-O | Health Risk Appraisal – for Older people |
| HRQoL | Health Related Quality of Life |
| ICF | International Classification of Functioning, Disability and Health |
| MEDLINE | Medical Literature Analysis and Retrieval System Online |
| OHIP | Oral Health Impacts Profile |
| OHIP- EDENT | Oral Health Impacts Profile -Edentulous |
| OHQoL | Oral Health related Quality of Life |
| OIDP | Oral Impacts on Daily Performance |
| QoL | Quality of Life |
| PRO | Patient Reported Outcomes |
| PSS | Perceived Stress Scale |
| PSQ | Perceived Stress Questionnaire |
| SDA | Shortened Dental Arches |
| SEIQoL- DW | Schedule for the Evaluation of Individual Quality of Life –Direct Weighting |
| SES | Socio Economic Status |
| SIQ | Social Impacts Questionnaire |
| SF–36 | Short form 36 |
| SPSS | Statistical Package for the Social Sciences |
| SRRS | Social Readjustment and Rating Questionnaire (SRRS) |
| VAS | Visual Analogue Scale |
| WHO- | World Health Organisation |
| WHO CSDH | World Health Organisation Commission on Social Determinants of Health |
| WHOQOL-OLD | World Health Organisation Quality of Life- Older people |

# CHAPTER ONE INTRODUCTION

In recent years, there has been a paradigm change in oral health research. Studies increasingly evaluate subjective patient-reported outcomes apart from using conventional clinical measures to assess treatment interventions. Oral health-related quality of life (OHQoL) defined as “ *the impact of oral disease and disorders on aspects of everyday life that a patient or person values, that are of sufficient magnitude, in terms of frequency, severity or duration to affect their experience and perception of their life overall*”(Locker and Allen, 2007), is one such patient reported outcome, extensively used to assess the impact of oral health conditions and interventions (Allen et al., 2001, Locker, 2004, Marshman and Robinson, 2007).

Despite the increasing use of dental implants and other fixed prostheses, conventional removable dentures are expected to remain the common treatment choice for prosthesis across populations with missing teeth (Diehl et al., 1996, Petersen and Yamamoto, 2005, Petersen, 2009). Understandably, conventional denture treatment success remains vital from both clinical and public health perspective. However, receiving dentures is perceived as a stressful life event by individuals and hence may require considerable coping skills (Bergendal, 1989, Haugejorden et al., 1993, Klock and Haugejorden, 2002). Although coping strategies in individuals with long term health conditions has been widely researched, they are relatively underexplored in dentistry.

To date, several studies have explored denture treatment success using normative measures of clinical outcomes, processes and also patient reported outcomes such as denture satisfaction, chewing ability etc. However, none of these studies used coping strategies as a factor, except for one study which was a cross-sectional observation, not backed by any theory-based model (Heydecke et al. 2004). The aim of this research was to identify and observe longitudinally whether coping strategies influence denture success to improve OHQoL in individuals receiving dentures.

The following thesis is organised as follows:

**Chapter One** gives the overview of this study.

**Chapter Two** gives a narrative review of the existing literature on denture success, the lack of conceptualisation about denture satisfaction and the knowledge gaps in understanding denture success. The review then focuses on health concepts, health related quality of life and OHQoL. It then outlines and discusses about theoretical models such as the Wilson and Cleary (1995) and its suitability to this study. This chapter then elaborates the results of the literature review on determinants of denture success through which the variables were identified to be used for the study. An elaborate explanation on coping strategies, individual factors (ageing expectations, concern about oral health and perceived stress), environmental factors (income, education, caste and work status) and outcomes (OHQoL, denture satisfaction and chewing ability) populated within the theoretical model is given followed by the justification of using OHQoL as the primary outcome variable for denture success.

**Chapter Three** summarises the aim and objectives of the study. This study aimed to identify whether the coping strategies of individuals receiving dentures determined success to improve their oral health related quality of life.

The objectives are as follows;

* Recruit complete/partially edentulous adults receiving new dentures (irrespective of previous denture history)
* To collect and record data on clinical variables, coping, individual and environmental factors, oral health related quality of life and other outcome variables populated within the Wilson and Cleary model
* To determine if coping strategies influence OHQoL in people receiving new dentures.
* To determine and identify clinical, individual and environmental factors that influence OHQoL and other patient reported outcomes (denture satisfaction and chewing ability).
* To determine if clinical, individual and environmental factors influence the coping strategies of individuals receiving new dentures over time.

**Chapter Four** details the materials and methods including a brief description of the data analysis strategy and data management.

**Chapter Five** presents the results of the study. Broadly speaking in lagged analyses, coping strategies were not associated with OHQoL. Whereas clinical factors, notably number of teeth, occluding were consistently linked to OHQoL.

**Chapter Six** discusses the findings from this study in depth.

**Chapter Seven** summarises the conclusions and the recommendations provided from the finding of this research.

**Chapter Eight** lists the references.

**Appendices** section contains copies of key research documents.

# CHAPTER TWO LITERATURE REVIEW

## INTRODUCTION

Receiving dentures is considered a stressful life event (Bergendal, 1989, Haugejorden et al., 1993, Klock and Haugejorden, 2002). Despite advances and innovations in dental prostheses such as dental implants and implant-supported over-dentures, their manufacturing costs, lack of training expertise limit their affordability and availability (Critchlow and Ellis, 2010).

Conventional removable dentures are the most commonly used prosthesis across populations (Petersen, 2009). They are expected to remain the obvious choice of treatment for most adults with missing teeth in the foreseeable future (Diehl et al., 1996, Petersen and Yamamoto, 2005). Understandably, the success of conventional denture treatment is imperative from both clinical and public health perspectives.

The following chapter gives a brief historical note and reviews the existing literature on denture success. The clinical parameters often attributed to denture success are explored alongside patient perspectives. The critical gaps that exist on conceptualisation and usage of ‘denture success’ are highlighted. The review will then discuss existing literature on denture satisfaction including its lack of conceptualisation and the term’s use interchangeably with ‘denture success’.

The chapter will be completed with detailed discussion of the multi- dimensional concept of Oral Health Related Quality of Life (OHQoL), justifying its use to assess denture success.

## DENTURE SUCCESS, ASSESSMENTS, DENTURE SATISFACTION

Attitudes towards missing teeth and wearing dentures have radically changed over time with the advances in fixed prostheses and dental implants (Akagawa et al., 1988, Grogono et al., 1989, Bradnock et al., 2001). Understandably, the meaning of ‘denture success’ has evolved and developed

Dentures have been used for many years in the field of dentistry and yet, there is no clear consensus, nor a definition of the meaning of denture success. However, studies from the early 1960’s have discussed the term.

Boucher (1960) raised the initial concerns with the definition of prosthodontic success. He argued that the meaning of denture success often gets restricted within the view of dentists. Patients receiving new dentures may not necessarily adjust or adapt with them. If dentures are problematic or unsatisfactory, they get them repaired, replaced or simply discontinue wearing them. In the latter instance, unless the issue is reported to the dentist (who delivered the dentures), he/she assumes to have delivered a successful denture. The author thus argued that the meaning of denture success within the purview of the normative assessments of clinicians may not alone define them.

Langer and colleagues (1961) went on similar lines to state that *“The complete satisfaction of both patients and dentists in evaluating dentures is a necessary condition for success in complete denture construction. Whenever the patient and the dentist are both dissatisfied with the respective evaluation, such dentures may be regarded as failures. When one party is satisfied (patient or dentist) and the other is not, the dentures fall somewhere between the two categories.”* Their statement suggested that denture success was a balance between the perspectives of patients and the dentists.

The above views were reiterated by subsequent studies (Smith, 1976). However, relatively recent studies, suggest that concerted efforts of both patients and clinicians are required in order to achieve denture success (Smith and McCord, 2004).

This highlights a shift in the meaning and understanding of denture success. (i.e.) from concerns about including patient perspectives, to one of combined efforts between patient and clinicians. Dentists evaluate dentures using a set of technical and clinical standards based on normative assessments. Patients assess dentures based on their level of satisfaction (Smith, 1976, Wakabayashi et al., 1998, Thalji et al., 2015, Byun et al., 2016).

Hence, there is still a lack of clarity on the understanding of denture success, which means its interpretation and evaluation differs considerably between studies. This section explores the literature evaluating denture success using normative clinical parameters, the critiques of that approach and also the use of patient reported outcomes.

### Evaluating denture success using normative parameters

Evaluation of denture success using normative clinical parameters has been broadly based on its clinical denture quality. The quality of dentures has been assessed based on the clinical outcomes or on the clinical processes of its fabrication (e.g. materials and the methods used) using a variety of evaluation criteria (Yoshizumi, 1964, Rayson et al., 1971, Ramstad et al., 1980, Vervoorn et al., 1987).

Corrigan and colleagues (2002) designed the Functional Assessment of Dentures (FAD) criteria, one of the widely used methods to assess denture quality. Processes followed in denture construction were assessed and compared along with the clinical outcomes. For example, the materials used for impressions, denture base, lining and procedures in denture making such as impression techniques (Firtell and Koumjian, 1992, Drago, 2003, Massad et al., 2005) face bow transfer (Ellinger et al., 1979, Nascimento et al., 2004, Kawai et al., 2005, Kawai et al., 2010), try-in and processing methods (Kimoto et al., 2010, Inokoshi et al., 2012, Cunha et al., 2013) were explored.

They have been compared against clinical outcomes such as clinician’s time, masticatory performance, mandibular movements, denture stability and retention assessed by the dentists (Clough et al., 1983, Firtell and Koumjian, 1992, Fenlon and Sherriff, 1999, Fenlon et al., 1999, Drago, 2003, Massad et al., 2005, Kimoto et al., 2006, Kawai et al., 2010, Kimoto et al., 2010, Inokoshi et al., 2012, Cunha et al., 2013).

### **Problems with normative assessments of dentures**

Both clinical processes and outcomes are assessed normatively; that is, by dentists. However, these exclusively biomedical perspectives have been challenged for a number of reasons. Firstly, there has been growing emphasis on understanding the impacts of oral conditions, health services and interventions on individuals and society (Sheiham et al., 1982). Oral health service research is increasingly focussing on patient’s perspectives (Gerdin et al., 2005, Gibson et al., 2010, Baker et al., 2010, Gururatana et al., 2013, Nammontri et al., 2013, Marshman et al., 2014, Porritt et al., 2014). Individuals’ attitudes; their degree of disability and dysfunction are now being widely discussed when planning oral health care needs and evaluating services. Objective normative assessments ignore such wider impacts and impairments. Normative assessments also face challenges such as intra-examiner and inter-examiner variability. For example, similar clinical indicators used by different professionals showed discrepancies (Nikias et al., 1979).

Cushing and colleagues (1986) argued that clinical indicators of oral health outcomes overlook patient’s perceptions and suggested the development of measures incorporating social-dental indicators to overcome this problem. In their study, two thirds of complete dentures and a third of partial denture wearers, who were clinically assessed to be in need of replacement or repair, were satisfied with their dentures. This suggested that clinical indicators do not necessarily reflect patients’ perceptions. Such discrepancies have also been noticed in periodontal diseases (Pilot, 1980) and orthodontic interventions (Baldwin, 1980).

### Evaluating denture success using patient reported outcomes

The subjective, social and other motivational factors associated with wearing dentures were ignored largely ignored by studies in the past. However, subsequent studies assessed treatment outcomes in denture wearers using both patient reported outcomes such as patient’s satisfaction, self-reported clinical outcomes (denture comfort, retention) on the one hand and clinical indicators on the other (Berg, 1984, Berg, 1988, Diehl et al., 1996, Gjengedal et al., 2011).

### Denture satisfaction

Denture satisfaction is one of the widely used patient reported outcomes to assess treatment success in individuals receiving dentures. Although primarily based on the concept acceptability and assessment of denture service quality, it has evolved historically with its perception and meanings. The following section reviews denture satisfaction, its definition, issues with conceptualisation and its transformation into multi-dimensional factor over the years.

Smith (1976) stated that patients evaluate denture success based on their personal satisfaction with dentures. Interestingly, denture satisfaction is infrequently defined. The definition of denture satisfaction was searched electronically using the search terms such as “denture satisfaction”, “denture treatment satisfaction” and “definition denture satisfaction” in the dental and prosthodontic literature. A specific definition for denture satisfaction could not be found even though many studies have used it as an outcome measure.

#### Conceptualisation of denture satisfaction

The desire to measure denture satisfaction was elaborated by the introduction of the concept of patient treatment satisfaction into disciplines such as medicine, psychology, sociology, healthcare marketing and management. Due to the semi-independent development of this concept across disciplines, the term is very loosely described and not well understood. In addition, applied research does not use a theoretical approach. Understandably, denture satisfaction is not well conceptualised.

Early discussion of patient’s denture satisfaction arose under the context of denture complaints and performance assessed by recording patient reported chewing ability and comfort. Comfortable dentures with good chewing ability meant a better performance with dentures was considered an as an important tenet of denture satisfaction (Schultz, 1951). A reduction in the number of denture complaints post-delivery reported by patients was also considered as an increase in denture satisfaction (Pound, 1965).

Swoope (1973) regarded denture satisfaction to be related to multiple factors. Adjusting treatment needs in line with the subjective needs of an individual was considered to improve satisfaction. Denture satisfaction was also assessed by asking patients to rank factors in their order of importance. Factors that were included were comfort, chewing ability, retention, appearance and other’s opinions on their dentures (Guckes et al., 1978).

The early studies based on denture satisfaction were not very specific and did not clearly conceptualise denture satisfaction. However, relatively recent research studies assessed denture satisfaction in comparisons with clinical outcomes and other patient reported outcomes. They considered denture satisfaction as a multi-factorial concept.

#### Denture satisfaction and clinical factors

Denture satisfaction has been assessed against clinical outcomes of dentures. Positive associations were observed between denture quality and patients’ satisfaction (Turbyfill, 1989, van Waas, 1990, Garrett et al., 1996, Sato et al., 2000, Čelebić et al., 2003, Anastassiadou and Robin Heath, 2006, Fenlon and Sherriff, 2008). Patient experience with wearing dentures (age of dentures) was also related to denture satisfaction (Weinstein et al., 1988, Berg, 1988).

Fenlon and Sheriff (2008) investigated the factors influencing patient satisfaction with new complete dentures. They recruited 723 patients receiving new complete dentures at a University teaching hospital in London who were sent a postal questionnaire to assess satisfaction with their dentures. The study found significant relationships between the quality of dentures, residual alveolar ridge, adaptability and denture satisfaction. The study concluded by stating that residual alveolar ridge quality, retention and stability of dentures, jaw relationship accuracy and patient adaptability were strong determinants of denture satisfaction.

Conversely, studies have also showed poor relationships between patient satisfaction and clinical parameters. Studies showed individuals dissatisfied with their dentures even though the dentures delivered to them were fabricated in compliance with normative clinical standards Patients have sometimes shown high levels of patient appreciation for dentures that were rated of poor clinical quality over time (Berg, 1993, Fenlon and Sherriff, 2004).

Fenlon and Sheriff (2004), followed up four hundred and seventeen patients recruited for a denture outcome study two years earlier. 87% of participants responded. The previous study had assessed aspects of denture quality using a postal questionnaire three months after denture insertion. At two year follow-up, no significant associations were found between aspects of new denture quality and patient satisfaction or use of complete dentures. These results contrasted with the three month returns from the same patients that had demonstrated significant associations between new denture quality and satisfaction with and use of the new dentures. The study concluded that initial denture quality was not a significant factor for long term denture satisfaction.

These studies suggest that better clinical outcomes do not necessarily equate patient’s satisfaction with their dentures and how denture satisfaction cannot truly be a yardstick to measure clinical outcomes.

#### Denture satisfaction in relation to other patient reported outcomes

Patient’s self-reported outcomes with their dentures such as the level of comfort, stability, ability to chew, ability to speak and aesthetics were reported to be significant contributors to general satisfaction in dentures (Awad and Feine, 1998).

Heydecke and colleagues (2008) investigated whether patient self-reported chewing ability was influenced by denture fabrication method. Their randomised within subject crossover trial conducted with 20 completely edentulous participants showed no significant changes or improvements to chewing ability, speech and comfort of denture wearers with respect to the fabrication method used. Patients’ satisfaction with their dentures and their self-reported ratings of functional outcomes such as comfort and chewing ability also seemed not to be influenced by the method of denture fabrication.

The existing evidence suggest a very unstable association between other patient reported outcomes and denture satisfaction. The uncertainty can be explained by the semi-independent nature of the patient reported outcomes that used. The lack of conceptualisation and theorisation of such patient reported outcomes may undermine this research.

#### Denture satisfaction and personality traits

Personality and individual traits have also been cited as influences on patients’ satisfaction with their dentures (Moulton, 1946, Troffer and Beder, 1961, Bergman and Carlsson, 1972). Traits such as hypochondriasis, depression, hysteria and anxiety have been explored in relation to denture satisfaction. Significant associations have also been have been demonstrated between traits such as neuroticism and denture satisfaction (Guckes et al., 1978), albeit, such associations were inconsistent. Hysteria (Smith, 1976) and Extroversion-Introversion (Vervoorn et al., 1991) were observed to be common personality traits associated with denture satisfaction.

More recent studies demonstrated relationships between personality domains such as neuroticism, extraversion, openness, agreeableness and conscientiousness and denture satisfaction (Al Quran et al., 2001).

Fenlon and colleagues (2007) investigated the specific associations between patient personality traits and patient’s satisfaction with their dentures. They recruited three hundred and eight patients attending a dental teaching hospital for replacement dentures, of which two hundred and seventeen completed all the stages of the study. A personality questionnaire was completed by the patients alongside an assessment of existing denture quality. After denture insertion the denture quality was assessed again. Satisfaction with the new dentures was assessed in a structured interview during the first post insertion visit. Questionnaires for denture satisfaction were mailed twice (3 months and 2 years) post insertion to all participants. Although use of dentures were not associated with the individual’s personality overall, the personality trait of neuroticism was significantly associated with satisfaction with the old dentures. There were no significant association at the first instance in the case of new dentures. However, three months and also two years post insertion there was a significant negative association between satisfaction and neuroticism, except for appearance and chewing ability.

Overall, it appears that denture satisfaction is related to an individual’s personality especially with certain traits such as neuroticism. However, the relationship appears to be widely inconsistent with an individual’s overall personality. This further substantiates with our early argument on the lack of conceptualisation and theorisation of denture satisfaction.

Denture satisfaction is a widely used patient reported outcome to assess denture treatment. Satisfaction has been associated with a multitude of clinical, psychological, functional and social factors and even aesthetics. However, the concept of denture satisfaction has not only been vaguely defined, but also at the same time it has not been sufficiently theorised to address its complexity. Hence, there is gap, related to inconsistent associations between patient satisfaction with dentures and other factors.

### Summary

Based on the existing evidences, this thesis recognises that denture success has not been adequately conceptualised, nor is its use is based on theoretical approaches. Historically, studies have raised concerns about the inclusiveness of patient perspectives. However, patient reported outcomes are now widely being used in assessment of denture treatment.

However, there exists knowledge gaps in the following areas. The existing studies have not theorised the associations between clinical factors, patient reported outcomes and denture treatment success using a robust methodology in addition to lack of clarity in defining denture treatment success. Denture satisfaction, a complex yet vaguely conceptualised patient-reported outcome in its own right, has often been used as a term (often interchangeably) to define denture treatment success. However, given the complexity of denture success, patient satisfaction with dentures may be considered a component of treatment success rather than success as a whole. Measuring denture satisfaction alone may not be a valid or a comprehensive measure to quantify denture success. This suggests that a well-conceptualised multi-dimensional patient-reported outcome which links all these components may be a more valid and appropriate approach to measure denture success.

## CONCEPT OF ORAL HEALTH RELATED QUALITY OF LIFE (OHQOL)

Oral Health related Quality of Life (OHQoL) is a multidimensional concept increasingly used in contemporary dentistry to measure oral health status, assess oral healthcare interventions and outcomes. The following sections explore and give a brief grounding on the basic concepts of health, quality of life and other aspects to understand this concept all-around.

### Health

Health was defined by the World Health Organization (WHO, 1946) as “*a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity”* The perspective of health in both psychological and social dimensions were widened as a result of this definition. However, to the present day and age, the complexities associated with current patterns of health and illness, this definition of health is highly impractical. For instance, an individual living with a chronic health condition such as arthritis may not be able to achieve an absolute state of wellbeing. However, they can manage the complications by adapting to its everyday difficulties and challenges thereby achieving a better state of health and wellbeing.

The Ottawa charter on health promotion concluded that to achieve health, an individual or a population must be enabled to aspire, satisfy their needs and adapt or cope with the environment they live in (World Health Organization, 1986). Health was seen as an asset that offers individuals with the resources to lead their everyday lives. The Ottawa charter refers to determinants of health which comprises of factors associated to socio-economic, physical environment and individual characteristics behaviours and sees them as resources (WHO, 2008). The, variability of such resources in everyday life can affect health causing health inequalities among people and the societies they live in. Thus, considering determinants of health and their influence on general well-being and health is imperative. Health literature widely conceptualises health into two models: namely. the biomedical model and the bio psychosocial model (Nammontri, 2012).

#### Biomedical model

This model of health came into the conception based on the discovery of blood circulation within the human body in 1628 (Hewa and Hetherington, 1995). The human body and its functions were given a mechanical notion and compared to machines. The human mind was hence seen as a separate entity (Descartes, 1969). Concepts such as the germ theory by Louis Pasteur Robert Koch and other developments in the field of medicine suggested that modern medicine can manipulate and cure the human body using chemical compounds or with replacement and repaired of body parts. The model however had no regard for psychological, social domains of illness (Engel, 1977). Such simple reductionism by this model lead to the notion that only biological factors caused diseases and ignored the social determinants of health. Mere ‘absence of disease’ was seen as health and patients were seen as recipients of treatment procedures.

Within dentistry, measuring oral health status was traditionally focussed with clinical measures and indices such as the DMFT (decayed, missing, filled teeth) and CPITN (Community Periodontal Index of Treatment Needs). Such measures however do not describe the functional and psychosocial impacts of oral diseases/ conditions (Allen, 2003). The mouth and diseases within the oral cavity were seen in isolation from the overall human body. Prevention based interventions and strategies were focussed on the high risk individuals and in changing their behaviours rather than emphasising on those factors that lead to these behaviours in the first place (Watt, 2007). For instance, dentists often advised people to avoid high-sugary foods that are a risk factor for caries, tooth decay. However, they do not address the issue on why the individual is involved with having a high sugar diet. High sugar can be associated with factors such as stress and their socio-economic status (SES). With a very limited scope, the biomedical model cannot comprehensively define health in a broad the multidimensional context.

#### Bio-psychosocial model

The bio-medical model is restricted within physiological and normative parameters (Engel, 1981). Contexts that shape their behaviour and illness perception are largely ignored by the model (Engel, 1977).

These missing ideas and dimensions of the biomedical model are incorporated into this scientific model called the bio-psychosocial model (Engel, 1981). In this model, the individual is placed at top the organismic level and at the bottom of the social hierarchical levels thereby working for both patient and environmental levels. This model has provided a paradigm shift in terms of oral health from a ‘downstream approach’ where biomedical definitions of oral health were used towards ‘upstream approach’ focussing on wider psychosocial determinants of oral health (Watt, 2007)

For instance, the biological cause for a disease like oral cancer may be due to adverse habits such as tobacco chewing, smoking and exposure to other carcinogens, not all who have these habits ended up having oral cancer. Neither does everyone who suffer from oral cancer always have adverse habits. This highlights the lack of a comprehensive explanation of the disease process by the biomedical model. Whereas, the bio-psychosocial model observes illness and disease as a process caused by multiple factors such as biological (e.g. genetic predisposition), psychological (e.g. stressors that induce adverse habits) and social (e.g., diet, access to dental treatment care services, social and economic status).

Bio-psychosocial model also hast clinical practice implications. For instance, a patient receiving complete denture prosthesis on a biomedical approach may be subjected to normative procedures and is provided with dentures. The denture might meet clinical standards but the patient may not necessarily be satisfied with it. Under a bio-psychosocial approach, the patient needs will be given priority.

For example, to fulfil functional limitations like chewing, speech, along with patient’s personal and social expectations from their dentures. Assessments of these needs prior to delivering dentures will increase the likelihood of a successful treatment outcome.

Bio-psychosocial model can thus supplement from normative treatment procedures by addressing wider determinants of health and by using health status measures that incorporate subjective health outcomes.

### Quality of life

Quality of life (QoL) is a diverse concept that varies with societal, individual and theoretical aspects (Felce and Perry, 1995). QoL became a widely discussed concept post second world war due to considerable economic growth, increased people’s expectations, wellbeing and psychological fulfilment (Awad and Voruganti, 2000). In relation to health, it is now closely associated with the bio psychosocial model of health (Awad et al., 1997). However, there are aspects of life quality that are not directly related to health (e.g. having a good job, owning a house, family life) and so medicine is mostly concerned with “health-related” quality of life.

QoL means different things to different people. It is a multidimensional construct (Bowling, 2001). QoL can be seen as a fulfilment of need (Hornquist, 1990), personal satisfaction (Campbell et al., 1976, Emerson, 1985) while others describe it as a fulfilment of life plan and overall wellbeing (Goodinson and Singleton, 1989, Felce and Perry, 1995).

The World Health Organization (1995) defined quality of life as an *“ individual’s perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns”* *(p.1405)*. This definition also describes QoL as a multidimensional concept comprising various aspects and highlights that quality of life as a subjective perception.

With various interpretations and definitions, the concept of QoL is better understood than in the past but still remains elusive and hard to interpret. There is no single universally accepted definition. It remains a person-centred multidimensional concept comprising a range of factors not just those associated with health but also factors such as social, political and cultural.

With overall improvements in health and increased life expectancy, the focus has shifted towards improving the quality of life of individuals.

### Health Related Quality of Life (HRQoL)

Those aspects of QoL directly related to health may be regarded as an outcome of health and care. Thus HRQoL is defined as the *“physical, psychological and social domains of health, seen as distinct areas that are inﬂuenced by person’s experiences, beliefs, expectations and perceptions”* (Testa and Simonson, 1996)

The above definition sees HRQoL as a concept comprising varied domains of health from subjective patient -centered perspective. The concept of HRQoL has evolved further and is now discussed with a more specific approach. For example, many HRQoL measures are now condition or disease specific.

The outcome answers whether treatment improves the value of life itself using a subjective patient-led baseline against which effects of treatment are evaluated (Bowling, 2009). It synergises the concepts of both health and QoL and is widely used as a measure of for health and illness based on individual experiences.

### Oral health

Oral health has been defined by the Department of Health (1994) in the United Kingdom as the *‘standard of health of the oral and related tissues which enables an individual to eat, speak and socialize without active disease, discomfort or embarrassment and which contributes to general well-being'* *(p.2)*.

Oral health is an integral part of general health rather than something in isolation. The Department of Health definition of oral health follows the bio-psychosocial model as it highlights the subjective experience and the individual’s ability to carry out every day activities, which in turn enriches their overall well-being.

### Oral health related quality of life

Similar to HRQoL, ideas on developing socio-dental indicators related to oral health were put forth by authors in the later decades of the 20th century (Cohen and Jago, 1976, Reisine and Bailit, 1980) because clinical indices omitted the person’s subjective assessments of oral health. As the focus of dentistry has moved beyond oral diseases towards oral health, the concept of Oral Health Related Quality of Life (OHQoL) has come to the fore as a multi-dimensional concept bridging clinical variables and subjective status of individual’s oral health.

OHQoL has had a range of definitions that have evolved over the years. An early definition by Locker (1989) saw OHQoL as *‘the functioning of the oral cavity and the person as a whole and with subjectively perceived symptoms such as pain and discomfort’*

Gift and Atchison (1995) interpreted OHQoL as a concept comprising factors such as survival, absence of impairment; disease or symptoms; discomfort and pain, good physical functioning (chewing and swallowing); emotional functioning and social functioning. Subsequently, it was described as a concept that does not only focus on the oral cavity alone, but also the way oral disorders, diseases and conditions threaten health, wellbeing and quality of life in individuals (Locker, 1997).

The most recent definition of Locker and Allen (2007) differentiates between oral health status on a subjective level and evaluation of oral health status on a subjective level (i.e.) OHQoL.

They defined OHQoL as “ *the impact of oral disease and disorders on aspects of everyday life that a patient or person values, that are of sufficient magnitude, in terms of frequency, severity or duration to affect their experience and perception of their life overall” (p.409)* (Locker and Allen, 2007)

The above definition of OHQoL is the most compatible and relevant to this study as it links subjective health status, oral health and OHQoL.

#### Applications and potential uses of HRQoL and OHQoL instruments

Many studies have suggested the importance and the uses of (Locker, 1996, Fayers and Machin, 2000, Khanna and Tsevat, 2007). Robinson and colleagues (2003) summarised the uses of OHQoL under various categories as tabulated in Table 2-1.

Public health policies and allocating resources of health based on evidence can be planned using HRQoL measures (Guyatt et al., 1993). Assistance in terms of evaluating and screening psychosocial issues at a clinical level (Fitzpatrick et al., 1992) and also in terms of healthcare outcomes (Fayers and Machin, 2000) and explore different pathways that influence health (Locker, 1996). They also help with needs assessment and prioritisation of healthcare services (Gherunpong et al., 2006).

**Table 2‑1 Various inherent uses of HRQoL/ OHQoL measures**

|  |  |
| --- | --- |
| Areas | Potential uses of HRQoL/ OHQoL |
| Political | * Planning public health policy, resource allocation |
| Clinical Uses | * Communication tools * Commissioning programme of care * Evaluating interventions * Assessing the outcomes in new treatment methods * Understanding patient’s point of view * Screening * Identify and prioritise patient problems and preferences * Monitoring and evaluating individual patient care * Identifying which patients might benefit most from treatment * Involve patient’s perspectives in decision making & self-care * Predict outcomes in order to provide appropriate care * Clinical Audit |
| Research | * Evaluating outcomes of health care interventions * Elucidate relationships between different aspects of health |
| Public Health | * Describing and monitoring illness in populations * Plan, monitor and evaluate service * Needs assessment and prioritisation * Encourage greater lay participation in health care |
| Theoretical | * Exploring models of health * Describing factors influential to health |

Source: Robinson et.al (2003)

### Theoretical Models and OHQoL

Thus far, this review has indicated that subjective health outcomes can be poorly defined and have inconsistent relationships with clinical indicators. The advantage of a theoretical model is that it helps conceptualise these complex inter-relationships between various factors (i.e. clinical factors, OHQoL, environmental, psychological, emotional and cultural factors).

Theoretical models are imperative for the evolution of science. Theory based models are developed from theories based on specific idea sets which explain a natural occurrence. McLaren (1998) highlighted on the predictability on theoretical models over mere theories. The author suggested that models can predict material outcomes and can quantify them upon which theories can then be integrated. Theoretical models can thus bridge theory to practicality. For instance, in medical sciences, theoretical models can structure medical practice by explaining natural processes of diseases and conditions.

Biomedical scientists established the biomedical model to study diseases and explain their causes and pathology using technical medical terms. It helps physicians understand the clinical, biological, and pathological changes and features (Quintner et al., 2008). Theory based models are also suggested to predict natural occurrences by means of using logical material consequences approach empirically. In a study by Janket and colleagues (2004), an Asymptomatic Dental Score (ADS) was developed based on this criteria, as a potential pre-screening tool for coronary heart disease. In this study, among 256 patients from a University Hospital in Finland with chronic heart disease screened by angiograms, all the clinical dental factors that create inflammatory mediators such as caries, root stumps, gingivitis and even pericoronitis were examined. Based on these measures, ADS was developed by logistic regression analyses. The study concluded that ADS contributed significantly as a predictor of chronic heart diseases Similarly, Baker and colleagues (2010) tested the Wilson and Cleary model (1995) in relation to determinants children’s oral health.

Theory based models can be utilised as a guide and plan future actions and strategies. For instance, the Wilson and Cleary model (1995) evaluated associations between clinical status, symptom status, individual and environmental factors, functional status, general health perceptions and overall health related quality of life. By exploring the relationship between these factors various strategies and policies can be planned to improve outcomes and health related quality of life. Nammontri and colleagues (2013) used this model to design a health promotion intervention so as to improve children’s OHQoL

Theoretical models are used for systematic analyses of data than just mere analyses of theorised associations (Boorse, 1977, Boorse, 1997). They can further be statistically enhanced to quantify and gauge specified effect size.

To summarise, theory based models can be used as a framework to guide and well understand theorised associations between variables, help with statistical analysis, interpretation of results and help expedite with the designing and evaluative process of interventions. Most OHQoL studies in the past have lacked an application of a theoretical framework.

### Lockers conceptual model of oral health (1988)

Based on the International Classification of Functioning, Disability and Health (ICF), Locker’s conceptual model of oral health (1988) was developed.

This model related oral disease with factors such, impairment, disability and handicap. The model was compatible within the Wilson and Cleary model (1995) which was consequently developed.

Impairment in this model refers to various clinical manifestations in the oral cavity such as periodontal attachment loss, missing teeth and malocclusion which lead to limitations at a physical, biochemical and functional level. Functional limitation refers to restriction of the body or its components (e.g.) tongue, jaw movements. Disability refers to the limitation in performing the tasks and roles of the individual. Finally, the disadvantages that are experienced by the individuals as a result of failing to meet the expectations of the society they live is the Handicap (e.g.) wearing new dentures can cause a restriction of diet which can lead to individuals avoiding eating and socialising with others.

The model introduced a foundational shift and change, by highlighting oral diseases from within the bio-medical model whilst linking them with patients’ perspectives. This eventually helped with the development of various OHQoL measures (Daly et al., 2002). This model has been tested and validated on different populations (Locker et al., 1994) . However, individual characteristics and environmental factors were not included in this model.

**Disability**

**Disease**

**Impairment**

**Functional limitation**

**Handicap**

**Pain**

**Death**

**Organ**

**Individual**

**Society**

**Figure 2‑1. Locker's conceptual model of oral health**

### Wilson and Cleary model (1995)

The Wilson and Cleary model (1995) is a multidimensional model that links clinical factors and QoL. This model incorporated individual and environmental factors. The associations are theorised between approximate levels and direct, and indirect (mediated) associations between non-approximate levels.

This model has five levels of variables. They are arranged in a left to right continuum based on biological, social and psychological complexity pathway. Physiological variables are linked to symptoms onto functional status, general health perceptions, and overall quality of life by this model. Whilst distinguishing between these factors this model also recognises the complex inter-relationships between them.

#### Levels in the Wilson and Cleary m2odel

The various levels of Wilson and Cleary models are the following

* Biological and Physiological Variables: cell, organ and organ system functions of the body. Changes in biological processes cause changes in symptoms, functional status, health perceptions, and overall quality of life. For example, tooth loss and missing teeth causes change biological processes and functioning.
* Symptom status: Symptoms shifts focus towards the individual from a biological cellular level. Symptoms are “a patient’s perception of an abnormal physical, emotional, or cognitive state,” They can be categorised under physical, psychological, or psychophysical symptoms.
* Functional status: of an individual is the ability to perform tasks. It can be categorised under various realms- physical, social role and psychological.
* General Health Perceptions: This level incorporates all previous levels in the model, and is subjective. This level synthesises various dimensions of health in the evaluation process.
* Overall quality of life: The final level of the model showing the level of satisfaction an individual in terms of their overall life. This component depends on an individual’s value system and preferences which changes in tandem with their, circumstantial and environmental changes.

This model further highlighted on how subjective measures may not necessarily be associated with objective measures. For example, an individual with a few missing teeth may not necessarily be dissatisfied with their overall quality of living whilst another individual with similar number missing teeth may experience vast change in terms of their overall QoL. Objectively, in both the instances patients are usually advised to replace the missing teeth. These variations in QoL may be explained by the individual and environmental factors that play the mediating role with subjective outcomes.

#### Individual and the Environmental Characteristics

Studies have found associations between clinical status (e.g. missing teeth, caries and periodontal attachment loss) and subjective assessments of oral disease including OHQoL (Locker, 1992, Locker and Slade, 1994, Baker et al., 2010, Daly et al., 2010). One of the main concepts of this model is that individual and environmental factors influence an individual’s reaction to physiological and biological changes and the outcome (QoL).

Individual factors are inherent qualities and traits within an individual (e.g. age, sex). Whilst, environmental factors are an amalgamation of various external factors that affect everyday lives of individual human beings (e.g. occupation, income) (Sousa et al., 1999). Whilst broadly compatible, the Wilson and Cleary model is more comprehensive than the Locker model in incorporating these characteristics.

**Figure 2‑2. Wilson and Cleary model (1995)**

General

Health Perceptions

Biological and

Physiological variables

Symptom

Status

Functional

Status

Non-medical

**Factors**

Overall

Quality of Life

Environmental factors

Individual factors

#### Relevance of OHQoL and Wilson and Cleary model to denture success

The Wilson and Cleary model links biological and clinical factors with functional status, outcomes and overall quality of life alongside various individual and environmental factors. This model helps identify the possible processes or pathways through which any health outcome is brought into being.

This model has been tested in various populations affected by various conditions (e.g.) cardiovascular diseases (Janz et al., 2001), HIV (Sousa and Kwok, 2006) and renal diseases (Frank et al., 2004). Very recently, it has been tested in individuals experiencing oral health conditions such as xerostomia, edentulous old people and children (Baker, 2007, Baker et al., 2008, Nammontri et al., 2013, Gururatana et al., 2013). These studies recommended the inclusion of specific individual and environmental factors to capture the variations in outcomes.

Baker and colleagues (2008) tested the applicability of the model in a secondary analysis of a trail with housebound edentulous older people. The dominant direct and indirect pathways demonstrated its applicability in edentulous patients. The study showed that patient reported issues of edentulousness, such as reduced chewing ability and eating predicted a lower functional status, which in turn predicted lower global oral health perception mediated by patient reported functioning. Furthermore, the study showed that dentures (domiciliary denture service) significantly improved functional status and their global oral health perceptions. The Wilson and Cleary model has not been previously tested *a priori* with regards to successful denture treatment.

This model outlines the variables clearly and specifically, which helps choosing specific measuring tools to capture specific factors that influence the causal pathways of successful health outcomes.

### Summary

Thus far the review suggests that little clarity exists in nature of denture success. Studies have explored denture success using clinical outcomes. But such outcomes do not take into account of patient’s perspectives. Hence, patient reported outcomes were compared against clinical outcomes in later studies.

Patient satisfaction is a major patient reported outcome used to assess denture success. But even this outcome is poorly defined and has discrepancy with clinical outcomes. For example, clinically sound dentures had dissatisfied patients and individuals were satisfied with dentures that did not necessarily have the best clinical quality. Patient satisfaction was a complex and vague phenomenon that could not be linked with clinical outcomes. OHQoL has direct reference in terms of linking clinical perspectives to patient outcomes and is theoretically well conceptualised. This study will hence use OHQoL as an outcome measure to assess denture success.

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## FACTORS INFLUENCING ORAL HEALTH RELATED QUALITY OF LIFE IN DENTURE WEARERS: A REVIEW

Studies increasingly use OHQoL measures to evaluate healthcare including dentures (Davis et al., 2000a, Heydecke et al., 2004). To identify the individual and environmental variables related to OHQoL, this section systematically reviewed the literature to explore the existing evidence available to identify and highlight the factors that influence Oral Health related Quality of Life in conventional denture wearers. Assuming dentures improve OHQoL (Bagewitz, 2007, Nikolovska and Petrovski, 2012), the focussed question of this review was: what are the factors that influence OHQoL in conventional denture wearers?

Many studies have evaluated OHQoL improvement on dentures (Kapur et al., 1999, Awad et al., 2000). But only few have considered factors that influence the OHQoL in denture wearers (Baker et al., 2010). Understanding these factors might help us identify the factors that predict denture success in denture wearers.

An electronic search of English language articles published from 1995 to the time of searching (September 2016) was conducted using the MEDLINE data-base. Specific search terms “conventional dentures” AND (“oral health quality of life” OR “OHQoL”) were used.

The search was restricted to articles written in English language alone with the following search filters applied based on study type (e.g. Randomized Controlled Trials, Clinical Trials (Phase I, II, III and IV), Randomized Controlled Trial, Multicentre Study, Controlled Clinical Trial, Evaluation Studies, Comparative Study, Review and Journal Articles.

Studies that were published in peer reviewed journals from 1995 to September 2016, studies that evaluated conventional dentures (both partial and complete), studies testing associations with OHQoL and studies comparing the OHQoL of conventional denture wearers with those wearing other types of prostheses were shortlisted as per the inclusion criteria.

Systematic review papers, studies that evaluated using denture satisfaction but not OHQoL, studies about fixed partial dentures or implants alone and articles in languages other than English were excluded.

The initial search identified 432 sources. The titles were screened and those which directly related with removable conventional dentures alone were chosen leaving 288 sources (Figure 2-3). The abstracts of these 288 titles were screened and checked with the inclusion criteria. Studies that did not meet the criteria were excluded. The remaining articles were then completely read. Studied that did not meet the inclusion criteria at this stage were excluded. Only 49 studies completely met the criteria for inclusion and were included in the review (Table 2‑2).

Sample size, age of the sample, study design, timeline (i.e. follow-up assessment), OHQoL (instrument used) and other patient report outcomes that were measured were extracted from the results. The results are tabulated in Table 2-1.

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**Figure 2‑3. Flow chart of the search strategy – Conventional dentures and OHQoL**

Studies identified through database searching  
n = 432

n

Studies excluded -- Title  
n = 144

n

Studies excluded - Abstract  
n = 152

N n

Studies excluded -on reading full text n = 87

n

Studies for further evaluation  
n = 288

Potentially appropriate studies  
n = 136

n

Studies included in the review  
n= 49

n

**Table 2‑2. Studies measuring OHQoL in conventional dentures**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Study | Sample | N | Mean age (SD/Range) | Study design | Measurement points | OHQoL measure | Other impacts measured | Denture satisfaction |
| 1 | Abuzar, Kahwagi, Yamakawa(2012) | Individuals seeking removable partial dentures | 232 | > 60 (77.9%) | Cross sectional observational | One measurement post denture insertion | OHIP- 14 | Perceived denture performance  Denture material  Denture frequency of use | Yes |
| 2 | ALLEN, MCMILLAN, WALSHAW, LOCKER (1999) | Individuals seeking implants, removable dentures, dentate patients | 88 | 58,64,54 | Cohort | One measurement alone prior receiving dentures | OHIP -49 | Pain, general satisfaction with dentures,  Chewing | Yes |
| 3 | ALLEN, MCMILLAN,  LOCKER (2001) | 3 groups  Implant supported dentures,  Conventional dentures (sought implants), conventional dentures | 83 | 57, 60.1, 64.9 | Clinical Trial | Baseline and 3 months follow-up | OHIP -49 | Denture satisfaction, SF-36 | Yes |
| 4 | ALLEN AND MCMILLAN (2003) | 4 groups  (3 edentulous 1dentate)  Implant supported  Conventional dentures  (requesting implants)  Conventional dentures  Routine treatment | 103 | 58.7, 60.2, 65.1, 58.7 | Clinical trial | Pre-treatment and post treatment | OHIP -49 | SF-36, Denture satisfaction | Yes |
| 5 | ALLEN, THOMASON, JEPSON, NOHL, SMITH AND ELLIS (2006) | 2 groups (edentulous)  Implant group  Conventional denture group | 118 | 64.5 (8.8)  68.5 (9.9) | Randomised controlled trial\* | Pre-treatment and 3 months post treatment | OHIP -49 | Denture satisfaction | Yes |
| 6 | ARMELLINI, HEYDECKE, HABIL/WITTER, AND CREUGERS (2008) | 5 groups  Short Dental Arches(SDA)- intact anteriors  SDA -interrupted anteriors  SDA -distal extension  SDA - interrupted with RPD  Complete dental arches | 160 | 54 ± 18 | (2 centre) Cross-sectional observational | One measurement alone prior receiving dentures | OHIP -49 | SF-36 | No |
| 7 | ASSUNCAO, ZARDO,DELBEN AND BARAO (2007) | 2 groups  Complete dentures (CD)  Upper CD opposed by implant supported dentures | 34 | 68 | Cohort | One measurement 2 months after delivery of dentures | Questionnaire based on OHIP | Comfort,  Aesthetics, ability to chew 8 foods types of varying textures, psychological limitations. | Yes |
| 8 | AWAD,LOCKER, KORNER-BTENSKY,FEINE(2000) | 2 groups of edentulous  Conventional dentures  Implant-supported dentures | 102 | 33-65 | Randomised controlled trial | Pre-treatment and 2 months post insertion | OHIP -49 | Nil | No |
| 9 | AWAD,LUND,SHAPIRO,LOCKER,KLEMETTI,CHEHADE,SAVARD AND FEINE(2003) | 2 groups (Maxillary conventional dentures) with  Mandibular conventional dentures  Mandibular over dentures | 60 | 69.3 male (2.8)  69.1 female (3.2) | Randomised controlled trial | Pre-treatment and 2 months post insertion | OHIP -49 , OHIP EDENT | VAS scale on Comfort,  Stability (denture), ability to chew (6 type of food), clean, speak | Yes |
| 10 | BAE,KIM,PAIK AND KIM (2006) | 2 groups (denture wearers)  Complete denture  Partial denture | 445 | 55-64 (29.7%)  65-74(46.5%)  >75 (23.8%) | Cross-sectional telephone  Survey | One measurement | OHIP- 49 (Korean version) | Status of the removable denture | No |
| 11 | BARAN AND NALCACI (2011) | Patients seeking removable partial denture | 136 | 62.47 (7.36) | Longitudinal observational | Baseline and 1 year follow-up | OHIP- 49 (Turkish version) | Denture status | No |
| 12 | ELLIS, PELEKIS AND THOMASON (2007) | 2 groups (edentulous)  Conventional denture group  Duplicate denture group | 40 | 74.2 (7.29)  73.1 (8.61) | Longitudinal observational | Pre-treatment, 1-month post treatment,  12 months post-treatment | OHIP-49 |  | Yes |
| 13 | EMAMI, ALLISON, GRANDMONT, ROMPRE AND FEINE (2010) | 2 groups (complete edentulous)  Mandibular conventional dentures;  Over dentures retained by implants (ball attachments) | 173 | 66-69 (30.1%)  70-79 (61.8%)  80-89 (8.1%) | Cross sectional observational | One measurement after 12 months follow up | OHIP- 20, | Sense of coherence mediated effect of dentures on OHQoL | No |
| 14 | FORGIE, SCOTT AND DAVIS (2005) | 2 groups (edentulous)  Requesting replacement dentures | 58  (32, 26) | 71 (9.6)  74 (10.3) | Longitudinal observational | Pre-treatment and 3 months post dentures | OHIP-14 | Change in satisfaction for replacement dentures | Yes |
| 15 | FURUYAMA, TAKABA, INUKAI, MULLIGAN, IGARASHI AND BABA (2012) | 2 groups (edentulous)  Implant supported  Removable partial dentures | 188  (79, 109) | 51.7 (12.4) | Cross sectional observational | One measurement at least 1 month post insertion of dentures | OHIP-49 (Japanese version) | - | No |
| 16 | GECKILI, BILHAN AND BILGIN (2011) | 1 group (edentulous conventional denture wearers seeking implant retained mandibular over dentures) | 78 | 65-82 | Within subject cross over trial | Baseline before insertion of dentures and a 6 month follow-up | OHIP-14 (Turkish version) | - | No |
| 17 | HA, HEO, JIN, PAIK AND BAE (2012) | Elderly individuals requiring dentures (beneficiaries of the Korean NDS) | 439 | 73.62 (6.07) | Longitudinal observational | Baseline and 3 months post receiving dentures through NDS | OHIP-14 (K) - Korean version | Assess effects of Korean National denture service | Yes |
| 18 | HARDER, WOLFART, EGERT AND KERN (2011) | Individuals with conventional dentures switching to implant supported mandibular dentures | 11 | 66.7 | Longitudinal observational | Baseline and 4 weeks follow-up | OHIP-49 (G) German version | Chewing ability | No |
| 19 | HEYDECKE, LOCKER, AWAD, LUND AND FEINE (2003a) | 2 groups (edentulous)  Mandibular implant retained dentures;  Conventional dentures | 55 | 68.9 (3.2)  69.4 (2.7) | Longitudinal observational | Baseline (pre-treatment) 2 & 6 month follow-ups  (6 months only for SF-36) | OHIP -20 | Difference in general health status in elderly  SF-36 | No |
| 20 | HEYDECKE G, TEDESCO LA, KOWALSKI C, INGLEHART MR (2004) | 1 group of (edentulous) Completer dentures | 249 | 66 (12) | Postal cross sectional survey | One measurement | OHIP-14 | Whether coping styles influence OHQOL, Brief COPE | No |
| 21 | HEYDECKE, PENROD, TAKANASHI, LUND, FEINE AND THOMASON (2005a) | 2 groups (edentulous)  Mandibular implant retained dentures;  Conventional dentures | 48 | 70.5 | Longitudinal observational | Baseline (pre –treatment) and one year post insertion of dentures | OHIP -20 | Cost effectiveness between two types of dentures | No |
| 22 | HEYDECKE, THOMASON, LUND AND FEINE (2005b) | 2 groups (edentulous)  Mandibular implant retained dentures;  Conventional dentures | 102 | 50.8 (7.2)  51.2 (7.7) | Longitudinal observational | Baseline, 2 months follow-up | OHIP-49 | Influence of prostheses on Social, leisure and sexual activities Social Impact Questionnaire (SIQ) | No |
| 23 | HWANG, PATTON, KIM AND KIM (2012) | Socially active community living elders | 634 | 74 (26.5) | Cross sectional observational | One measurement alone | OIDP | Whether chewing ability can influence OHQoL | N0 |
| 24 | JABBOUR, EMAMI, GRANDMONT, ROMPRE AND FEINE (2012) | 2 groups (edentulous)  Mandibular implant retained dentures;  Conventional dentures | 153 | 71 (4.5) | Longitudinal observational | Baseline. 1 year and 2 year follow-up | OHIP -20 | McGill questionnaire, Stability of improvement in OHQoL over time | Yes |
| 25 | JOHN, SLADE, SZENTPETERY AND SETZ (2004) | 3 groups  Fixed partial dentures  Removable partial dentures  Completer dentures | 107 | 43.8 (12.5)  60.5 (9.4)  68.1 (7.1) | Longitudinal observational | Baseline (pre-treatment) and at 1, 6 and 12 months follow-up | OHIP-49 G  German version | Differences in OHQoL based on types of dentures | No |
| 26 | KAMALAKIDIS, ANASTASSIADOU, SOFFOU, PISSIOTIS  (2016) | Individuals seeking replacement complete dentures | 20 | 74.2 (7.4)  71.5 (5.3) | Cross sectional | One measurement only | OHIP-20 | To assess difference in OHQoL and complete denture satisfaction questionnaires (CDS) satisfaction levels between two construction methods | Yes |
| 27 | KUBOKI, ICHIKAWA, BABA,HIDESHIMA, SATO,WAKE, NAGAO,UEDA,ONO,TAMAKI, TSUGA, SAKURAI, SATO, ISHIBASHI, YATANI, OHYAMA, AKAGAWA, HIRAI, SASAKI AND KOYANO (2012) | 3 groups  Edentulous  Partially edentulous  Patients with teeth problems | 151 | 66.3 (11.5) | Multi-axis. Longitudinal assessment | Measurement at baseline and 2 weeks after first visit | OHIP – 49  Japanese version | Evaluation of a multi-axis assessment scheme introduced for prosthodontic treatment | No |
| 28 | LEE, YANG, HO AND LEE (2012) | Elderly divided into 3 groups  Edentulous and satisfied  Edentulous and not satisfied with dentures  Dentulous | 1332 | 74.05 | Cross sectional observational | One measurement only | OHIP -49  (Chinese version) | Denture replacement | Yes |
| 29 | LOCKER, MATEAR, STEPHENS, LAWRENCE AND PAYNE (2001) | 1 group of elderly people | 225 (71%-removable dentures) | 83 | Cross sectional observational | Measured after a personal interview. Reference period of 1 year | GOHAI, OHIP-14 | Activities of daily living (ADL), Perceived stress questionnaire (PSQ) | Yes |
| 30 | LOCKER AND ALLEN (2002) | Community dwelling older adults | 541  (3 years follow up) | <50 | Longitudinal observational | Baseline 1, 3 and 7 year follow-up | OHIP -49 , OHIP -14 | To determine a short of OHIP questionnaire, Discriminant validity was determined between denture wearers | No |
| 31 | MICHAURD, GRANDMORT, FEINE AND EMAMI (2012) | 2 groups of denture wearers  Implant over dentures  Conventional dentures | 199 | 70  Range 64-85 | Longitudinal observation | Baseline and 6 month 1 year follow-up visits | OHIP - 20 | McGill Denture Satisfaction Instrument | Yes |
| 32 | MONTERO, LOPEZ, GALINDO, VICENTE AND BRAVO (2009) | 3 groups  Requesting prostheses  Conventional prostheses  Control group (neither) | 78  (31, 29,18) | 64.7  (10.7) | Cross sectional observational | Baseline and 3 months follow-up | OIDP and OHIP-14  Spanish versions | Satisfaction, chewing, aesthetic function | Yes |
| 33 | MORAIS, HEYDECKE, PAWLIUK, LUND AND FEINE (2003) | 2 groups edentulous  Implant supported mandibular dentures  Conventional dentures | 56 | 70.1  69.6 | Randomised controlled trial | Baseline and 6 and 12 months follow-up | (no explanation on OHQoL measure used) | Anthropometric data, Blood nutrients, General satisfaction Nutrition, chewing ability. | Yes |
| 34 | OZHAYAT, GOTFREDSEN, ELVERDAM AND OWALL (2010a) | Group of edentulous adults seeking both fixed and removable conventional prostheses | 22 | 67.5 | Longitudinal observational | Pre-treatment, 2-12 month follow up | OHIP - 49 | Schedule for the Evaluation of  Individual Quality of Life – Direct Weighing SEIQoL-DW, | No |
| 35 | OZHAYAT, GOTFREDSEN, ELVERDAM, OWALL (2010b) | Group of edentulous adults seeking oral rehabilitation | 60 | 60 | Longitudinal observational | Before start of the treatment and at four weeks follow-up | OHIP- 49 | Schedule for the Evaluation of  Individual Quality of Life – Direct Weighing SEIQoL-DW, | No |
| 36 | OZHAYAT AND GOTFREDSEN (2012) | 3 groups  2 groups denture wearers based on type of prostheses  1 group as a control | 307 | 60.8 | Longitudinal observational | Pre-treatment and 1-4 months post treatment | OHIP-49 | Effect of different prosthodontic treatment | Yes |
| 37 | PEARSON, GIBSON, DAVIS, GELBIER AND ROBINSON (2007) | 2 groups of denture wearers  Study group  (domiciliary service)  Control group (conventional methods) | 126 | 55 (39-76) | Randomised control trial | Pre-treatment and 3 months follow up | OIDP | Evaluation of a denture provision | No |
| 38 | PISANI, SEGUNDO, BALBINO, DE SOUZA, PARANHOS AND SILVA (2012) | Individuals wearing complete dentures with less retentive mandibular dentures | 33 | 68.2 (10.2) | Longitudinal observational | Prior to relining the denture and 3 months follow up | OHIP EDENT – Brazilian version | To check if relining dentures improves OHQoL |  | |
| 39 | REISSMANN, JOHN AND SCHIERZ(2011) | Convenience sample of people seeking dental treatment at a prosthodontic unit | 42 | 57.5 (15.7) | Longitudinal observational | 3 measurements within 3-4-week period post intervention. One pre-treatment for new patients | OHIP-49 | Influence of administration methods | No |
| 40 | RING, HOFER, HEUSTON, HARRIS AND BOYLE (2005) | Individuals receiving conventional denture treatment | 117 | 64 (8) | Randomised control trial | Baseline before treatment and 3 month follow-up after treatment | OHIP -49 | Schedule for the Evaluation of  Individual Quality of Life – Direct Weighing SEIQoL-DW | No |
| 41 | Ryu,Tsakos and Sheiham (2008) | Individuals recruited in Korean National health survey | 1029 | 30-64 | Cross sectional observational | One measurement only | Condition specific (CS -OIDP) | Compare normative and socio-dental prosthodontic needs | No |
| 41 | Samnieng, P Lekatana, H (2016) | Community dwelling Thai aged 60 years or older | 428 | 68.79 | Cross sectional observational | One measurement only | GOHAI | Quality of life was assessed with WHOQOL-BREF | No |
| 43 | SOUZA, PATROCINIO, PERO, MARRA AND COMPAGNONI (2007) | Edentulous conventional complete denture wearers | 58 | 69.1 (10.3)) | Longitudinal observational | Baseline before surgery and follow-up 3 months after surgery | OHIP EDENT – Brazilian version | Validation of the OHIP-EDENT version | No |
| 44 | Torres, Costa, Modena, Cota, Cortes and Seraidarian (2011) | 2 groups edentulous  Implant supported mandibular dentures  Conventional dentures | 100 | 64.24 (10.69)  61.78 (8.92) | Cross sectional observational | One measurement only? (mention of 12 months prior conclusion of study) | OHIP-14 | Association between personality traits and quality of life  in denture wearers | No |
| 45 | Tsakos, Sheiham, Iliffe, Kharicha, Harari, Swift, Gillman, and Stuck(2009) | Community-dwelling elders 65 yrs. of age and older | 1054 | 74.7 | Secondary data from Randomised control trial | One measurement only | GOHAI | Health Risk  Appraisal for Older Persons (HRA-O) | No |
| 46 | Veyrune, Jeanin, Dutheil and Riordan (2005) | Patients seeking new dentures randomised into 2 groups. | 26 | 64.5 (10.7) | Randomised controlled trial | Baseline, at denture placement, 6 weeks, 12 weeks follow up (Group 1). Group 2 after denture placement only | GOHAI- French version | Effect of new dentures on satisfaction | Yes |
| 47 | Wolfart, Heydecke, Luthardt, Marre, Freesmeyer, Stark, Wostmann, Mundt, Pospiech, Jahn, Gitt, Schadler, Aggstaller, Talepur, Busche and Bell (2005) | 2 groups  RPD group  Premolar occlusion group (PROC) | 21 | 62 (10) | Multi-centre randomized clinical trial (PILOT) | Pre-treatment, 6 weeks, 6 months and 12 months follow-up | OHIP-49 | Research Diagnostic Criteria  (RDC) questionnaire | No |
| 48 | WOSTMANN, BALKENHOL, KOTHE AND FERGER (2008a) | 3 groups  No prosthesis  Non-functioning prosthesis  Removable partial dentures | 98 | 60.3 (10) | Longitudinal observational | Baseline, 1 year follow up | DIDL | Crown retained RPDs impact on patient’s well being | Yes |
| 49 | Wostmann, Michel, Brinkhert, Weskhott, Rehmann and Balkenhol (2008b) | Group of patients capable of self- feeding themselves >60 years, with dentures requiring repair or replacement | 47 | 72.6 (6.7) | Longitudinal observational | Baseline, 6 month follow up | OHIP-G14 German version | Mini Mental Status (MMS); Mini Nutritional Assessment (MNA);  Serum parameters, Masticatory efficiency test (MET) | No |

* OHIP – Oral health Impact profile
* OIDP – Oral Impacts on Daily performance
* SF – Short form;
* GOHAI – Geriatric Oral Health Assessment Index
* DIDL – Dental Impact of Daily Living

Sample sizes ranged from just 11 participants (Harder et al., 2011) to 1332 (Lee et al., 2012). Participants predominated in the 50-70’s age group (Abuzar et al., 2012, Allen et al., 1999, Ellis et al., 2007) with overall age range between 30 to 89 years. Most were (thirty-two) were either longitudinal observational studies or randomised control trials. The studies included involved patients seeking replacement dentures (Forgie et al., 2005), duplicate dentures (Ellis et al., 2007), dentures with shortened dental arches (SDA’s) (Armellini et al., 2008), removable partial dentures and complete dentures (Bae et al., 2006); people wearing loose complete dentures (Pisani et al., 2012). Although, few studies involved surveying elderly populations (Ha et al., 2012, Hwang et al., 2012, Locker et al., 2001, Lee et al., 2012, Locker and Allen, 2002, Ryu et al., 2008, Tsakos et al., 2009, Wostmann et al., 2008b).

**Table 2‑3. OHQoL measures used in studies used in the systematic review**

|  |  |
| --- | --- |
| **OHQoL measure** | **Studies (Authors, Date)** |
| Oral Health Impact Profile - 49 | Allen et al., 1999, Allen et al., 2006, Armellini et al., 2008, Awad et al., 2000, Awad et al., 2003, Heydecke et al., 2005b, Locker and Allen, 2002, Ozhayat et al., 2010a, Ozhayat and Gotfredsen, 2012, Reissmann et al., 2011, Ring et al., 2005, Wolfart et al., 2005 |
| Oral Health Impact Profile – 14 | Abuzar et al., 2012, Forgie et al., 2005, Locker et al., 2001, Locker and Allen, 2002, Torres et al., 2011 |
| Oral Health Impact Profile – 36 | Allen and McMillan, 2003 |
| Oral Health Impact Profile – 20 (EDENT) | Emami et al. 2010, Heydecke et al., 2003b, Jabbour et al., 2012, Michaud et al., 2012 |
| Geriatric Oral Health Assessment Index (GOHAI) | Locker and Allen, 2007, Tsakos et al., 2009 |
| Oral impacts on daily performances (OIDP) | Montero et al. 2009, Pearson et al., 2007, Ryu et al., 2008 |
| Dental Impact on Daily living (DIDL) | Wostmann et al., 2008b |
| Other language versions of OHIP – 49, 14; OIDP | Bae et al., 2006, Baran and Nalcaci, 2011, Furuyama et al., 2012, Geckili et al., 2011, Ha et al., 2012, John et al., 2004, Kuboki et al., 2012, Lee et al., 2012, Montero et al., 2009, Pisani et al., 2012, Souza et al., 2007, Veyrune et al., 2005, Wostmann et al., 2008b |

In all except one study (Assuncao et al., 2007), OHQoL was used as the primary outcome measure using standardised OHQoL measures (Table 2-2). Nineteen of the studies also measured denture satisfaction alongside OHQoL (Abuzar et al., 2012, Allen et al., 1999, Allen et al., 2001, Allen and McMillan, 2003, Allen et al., 2006, Assuncao et al., 2007, Ellis et al., 2007, Forgie et al., 2005, Ha et al., 2012, Jabbour et al., 2012, Lee et al., 2012, Locker and Allen, 2002, Ozhayat et al., 2010b, Michaud et al., 2012, Montero et al., 2009, Wostmann et al., 2008b, Veyrune et al., 2005). Of the 19 studies, 11 of them showed significant associations between denture satisfaction and OHQoL (Allen et al., 2001, Locker et al. 2001, Locker and Allen, 2002, Allen and McMillan 2003, Awad et al., 2003, Forgie et al., 2005, Veyrune et al., 2005, Allen et al. 2006, Jabbour et al., 2012, Ha et al., 2012, Montero et al., 2009).

Other patient reported outcomes such as denture comfort, pain, chewing ability and stability were investigated in 13 studies (Locker and Allen, 2002, Heydecke et al., 2003b, Bae et al., 2006, Assuncao et al., 2007, Michaud et al., 2008 Emami et al., 2010, Baran and Nalcaci, 2011, Geckili et al., 2011, Hwang et al., 2012, Jabbour et al., 2012, Kuboki et al., 2012, Lee et al., 2012, McKenna et al., 2012).

### Variables identified

This review aimed to identify factors that predict OHQoL in denture wearers. Based on the Wilson and Cleary (1995) model, the individual and environmental factors were identified and have been tabulated in the Tables 2.3 and 2.4

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Individual factors** | **No of studies** | **Authors & Date** | **Study design** | **Measure** | **Result positive or negative** |
| **Age** | 11 | (Awad et al., 2000, Heydecke et al., 2003b, Forgie et al., 2005, Bae et al., 2006, Ellis et al., 2007, Michaud et al., 2008, Emami et al., 2010, Torres et al., 2011, Abuzar et al., 2012, Hwang et al., 2012, Jabbour et al., 2012) | Cross-sectional, Randomised control trial, Longitudinal study, Survey | OHIP 14, OHIP 49, OHIP-20, OIDP (Korean), | Non-significant or no association |
| 8 | (Allen et al., 2006, Armellini et al., 2008, Tsakos et al., 2009, Furuyama et al., 2012, Ha et al., 2012, Lee et al., 2012, Ozhayat and Gotfredsen, 2012) | Randomised control trial, Cross-sectional study, Longitudinal study | OHIP 49, OHIP – J 49 (Japanese), OHIP-14 K (Korean), OHIP Chinese, GOHAI | Significant association |
| **Gender** | 9 | (Awad et al. 2000) (Ellis et al., 2007, Michaud et al., 2008, Torres et al., 2011, Abuzar et al., 2012, Ha et al., 2012, Hwang et al., 2012, Jabbour et al., 2012, Lee et al., 2012) | Longitudinal study, Cross-sectional study | OHIP, OHIP-20, OHIP-14 K (Korean), OIDP (Korean), OHIP Chinese, OHIP-14 | Non-significant or no association |
| 2 | (Armellini et al., 2008, Tsakos et al., 2009) | Cross-sectional study, Randomised control trial | GOHAI | Significant negative gender effect (Women ) |
| 3 | (Baran et al., 2007, Emami et al., 2010, Geckili et al., 2011) | Longitudinal, Cross sectional, Crossover trial | OHIP (Turkish), OHIP 20, OHIP-14,OHQoL- UK | Significant negative gender effect (Men) |
| **Subjective SES** | 0 |  |  |  |  |
| **Perceived stress** | 2 | (Locker et al., 2001), Locker & Allen, 2002 | Cross-sectional, Survey | OHIP, OHIP-14, GOHAI | Strong association |
| **Concern about oral health** | 2 | (Locker and Allen, 2002, Kuboki et al., 2012) | Cross sectional, Multi-axis longitudinal study | OIDP (Korean), OHIP Chinese, OHIP | Significant association |
| **Coping strategies** | 1 | Heydecke et al (2004) | Cross-sectional survey | OHIP-14 | Certain association present |

**Table 2‑4. Individual factors associated with OHQoL in denture wearers**

**Table 2‑5. Environmental factors associated with OHQoL wearing dentures identified from the review**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Factors** | **No of studies** | **Authors & Date** | **Study design** | **Measure** | **Relationship between variable and OHQoL** |
| **Education** | 5 | (Tsakos et al., 2009, Emami et al., 2010, Torres et al., 2011, Abuzar et al., 2012, Lee et al., 2012) | Cross-sectional, Longitudinal, Randomised control trial | OHIP Chinese, OHIP-14, GOHAI | Significant association – Higher education better OHQoL |
| 1 | (Jabbour et al., 2012) | Longitudinal | OHIP Turkish version OHIP-20 | Non-significant or no association |
| **Employment** | 1 | (Baran and Nalcaci, 2011) | Longitudinal | OHIP (Turkish) | Significant association – Employed better OHQoL |
| 2 | (Emami et al., 2010, Jabbour et al., 2012) | Cross-sectional ,Longitudinal | OHIP-20 | No significance or no association |
| **Income** | 4 | (Tsakos et al. 2009, Torres et al. 2011, Abuzar et al. 2012, Lee et al. 2012) | Cross-sectional, L:ongitudinal study, Randomised control trail | OHIP , OHIP Chinese, OHIP 14, GOHAI | Higher income better OHQoL |
| 2 | (Emami et al., 2010, Jabbour et al., 2012) | Cross-sectional, Longitudinal | OHIP-20 | Not significant or no association |

## Individual factors and OHQoL in denture wearers

As tabulated in Table 2-3, various individual factors were associated with OHQoL in denture wearers in the review. The following factors: Coping strategies, subjective socio-economic status, perceived stress, ageing expectations, and concern about oral health and their association with OHQoL are explored in depth in this section

### Coping strategies

Appropriate coping strategies have been shown to reduce the risk of oral diseases (Genco et al., 1999) and have been associated with OHQoL in denture wearers as identified in this review (Heydecke et al., 2004).

#### The concept of coping

Traditionally, coping was discussed under two types of literature. Firstly, in animal experiments as a survival mechanism of an organism to escape, avoid and overcome noxious agents (Miller, 1980a, Ursin, 1980). A second type was based on psychoanalytical psychology, also known as the psychoanalytical- ego approach with a realistic, flexible thought process to solve problems and reduce stress (Aldwin, 2007). Within this type of literature, Lazarus (1993) contrasted two different approaches towards conceptualising coping (i) as a style, personality characteristic or trait and (ii) as a context specific process or a strategy.

#### Coping as a trait or style

Traits are properties or characteristics within an individual, under a given class or pattern of situations comes out as reactions in a particular at their own disposal (e.g.) repression-sensitisation, anger-in and anger-out, coping-avoiding monitoring-blunting (Funkenstein et al., 1957, Goldstein, 1959, Goldstein, 1973, Shipley et al., 1978, Harburg et al., 1979, Shipley et al., 1979, Miller, 1980b, Krohne and Rogner, 1982, Miller, 1987).

Thus coping styles are broad, pervasive and encompassing ways of relating particular types of people (e.g.) being powerful, hostile, controlling, ambiguous, evaluative, imminent, evaluative or vice versa (Lazarus and Folkman, 1984).

However, this approach was criticised for assuming to operate as a stable disposition through an individual’s life-course and underestimating complexities and variability (Lazarus and Folkman, 1984).

#### Coping as a process or state

Lazarus and Folkman’s (1984) alternative approach regarding coping was that it being a process-oriented, dynamic concept that changes according to the specific needs of individuals. This concept placed the process within conditions of psychological stress, requiring thought processes and behaviour modification (Lazarus, 1993).

Coping was thus defined by them as a process of *“ constantly changing cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resource of the person”* (Lazarus and Folkman, 1984; p.141)

The Transactional model of stress and coping (Figure 2-4) explains coping as a transactional process as conceived by Lazarus and Folkman (1984). The transaction is a dynamic encounter between an individual and their environment arising as result of a stressful event. The transactional process can occur within a few moments, may continue for hours, days, weeks and even years. Stress arises as soon as the person perceives that he/she is vulnerable, threatened and cannot adequately to cope with the situation (Lazarus and Folkman, 1984).

**Figure 2‑4. Transactional model of stress and coping (Lazarus and Folkman, 1984)**

**Stressful event**

**PRIMARY APPRAISAL**

* **Should I deal with this?**
* **Am I in trouble?**
* **Does this matter to me?**

**SECONDARY APPRAISAL**

Any coping options?

Will I be able to cope?

Will the coping strategy work?

**Inadequate resources**

**To COPE**

**Stress**

**Adequate resources**

**To COPE**

Emotion focussed

**COPING**

Problem focussed **COPING**

**REAPPRAISAL**

Post the stressful event, the process of appraisal (i.e.) cognitive subjective evaluation of the transaction between the individual and the environment occurs. This evaluation enables the individual to interpret whether the event is stressful or not. There are three types if appraisal namely, primary, secondary and reappraisal. Primary appraisal is the cognitive evaluation that decides whether an event is stressful or not. The possible outcomes of which are either ‘irrelevant’, ‘benign-positive’ or ‘stressful’. If appraisal outcome is irrelevant then usually the event has no implication on the individual’s well-being. If it is benign or positive, the event might even improve their well-being. Whereas if the event is interpreted as stressful, it is usually further appraised as either Harm/loss, threat or a challenge. Usually stressful event appraisals are chronic (McCrae, 1984)

The secondary appraisal evaluates the extent to which additional resources are needed to cope with the stressful situation. Competences, social support, resources to deal with stressors in order to re-establish equilibrium between person and environment is usually evaluated (Schwarzer, 2001). An individual usually asks three questions when evaluating their competence.

1. Coping options available?

Internal: individual strength, determination; External: peer support, professional health care

1. Likelihood of being able to apply the strategy?
2. Likelihood that it will work (i.e.) will it reduce stress?

Usually if the secondary appraisal suggests enough resources to cope with a stressful event, the individual then resorts to implementing either problem-focussed coping or emotion-focussed coping strategies.

Problem focussed coping strategies are those followed when an individual feels that they have control of the situation and thus can manage the source of the problem (Lazarus and Folkman, 1984). They are objective, analytical process that focusses mainly on the environment and involve attempts or efforts to reduce the demands of the stressor or to increase the available resources to manage the stress (Ogden, 2012).

The efforts are directed towards defining the problem, generating alternative solutions, weighing the positives and negatives of both and learning new skills to manage (Lazarus and Folkman, 1984).

Emotion focussed coping involves attending to the emotional consequences of the stressor. The usual behavioural and cognitive responses are avoidance or minimization of the stressor, distancing oneself, acceptance, seeking emotional support, venting anger. These strategies decrease emotional distress that arises out of the stressful event. They are often used when the individual feels that nothing can be done about the situation (Lazarus and Folkman, 1984). Emotion focussed strategies can itself trigger more stress and negative emotions based on the relevance of the coping strategy. Such subsequent stress or distress is followed by appraisals known as reappraisals.

Reappraisals are continuous from coping strategies on the basis of new information that might emerge out of the initial coping strategy. Its mechanism is identical to the initial process of appraisal except that the stressor is not from a fresh stimulus. It usually arises due to using emotional coping strategies. Reappraisals may lead to more stress and distress (Lazarus and Folkman, 1984)

#### Measuring coping strategies

Folkman and Lazarus’s (1980) “Ways of Coping” scale is based on their framework (Lazarus, 1966, Lazarus and Launier, 1978). This scale comprises 68 items including domains such as defensive coping (avoidance, isolation, suppression and intellectualisation), information-seeking, problem solving, and palliation, inhibition of action, direct action and magical thinking. The items are classified in two sub-scale categories namely, problem-focussed and emotion-focussed coping. However the validity of the subscales were weak, the internal consistency and reliability were very modest (Endler and Parker, 1990).

The COPE questionnaire was designed to further scrutinise this distinction and explore problem-focussed coping (Carver et al., 1989). This measure was designed using the Lazarus model of stress and coping (1987) and another model of behavioural self-regulation (Carver and Scheier, 1981).

The COPE questionnaire contains 53 items with 14 sub-scales. Five sub-scales measure conceptually distinct themes of problem-focussed coping; active coping, planning, suppression of competing activities, restraint coping and seeking instrumental social-support. Five other sub-scales measured the aspects of emotion-focussed coping (i.e.) seeking emotional support, positive re-interpretation, acceptance, denial and turning to religion. The rest four sub-scales measure the other coping strategies such as venting, behavioural, alcohol-drug and mental disengagement responses. This scale was shown to possess good psychometric properties (Balducci et al., 2008), but had certain inadequacies for use in specific populations like community alcoholic drinkers were shown (Hasking and Oei, 2002).

The inventory showed good test-retest reliability, even in cross-cultural versions (Sica et al., 1997). A brief 28 item version was developed (Brief COPE; Carver 1997). This inventory had the same 14 subscales with two items and was developed due to the length of the previous questionnaire. The psychometric properties of this scale are presented in the methods section

#### Coping strategies, health-status and oral health behaviours

Better coping strategies have shown positive associations with health outcomes and health-related quality of life in mental health issues (Garnefski et al., 2002) and illnesses such as asthma (Van De Ven et al., 2007), arthritis (Burke and Jean, 1993, Sawyer et al., 2004), cancer (Reynolds et al., 2000, Kershaw et al., 2004) and inflammatory bowel disease (Van der Zaag-Loonen et al., 2004).

In relation to oral health, very few studies have explored the association coping strategies. Geno and colleagues (1999) conducted a cross-sectional study of 1,426 subjects to assess the relationship between periodontal disease, stress, distress, and coping. The study used a combination of five psychosocial questionnaires of which coping strategies was one of them. Periodontal disease was measured using clinical assessments for plaque, gingival bleeding, calculus, probing depth, clinical attachment and alveolar crestal height (ACH)

The findings of the study suggested that, emotion-focussed coping (inadequate coping) had a higher risk of having more severe attachment and alveolar bone loss. However, problem-based coping (considered adequate coping) no periodontal disease which suggested that the effects of stress on periodontal disease can be moderated by adequate coping behaviours.

Wimmer and colleagues (2002) conducted a case-control study of 89 patients who had chronic destructive periodontitis compared with 63 individuals with no disease. The patients with disease used more distractive and defensive coping and less active coping than the control group. There was a significant association between defensive coping and periodontal attachment loss.

Very few studies have explored the relationship between coping strategies, oral health and related behaviours. They show associations between negative coping strategies associated with increased risks in oral diseases. However, these are not generalisable due to insufficient evidence.

#### Coping strategies, OHQoL and dentures

Just as oral health, very fewer studies have explored the associations between coping strategies and OHQoL. The relationships between these two factors are however suggested in the absence of data (Baker et al., 2008, Reissmann et al., 2012).

Rodd and colleagues (2012) explored the psychosocial predictors of OHQoL in children during a transition period to secondary school. Ninety-two children aged between 10-11 years completed a short form of the Child-perception questionnaire before entering secondary school and three months post-transition.

Children with low self-esteem and practising ‘avoidance coping strategies experienced low OHQoL. Authors suggested further exploration into the causal pathways between coping strategies and OHQoL.

In a recent longitudinal study, 101 people experiencing dentine hypersensitivity completed a series of questionnaires (Porritt et al., 2014). A direct significant pathway was found between emotion-based coping strategies and worse OHQoL in individuals experiencing frequent sensations of dentine-hypersensitivity. This suggested that coping strategies was associated OHQoL of individuals with severe hypersensitivity and hence that an individual’s coping strategies can play a role in determining OHQoL.

This review however aims to explore predictors of OHQoL in individuals receiving dentures. The role of coping strategies in predicting OHQoL in denture wearers is not known. The review in section 2.2 identified one study on this topic (Table 2-3) by Heydecke and colleagues (2004). This cross-sectional study investigated whether the effect of coping strategies was related to OHQoL in individuals receiving dentures through a cross-sectional observation. Two hundred and forty-nine fully edentulous patients completed mailed questionnaires comprising of OHIP-14 (measuring OHQoL) and Brief COPE (measuring coping strategies). Significant negative associations were found between the emotional coping themes of Brief COPE such as behaviour disengagement, substance abuse, denial and religion with OHQoL. Emotional support alone showed positive significance. The study concluded by suggesting that coping strategies of an individual may moderates the impact of wearing dentures on OHQoL. Causality cannot be affirmed with this being a cross-sectional observation. However, this was one of the first studies that explored such relationships in denture wearers and provides a rationale to further explore this relationship. Such exploration might elucidate whether coping strategies predict OHQoL in denture wearers, thus influence the denture success.

### Ageing expectations

Until recent times, people of old age were seen as living past a healthy and functional life (Schroots, 1996). Functional impairments and cognitive decline were considered as inevitable parts of ageing (Sarkisian et al., 2001).It has been suggested that care decisions taken by older adults are influenced by such expectations (van't Veer-Tazelaar et al., 2008)

Neugarten (1969) suggested that the sequence of major life events created “a normal, expectable life cycle” postulating that individuals have their own social clocks and will consider themselves being “early,” “late,” or “on-time” when achieving a transition or event. These normal, expectable life events were considered to be turning points and the expectation to encourage planning and rehearsal. When illness arrives at a usual age, the individual will be emotionally ready resulting in little or no need for emotional resources. Conversely, when it occurs early in life it can lead to crises. At that point, emotional support becomes imperative (Conlon, 2013).

#### Consequences of ageing expectations

Old adults who attribute their symptoms to old age (i.e. expectations regarding ageing) were less likely to seek help (Prohaska et al., 1987) and more likely to accept the illness and its symptoms (Leventhal and Prohaska, 1986). Similarly, Sarkisian hypothesized that older people who attribute illness to ageing are less likely to “engage in self-care and health promoting behaviours that make successful aging possible” (Sarkisian et al., 2002b). Lower expectations regarding ageing is independently related to low physical activity levels (Sarkisian et al., 2005) and have an impact on health status (Kim, 2009). Thus, it is suggested that expectations regarding ageing can influence older persons’ judgments with respect to self-care, health promotion behaviours and care seeking. Receiving dentures could be considered as an ageing expectation.

#### Ageing expectations, quality of life, oral health dentures

Sarkisian and colleagues’ (2005) survey of 429 older people (mean age = 76 years) found that lower expectations of ageing were associated with lower physical and mental health related quality of life. In a secondary analysis of a surveys conducted in 20 countries as part of the WHOQOL-OLD field study (n= 4593 adults, mean age = 72 years) participants’ attitude toward ageing mediated the relationship between subjective health and quality of life (Low et al., 2013).

Expectations regarding ageing has been underexplored in relation to oral health. The review conducted in section 2.2 did not identify any studies associating ageing expectations with OHQoL in denture wearing individuals. Although studies have found that age is not a cause for losing tooth and wearing dentures, denture wearing is more likely in older people. Hence, understanding whether an individual’s expectations regarding their ageing influenced denture success was deemed crucial in order to under the association between age and wearing dentures. So it was included as one of the variables in this study.

### Concern about oral health

Bandura (2006) stated that individual’s beliefs as powerful personal resources enabling them achieve results by action and negotiating with their everyday lives. They are suggested to play an essential role in individual’s behaviour, confidence and perceptions by means of cognitive, motivational, affective and decisional processes thereby contributing to their health.

Concern about one’s oral health is an oral health belief. An individual with limited concern about health might be more likely to engage in health risking behaviours and be less likely to respond to health promotion initiatives. Individuals who exhibit a lack of concern about oral health show negative dental self-care behaviours such as dental neglect. Such negative dental behaviours predict poor oral health outcomes (Nuttall, 1996, Thomson et al., 1996, Sanders et al., 2004a).

Lack of concern about oral health can be equated to dental indifference. Dental indifference is an attitude that undervalues teeth, displays lack of interest and lack of adherence to health care recommendations (Nuttall, 1996). It has been shown as one of the reasons for dental non-attendance in general population as some people may have more important things to be concerned about than teeth. Marshman and colleagues (2014) demonstrated that dental indifference was associated with OHQoL in prisoners and suggested that services need to address this issue to improve oral health.

Maslow (1943) conceptualised human needs in the form of a hierarchy. He observed a pattern of human behaviour that addressed priorities based on individual needs. His five stage model was broadly grouped into basic needs (i.e. physiological, safety, love / belongingness and esteem) and growth needs (i.e. self-actualisation) in a hierarchy. An individual’s needs must be satisfied at the lower levels before they progress to the higher complex levels. In this way, we can understand individual’s concern about their oral health may be a complex need in their hierarchy. Maslow’s hierarchy was used as a framework to assess concern about oral by Marshman and colleagues (2014)

#### Concern about oral health and OHQoL, denture wearers

Two studies (Table 2-3) from this review showed significant associations between concern for oral health and OHQoL in denture wearers (Locker and Allen, 2002, Hwang et al., 2012)

Locker and Allen (2002) measured, self-rated oral health and self- perceived dental need among elders visiting a geriatric care centre (Locker et al., 2001) of whom 31% were edentate and 71% of the dentate wore partial dentures. Irrespective of denture status there were significant associations between self-rated health, perceived dental need and improvement in OHIP-14 scores. Although perceived need is a different dimension altogether an item in the questionnaire asking the concern about oral health was significantly associated with OHQoL (OHIP-14).

Hwang and colleagues (2012) study of 634 independent elders in Korea (51 edentate), explored the relationship between Oral Impacts on Daily Performances (OIDP) scores and chewing ability. OHQoL was better in denture wearing individuals than edentate adults. Concern about oral health (recorded as ‘concerned’, ‘not concerned’ and ‘neither’) was related to OHQoL. This was the only study extracted in the review to demonstrate a direct relationship between concern about oral health and OHQoL in a positive direction. While these data support a relationship between concern about oral health and OHQoL in denture wearers, its causal direction is questionable as the study was cross-sectional.

The above studies suggest indirect as well as direct relationships between concern about oral health and OHQoL in denture wearers and give a rationale to further explore this relationship to provide more insights into whether individual’s concern about oral health mediates or confounds the successful outcomes (OHQoL) in denture wearers.

### Perceived stress

Definitions

Stress is defined as a *”perceptual phenomenon arising from a comparison between the demand on the person and his (sic) ability to cope”* (Cox, 1978)*.*

Likewise, Cohen and colleagues (1995; p.3) define stress as “*a process in which environmental demands tax or exceed the adaptive capacity of an organism, resulting in psychological and biological changes that may place person at risk for disease” (p3)*

These definitions emphasise the adaptive capacity of an individual. This capacity is subjective and varies from person to person. Both groups of authors explained stress under objective stressful events, coping processes and personality factors. When this stress levels exceed the adaptive capacity the individual may become vulnerable to a disease.

Perceived stress is explained as something that is subjectively experienced by an individual when they believe that their demands exceed their ability to cope (Lazarus and Folkman, 1984). This lead to the development of ‘Transactional Model of stress’ (Lazarus and Folkman, 1987). This model introduced the concept of cognitive appraisal and transaction between the individual and the environment to elicit a stress response. This model was elaborated earlier under the coping strategies section.

#### Stress mechanisms and health

Various models of stress have been explored in the past. Models such as the Cannon’s (1939) fight or flight model and Selye’s (1956) General Adaptation Syndrome (GAS) based on as stimulus-response framework.

Based on how an individual perceives the stressor (i.e. a cognitive appraisal) they have three types of response namely, emotional, physiological and behavioural. Emotional responses are usually expressed negatively in the form of annoyance, anger, apprehensions, fear, sadness or positively (whilst having adaptive significance) like being thankful, joyful, hopeful, encouraged and content (Carver and Vargas, 2011).

Physiological responses are usually in the form of fight or flight response as Seyle’s (1956) GAS as mentioned earlier. In fight or flight response the modern stressors usually lead to a long-term response. The GAS has three stages namely alarm stage, resistance stage and exhaustion stage.

Behaviourally individuals respond to stressors by catharsis where they abandon the emotions completely, by coping either emotionally or with active problem-solving approach. Individuals experiencing stress are suggested to engage themselves with poor health practices or health impairing behaviours such as having adverse smoking habits, consumption of alcohol and poor eating habits, thus increasing the risk of illness (Cohen and Williamson, 1988). Other impacts may be increase the risk of psychosomatic disorders, hypertension, ulcers and migraines

#### Perceived stress, clinical status, oral diseases and dentures

Stress is considered an important risk factor both in terms of physical and mental health. Studies suggest that various illnesses (e.g.) respiratory (Cohen et al., 1991), cardiovascular (Dimsdale, 2008) and cancers (Mundy-Bosse et al., 2011) have stress as an underlying factor.

#### Effects on oral health

Studies suggest that In terms of oral health, stress due to life events such as upheaval of a native led to an increase in dental caries (Sutton, 1993). Stress can also influence periodontal diseases occurrence in an individual (Hugoson, 2002). Marcenes and Sheiham’s (1992) cross-sectional study of 164 male workers in Brazil aged 35-44 years showed that perceived stress was strongly associated with their poor periodontal health even after controlling SES. Workers with high demands at work-reported gingival bleeding and pockets. Stress was higher in patients with rapid progressive periodontitis than those having chronic adult periodontitis (Monteiro da Silva, 1996).

#### Causes of stress in oral health

Studies have focussed on the perceived stress due to dental life events such as tooth loss and receiving new dentures (Bergendal, 1989). Perceived stress due to dental life events are rated higher than many other life events (Klock and Haugejorden, 2002).

In a questionnaire survey with 311 Swedish adults, the relative readjustment needed when receiving new dentures was compared with 46 everyday life events using the Social Readjustment and Rating Questionnaire (SRRS) (Bergendal, 1989). The results showed that receiving new dentures was ranked 33rd, higher than life events such as tooth loss, marriage, retirement, changing work domestic issues etc. However, this study has only compared these two dental life events of receiving dentures and tooth loss against more general stressors.

Similar studies were conducted in Norway (Haugejorden et al., 1993, Klock and Haugejorden, 2002).

The former again compared dental events against general life events. Receiving dentures was ranked 33rd as was the case with Bergendal (1989). This study suggested further that coping skills are required for individuals receiving dentures. The latter study assessed coping skills and predictors of ability to cope with dental life events using a short form of Social Readjustment Rating Questionnaire (SSRQ). The results were similar to that of the former. Although receiving dentures is not an oral disease or a condition, the perceived stress was higher than cause of tooth loss by oral diseases such as periodontitis.

#### Perceived stress and OHQoL

Perceived stress has been associated with negative views of oral health (Locker, 2000) and low self-ratings of oral health by adults despite adjustments for age, gender, income and missing teeth (Sanders and Spencer, 2005). Such associations have been shown across ethnic groups (Watson et al., 2008).

A cross-sectional study of 3678 Australian adults (aged 18-91 years) related perceived stress with higher OHIP-14 scores. Similar associations were found in a study among 225 elders in Toronto (Locker et al., 2001). The sample included a large proportion of denture wearers (71%), suggesting an association between perceived stress and OHQoL in denture wearers. These studies were cross-sectional, thus a causal relationship cannot be established (Sanders and Spencer, 2005).

The literature on the effect of perceived stress on OHQoL in denture wearers is limited. Two studies (Table 2-3), discussed perceived stress and its relationship with oral health status and OHQoL in denture wearers (Locker et al., 2001, Locker and Allen, 2002).

No study was identified that explored the social factors and other pathways that may mediate the effects of perceived stress on OHQoL in denture wearers. Hence, it cannot be affirmed that perceived stress levels predict denture success by mediating or confounding OHQoL. But these existing associations provide a rationale to further explore whether perceived stress levels mediate or confound OHQoL in denture wearers.

### Subjective Socio-Economic Status

Subjective socio-economic status (SES) considers an individual’s perception of how they rank themselves in relation to others. Jackman and Jackman (1973) defined Subjective SES as “the individual’s perception of his own position in the social hierarchy”. However, how subjective SES influences health and the mechanism of the associations is not explicit.

People use non-economic criteria to interpret and judge their own socio-economic status (Singh-Manoux et al., 2003). Factors such as prestige also influence subjective SES so that it is considered as a reflection of the cognitive averaging of the standard markers of SES. It is thought to add a social element to the association between SES and health outcomes (Nock and Rossi, 1979) and may serve as a better marker for self-reported health outcomes (Ostrove et al., 2000, Operario et al., 2004, Hu et al., 2005, Franzini and Fernandez-Esquer, 2006).

An individual’s perception of their position in the society and its hierarchy may generate emotions that reflect on their physiological processes on neuroanatomical structures. This may eventually lead to an increased biological vulnerability. Indirectly, adoption of unhealthy behaviours may occur (Wilkinson, 1992). Singh-Manoux and colleagues (2005) gave three different hypotheses to explain the effect of subjective SES on health. Firstly, as a measure of social position based on their past and perceptions of future.

Secondly, the hierarchy-health relationship that sees subjective SES as crucial in assessing the relative position of an individual in the hierarchy of the society they live in. This concept explains the SES and health link in a better way than objective SES (Wilkinson, 2002). For instance, objective indicators such as the position in an occupation may generate the same ratings for two different individuals working the same position for an occupation (e.g. a HR manager) but those who work for a more prestigious organisation or a corporation might want to rate their subjective status higher than the other.

The third perspective was reverse causation or common method variance. The association between subjective SES and health may be false, based on the possibility that individual assessments of SES can be mediated by other factors like health status etc. due to response bias. However, the test-retest reliability demonstrated by this measure has consistently shown to be adequate in various samples in variety of populations. The results shown by these studies may justify the overruling the argument of response bias.

Despite these findings, the association between SES and health require in depth observation (Singh-Manoux et al., 2005), especially as it has not been studied in relation to denture success.

#### Subjective SES, clinical status, dentures and OHQoL

Few studies have investigated associations between subjective SES and health. Sanders and colleagues (2006a) studied 2915 Australian adults aged 43-57 years. Individuals placing themselves on a lower subjective SES (using the MacArthur Scale of Subjective Social Status) more likely to had less than 24 teeth, rated their oral health as poor or fair and were less satisfied with their chewing ability.

Lower subjective SES was also associated with lower OHQoL. Hence, lower subjective SES was seen as to be associated with higher prevalence of oral health conditions even after variables such as age, sex, country, habits such as smoking; alcohol consumption, body mass index, tooth brushing frequency and interdental cleaning. However, this study does not clearly suggest a causal association.

No studies were found to have investigated subjective SES in denture wearers. In this study, we consider SES as a confounding variable that may influence denture success to improve OHQoL in denture wearers.

### Summary

The individual factors discussed in this section suggest that the impact on OHQoL in denture wearers may be predicted or moderated by them. Factors such as coping strategies, ageing expectations, concern about oral health and perceived stress, all show some associations with oral health status, oral health related behaviours and oral health related quality of life in denture wearers. Albeit, the pathways of these associations cannot be studied as most of the studies were cross-sectional and lacked a theoretical basis. The simultaneous effects of individual factors along with environmental factors (discussed in the next section) might mediate or confound effects on OHQoL in denture wearing individuals.

## Environmental factors and OHQoL in denture wearers

Environment may be divided into social and physical aspects (Eyler et al., 2002). The social environment comprises interpersonal or social factors which involves family, friends, socio-economic status, healthcare experts and providers (McLeroy et al., 1988). The physical environment comprises an individual’s home, locality, neighbourhood and workplace (Yen and Syme, 1999). The review identified several socio-demographic factors associated with OHQoL in denture wearers (Table 2‑5)

### Socioeconomic status (SES)

People from higher SES group have better health and lower mortality (Marmot et al., 1991). SES reflects an individual’s social position (Adler and Snibbe, 2003) and is considered an indicator of their resources (Fujishiro et al., 2010) and one of the major correlates of both general and oral health (Siegrist and Marmot, 2004)

Two types of SES are measured predominantly. Objective SES is measured using an individual’s income, level of education and the status or position at work (Bartley, 2004, Saegert et al., 2007) and subjective SES (discussed in the previous section) emphasises the individual’s perception of their position in the hierarchy of society (Jackman and Jackman, 1973). For clarity within this study, objective SES was considered as an environmental characteristic and subjective SES as an individual characteristic.

#### Objective SES, clinical status and health related behaviours

Objective SES, has been shown to influence numerous health problems such as heart disease, cancer, stroke, diabetes, hypertension, infant mortality, arthritis, back ailments, mental illness, kidney diseases and many more ailments (Winkleby et al., 1992, Damiani et al., 2011, Connolly et al., 2000, Everson et al., 2002, Gruttadauria et al., 2011).

Such associations across different populations and social groups suggest very strong and consistent links between objective SES and health (Marmot and Wilkinson, 2001, Kelly and Bonnefoy, 2007, World Health Organization, 2010). It is almost incontrovertible to question this association with given amount of evidence.

The links between oral health and SES are equally well-established phenomenon (Locker, 2000, Watt and Sheiham, 1999, Sheiham et al., 2011). Oral health inequalities has been demonstrated in both children and adults using different indicators of objective socio-economic position in different populations and in different countries (Watt and Sheiham, 1999, Locker, 2000, Thomson et al., 2004, Harris et al., 2004, López et al., 2006, Sanders et al., 2006a, Sanders et al., 2006b, Franzini and Fernandez-Esquer, 2006, Sabbah et al., 2007).

Reviews have demonstrated that SES indicators such as income, occupation, education were significantly associated with oral diseases like dental caries in adults (Costa et al., 2012), Australian Dental Statistics and Research Unit report (2003) on social determinants of oral health found that low income was associated with poor oral health status. particularly with respect to the prevalence of periodontitis and tooth loss (Lawrence et al., 2008, Nguyen et al., 2010, Turrell et al., 2007).

#### SES and health

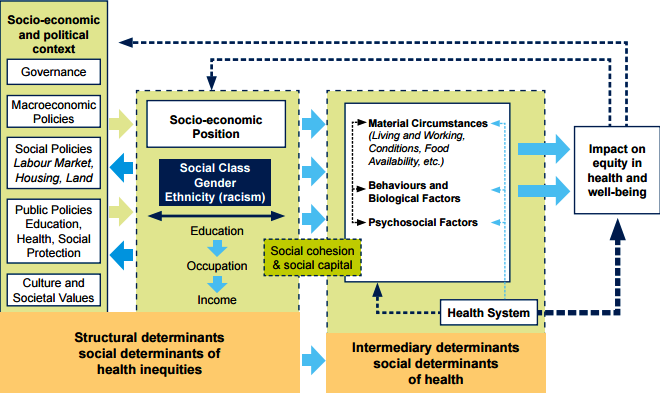
SES is the measure of an individual’s combined economic and social status and tends to be positively associated with better health. SES is argued to influence health in three aspects namely, with the ability to benefit from health promoting resources and care, socialisation of early health habits and sustaining it and also and positing that rather than SES influencing health, health influences the SES (i.e.) less healthy individuals complete fewer years at school, miss work, and earn lower incomes (Baker, 2014).

However, the social determinants of health as explained by the World health organisation describes them as conditions in which people are born, grow, live, work and age that are shaped by the distribution of money, power and resources at global, national and local levels (World Health Organisation, 2016). Thus objective SES of individuals and their social determinants of health overlap conceptually and are directly responsible for their health status inequities (i.e.) the unfair and avoidable differences in health status seen within populations.

Commission on Social Determinants of Health (CSDH), a global network of policy makers, researchers and civil society organizations was created by the World Health Organization (WHO) in 2005 to give support in tackling the social causes of poor health and avoidable health inequalities (health inequities). This commission developed a model framework (WHO- CSDH model) that outlined how the major structural determinants relate to each other, mechanisms involved in generating inequalities in population health. It highlights the overriding importance of the ‘structural determinants’, the socio-economic status and political contexts that influences the social hierarchy in any society, and the resulting socio-economic position of its individuals (Figure 2-5)

The intermediary determinants then influence the health through the circumstances and risks for disease. People from lower socio-economic groups are born, live, work and age in less favourable circumstances than those from higher SES. These include material and social circumstances (e.g.) housing and working conditions, neighbourhoods; psychosocial factors (e.g.) stress, social support; behavioural and biological factors. The model also includes health services and the importance of fair access to good quality care. The unequal distribution of these intermediary factors is associated varying exposure and vulnerability to health-compromising conditions leading different consequences of ill health thereby constituting the fundamental mechanism through which SES generates health inequalities (Solar and Irwin 2010).

**Figure 2‑5. The WHO CSDH conceptual framework (Solar and Irwin, 2007)**

*screenshot image: Watt et.al (2015)*

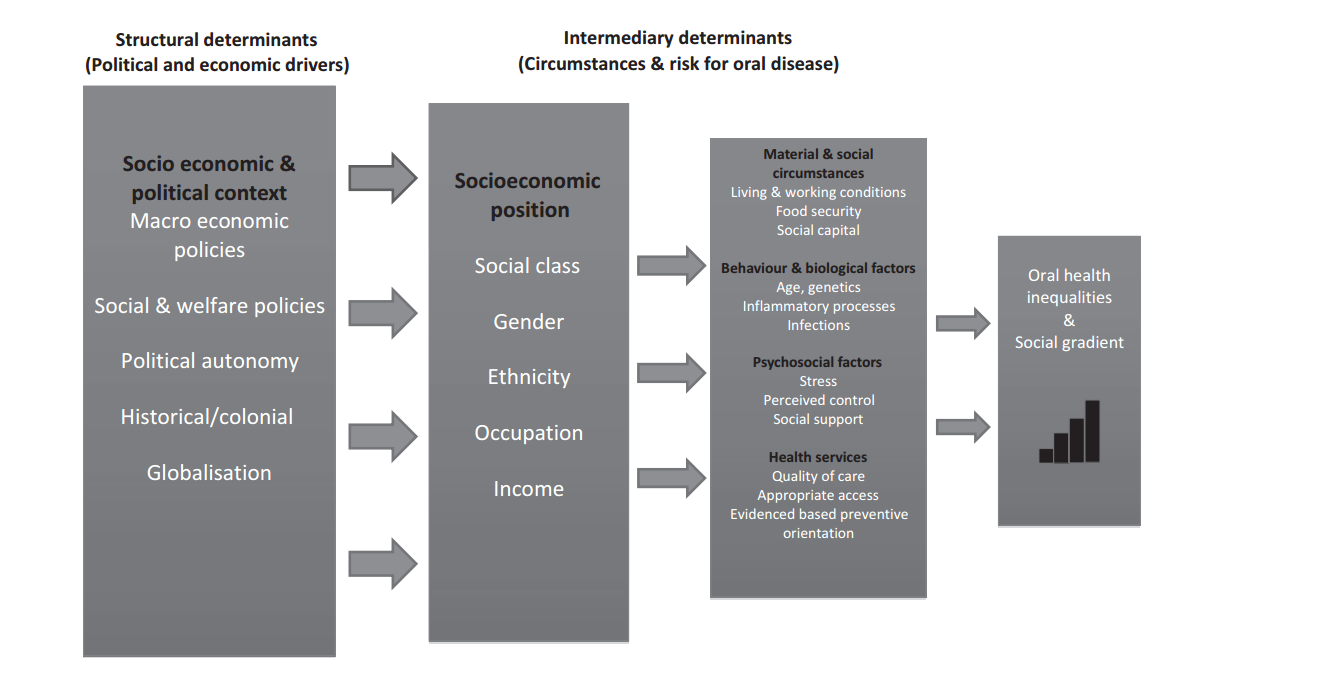
#### Mechanisms of SES on health

Better education levels and income have been shown to be associated with health-improving behaviours like reduced smoking, regular visit to dentist and healthy eating habits (Sabbah et al., 2009). This suggested that health related behaviours might mediate the association between SES and oral health. Education and income status and remained a signiﬁcant determinant of health related behaviours even after adjusting potential confounders. Inducing behaviours like smoking thereby causing periodontal diseases (Klinge and Norlund, 2005) and oral cancer risk (Conway et al., 2008). Conversely, low levels of education and income were associated with poorer oral health outcomes such as increased periodontal attachment loss, weak occlusal surfaces and gingival bleeding (Paulander et al., 2003, Sabbah et al., 2009). Thus, the social gradient of oral health is quite similar to that of general health, indicating a shared set of pathways and influences (Sabbah et al., 2007).

Same biological, behavioural, psychosocial, environmental and socioeconomic risk factors determine patterns of oral health inequalities. It has also been demonstrated in a wide variety of populations in diverse countries in different outcomes The existence and universal nature of the social gradient in oral health is fundamentally important in understanding the nature, causes and implications for tackling oral health inequalities (Watt and Sheiham, 2012).

Based on the CSDH framework Watt and Sheiham (2012) developed a new conceptual model for oral health inequalities. The political and economic drivers (i.e.) all the social and political mechanisms that generate, reinforce and maintain social hierarchies including macroeconomic policy, educational systems, labour markets, fiscal policy, welfare and health systems were structural determinants. Contrary to the other model, individual’s socioeconomic position was the intermediary determinant. Individual’s socio-economic position or SES is a reflection of their social class, occupational status, educational attainment and income level in the social hierarchy.

**Figure 2‑6. New conceptual model for oral health inequalities (Watt and Sheiham, 2012)**

*Screenshot image: Watt and Sheiham (2012)*

Socioeconomic position therefore is linked to people’s degree of power, prestige and access to resources and support. The model also included the healthcare system as a social determinant of health through recognition of the role of health services in influencing health inequalities.

#### Objective SES, OHQoL and dentures

The associations between objective SES indicators and OHQoL were prominent but inconsistent in this review. Many studies showed results with no associations between OHQoL and SES (Acharya et al., 2009, Brennan et al., 2008, Kim et al., 2009, Klages et al., 2005, Locker et al., 1994, Hassel et al., 2007, Ikebe et al., 2004, Lahti et al., 2008, Pereira et al., 2009, Pires et al., 2006, Pohjola et al., 2009, Sousa et al., 2009, Srisilapanan et al., 2001, Tabolli et al., 2009, Emami et al., 2010). Other studies showed a direct significant relationship between better levels of education and better OHQoL (Caglayan et al., 2009, Hassel et al., 2006, Marino et al., 2008, Sanders et al., 2004b, Saub et al., 2006, Tsakos et al., 2009, Papaioannou et al., 2011, Gomes et al., 2009, Kushnir et al., 2004, Sanders, 2010).

Emami and colleagues (2010) showed strong relationships between OHQoL amongst denture wearers and their level of education. Higher income was associated with OHQoL in the following studies (Brennan and Spencer, 2010, Sanders et al., 2004b, Locker et al., 2009, Locker et al., 1994, Makhija et al., 2006, Guzeldemir et al., 2009, Ikebe et al., 2007, Sanders et al., 2009).

Significant associations between education level and OHQoL improvement by dentures in the following studies (Tsakos et al., 2009, Emami et al., 2010, Torres et al., 2011, Abuzar et al., 2012, Lee et al., 2012).

Income levels were also associated with OHQoL improvement with dentures for some studies (Tsakos et al., 2009, Torres et al., 2011, Abuzar et al., 2012, Lee et al., 2012) and not associated in the others (Michaud et al., 2008, Emami et al., 2010, Jabbour et al., 2012).

Mechanisms for the relationships between objective SES and OHQoL are relatively unknown. The following section explains health inequalities and how they might influence oral health conceptually.

#### Explanations for Health inequalities

Sisson (2007) stated that successful oral health interventions to reduce health inequalities require underpinning by theories of the mechanisms that cause these health inequalities. Hence, it is necessary to review the explanations for the effects of SES to cause health inequalities.

The following sections concisely review these explanations. For the effects of SES to cause health inequalities, behavioural, material, psycho-social and life course socio economic status perspectives alongside the ecological approach of heath inequalities was reviewed.

*Materialist approach*

This perspective places emphasis on the external environment and its role on individuals. Lack of material resources reflects poor income, adverse working, housing conditions, poor food quality and other aspects of daily life. Low access to these tangible resources acts as risk to health. This perspective has often been questioned as inequalities persist despite increases in life expectancy (Richard, 1997, Wilkinson, 1996, Wilkinson, 1992).

##### Behavioural and Cultural approach

The behavioural and cultural approach explains that the differences in norms and values cause individuals from a lower SES to adopt risky behaviours. This perspective was considered initially in the Black report (1980). Differences between groups have been observed based on their health behaviours such as smoking, attending the dentist, diet and oral hygiene practices (Watt and Sheiham, 1999). However, this approach does not explain why these such differences were found between these social groups.

The direct behavioural model assumes that lower income and status is associated with lower personality traits (e.g.) intelligence, coping styles, internal locus of control or sense of coherence (Bosma et al., 1999). Conversely, people with positive personality traits have been related to a higher social advantage, better health and are placed in socially favourable circumstances (Bartley, 2004).

More cultural hypotheses argue that people of lower incomes with adverse health behaviours (e.g. smoking have nothing attributable to their income levels that hinders someone to reduce or give up smoking (Bartley, 2004). Culture is suggested to play an important role on such high risk behaviours. The alternative hypothesis suggests such behaviours are not by choice but rather associated to the cultural norms. These norms differ among various social groups and explain the social patterning of behaviours.

##### Psychosocial Explanations

Psychosocial explanations recognise the social context in which behaviours are chosen. The psychosocial approach states the differences in psychological traits and resources available among various socioeconomic groups lead to health inequalities. People from lower ,disadvantaged socio-economic backgrounds are theorised to go through higher psychosocial stress (Marcenes and Sheiham, 1992) and perceived low social support (Gore, 1978) than those from higher socioeconomic groups.

In relation to oral health, higher levels of stress has been associated with higher risk oral diseases like periodontitis (Marcenes and Sheiham, 1992) and poorer oral health related behaviours (e.g.) self-care scores (Sanders and Spencer, 2005).

##### Life course approach

The life course approach observes health at any age based not just on current conditions, but also on living conditions, since conception (Kawachi et al., 2002).

This is the comprehensive approach in describing inequalities in oral health. This approach presents oral health inequalities as an interaction of materialist, behavioural and psychosocial factors over time. Apart from explaining development of dental disease in individuals, this approach also explains the persistence of health inequalities despite improving living standards, health based knowledge and health promotion over time.

Nicolau and colleagues (2003) demonstrated that socio-economic and biological risk factors in early life are signiﬁcantly associated with dental caries experience at 13 years of age.

Thomson and colleagues’ (2004) birth cohort study of 789 individuals in New Zealand determined whether adult oral health was predicted by childhood SES advantage or disadvantage (controlling for childhood oral health) and vice versa based on a life course approach. The study also assessed whether oral health in adulthood was affected by changes in SES. Both childhood SES and oral health both determined adult oral health although, the latter association was not as clear cut as the former. Changes in advantage of SES was also associated with changes in adulthood oral health. The study concluded that the life-course approach is a useful paradigm to understand oral health inequalities.

##### Ecological approach

The ecological approach focusses on health inequalities based on the relationships and interactions between individuals and their physical and social environments (Wilkinson, 2006, Wilkinson, 2002). This approach highlights how existing social inequalities within a society can influence the health of its population.

The causal mechanism within this approach focusses on two different perspectives. Firstly, the nature and importance of psychosocial risk factors for health in affluent societies. Secondly, triggers to violence and why it increases with inequality. Greater equality is also associated with “helpfulness” and group membership, while greater inequality is linked with hostility in this approach (Marmot and Wilkinson, 2001).

Overall this approach attributes factors such as social dominance, autonomy and the quality of social relations to have an impact on psychosocial well-being which eventually determines the pattern of population health especially in developed countries (Marmot and Wilkinson, 2001).

#### Summary –SES

Abundant evidences suggest oral health outcomes and inequalities are influenced by underlying social disparities.

Socio-economic status forms an integral part of the social determinants which are the fundamental structures of social hierarchy that create the conditions of daily life where people live, grow , work and age that lead to their health status and are eventually responsible for health inequities between populations (Marmot et al., 2007). The WHO- CSDH model shows how populations are stratified based on income, education, occupation and other socio-economic factors which in turn shape the determinants of health status based on their social hierarchy and status (World Health Organization, 2010).

In terms of oral health inequalities the social gradient is very similar to that of general health (Sabbah et al., 2007). Common biological, behavioural, psychosocial, environmental and socio economic status risk factors determine inequalities in both general and oral health patterns (Watt et al., 2015). Watt and Sheiham’s (2012) new conceptual model for oral health inequalities framed SES as the intermediary determinant or oral health inequalities interlinking through the biological, behavioural, environmental and immediate social circumstances.

In this section various explanations of inequalities were discussed but they are not mutually exclusive. They may interact and operate in tandem to cause inequalities at individual and population levels. Objective SES is associated with oral health status, oral health related behaviours and OHQoL in denture wearers. However, the studies chosen in this review show these associations but do not specifically explain the mechanisms through which they influence OHQoL in denture wearers (Baran et al., 2007, Michaud et al., 2008, Emami et al., 2010, Jabbour et al., 2012). But given the ample existing evidence Objective SES was used as variable to be observe whether it predicts denture success.

## Summary

It has been reported that wearing removable prosthesis demands emotional and functional adjustments in life (Fiske et al., 1998). To accept external objects like dentures into the mouth to may require adaptation on a large scale from the patient (Hogenius et al., 1992). Such adaptation to dentures will not just be restricted with functional and physiological aspects, but may require adaptations at an emotional level as well. The ability to adapt to dental prostheses (dentures) especially removable ones, is seen as a challenge in prosthodontic management (Müller and Hasse‐Sander, 1993). Coping strategies is a relatively under-explored area in the prosthodontic literature. Based on the evidence discussed in this section, the relationship between coping strategies, oral health status, OHQoL in denture wearers warrant further exploration.

With the advent of patient- centred research in dentistry, patients’ own perceptions are given a higher importance in treatment outcomes (Gerdin, et al., 2005; Gibson, et al., 2010). Assessing treatment outcomes based on patient’s perspectives may help achieve successful oral health interventions in patients.

Denture success is considered differently by dentists and patients (Wakabayashi et al., 1998). While the former consider success when certain technical standards are achieved, the latter evaluate success based on personal satisfaction or other subjective assessments. The clinical parameters of dentures such as denture quality, denture processing and fabrication methods and the anatomical features of patients were traditionally regarded as the main factors that determine denture success (Yoshizumi, 1964, Swoope, 1973, Levin and Landesman, 1976).

Studies have compared these clinical parameters against patient satisfaction. Positive associations between denture quality, the techniques used in construction and fabrication of dentures and patients’ satisfaction (Turbyfill, 1989, van Waas, 1990, Garrett et al., 1996, Sato et al., 2000, Čelebić et al., 2003, Anastassiadou and Robin Heath, 2006, Fenlon and Sherriff, 2008) suggesting that clinical parameters of dentures may influence patients’ satisfaction.

However, studies also show weak relationships between patient satisfaction and clinical parameters of dentures. Denture wearers may be dissatisfied with their dentures even when they are constructed using good clinical methods (Berg, 1993), Also patients have sometimes shown high levels of patient appreciation for dentures that were rated of poor clinical quality (Fenlon and Sherriff, 2004). Heydecke and colleagues (2003a), compared clinician and patient satisfaction ratings of dentures and showed the two do not usually agree when evaluating individual prostheses. Anatomical features have also been shown to poorly predict patient satisfaction (Wolff et al., 2003)

These above data suggest inconsistent relationships between patient satisfaction and clinical aspect of dentures. The success of dentures cannot be determined by a set of a few factors but rather by a complex interrelationship between various factors. Patient satisfaction is a poorly conceptualised patient reported outcome. Quality of Life (QoL) is a dynamic construct influenced by various factors such as adaptation, coping, cognitive appraisal, affect and problem evaluation and self-concepts (Allison et al., 1997). Oral Health related Quality of Life (OHQoL) is a multi-dimensional oral health outcome (Locker and Allen, 2007) that has been widely used in studies assessing the impacts of missing teeth and available prosthodontic treatments (Atchison and Dolan, 1990, Bouma et al., 1997, Allen and McMillan, 1999, Awad et al., 2000, Inglehart and Bagramian, 2002, Heydecke et al., 2003a, Armellini et al., 2008). OHQoL measures are known for being highly responsive, sensitive and well conceptualised in theoretical models (Allen et al., 2001). Thus, OHQoL might be a better outcome to address the inconsistences existing between clinical assessments and patient reported outcomes that describe denture success

Coping with dentures

Dental events such as receiving new dentures may contribute to an individual’s total life stress (Bergendal, 1989, Haugejorden et al., 1993). Wearing this extraneous object might be very stressful and require an individual’s adaptation, not just on a physical basis, but also in a functional and emotional sense (Hogenius et al., 1992). A patient’s adaptation to dentures depends on psychosocial, emotional factors and pre-treatment expectations (Bellini et al., 2009). Hence, improving adaptation to dentures may not be achieved using one generic approach for patients who seek dentures. It requires a better understanding of the underlying factors.

Few studies have focussed on coping strategies in denture wearers. Heydecke and colleagues (2004), demonstrated that low OHQoL was associated with emotion-focussed coping. At the same time, there were no associations demonstrated between OHQoL and problem focussed coping. Coping strategies appear to be a potentially important factor for denture wearers but require further evaluation to understand whether they mediate the relationships between receiving new dentures and OHQoL and thus predict denture success. Gaining such knowledge might allow dentists to predict denture success and may also give new scope for developing strategies to promote positive coping strategies for a smoother, successful transition and their adaptation with dentures.

# CHAPTER THREE AIM AND OBJECTIVES

## **Rationale and aim**

The widespread use of conventional removable dentures to manage missing teeth in patients is expected to remain for the foreseeable future. Successful conventional denture treatment is therefore vital to improve the quality denture provision and population oral health. However, gaps in the existing literature on denture success leave the field poorly defined and conceptualised. It is crucial that denture success is evaluated using a robust well conceptualised measure. The increased use of OHQoL as an outcome measure to assess oral health interventions means that this multi-dimensional concept is not only well conceptualised but also well placed to measure denture success.

Receiving new dentures is considered as stressful life event among individuals and those who have no experience wearing dentures can find it to be upsetting. Adapting to new dentures depends on psychosocial and emotional factors associated with the individual, which may include their coping strategies. Existing data suggest cross-sectional associations between coping strategies and OHQoL in removable denture wearers. Hence, a further longitudinal exploration of this association using a robust theory based model will be beneficial. Thus, the aim of this research was to examine whether coping strategies of individuals determine denture success to improve their OHQoL.

## Objectives

The objectives to meet the above aim were to:

1. Recruit a cohort of complete/partially edentulous adults seeking dentures (irrespective of denture wearing history)
2. To collect and record data on clinical variables, coping, individual and environmental factors, OHQoL and other patient reported outcome variables populated within the Wilson and Cleary model
3. To determine if coping strategies influences OHQoL in people receiving new dentures.
4. To determine and identify clinical, individual and environmental factors that influence OHQoL and other patient reported outcomes (denture satisfaction and chewing ability).
5. To determine and identify clinical, individual and environmental factors influence coping strategies of individuals receiving new dentures over time.

This project is expected to fill the gap in knowledge that exists in the understanding of denture success and its possible determinants. At the beginning of this project very little was known about coping strategies in denture wearers and its effect on denture wearing. By using a well-structured, theory based model, the possible causal connections between the determinants and potential factors can possibly be explained. This study may also help understand the interrelationships between and among the potential determinants of denture success. The study has the potential to inform public health knowledge and refine the existing evidence pool thus helping design future oral health promotion strategies for denture wearers.

# CHAPTER FOUR MATERIALS and METHODS

## Method

Prospective longitudinal clinical examination and self-report questionnaire study was chosen to meet the aims and objectives of this study.

### Sample

Consecutive patients referred to the outpatient surgery of the Department of Prosthodontics at Sri Ramachandra Dental College and Hospital, Chennai. The target sample were those seeking or already in the process of receiving conventional dentures. In the case of the latter, participants were those who were yet to have their denture try-in.

### Institution

Participants were recruited at Sri Ramachandra Dental College and Hospital located in Porur, a suburb of Chennai, the southern metropolis of India. The Department of Prosthodontics had nearly 50 dental units in the Undergraduate and Postgraduate clinics with its own facilities for prosthodontic fabrication (Sri Ramachandra University, 2012)

### Selection of participants

* The targeted population was adults (18 years and above).
* The accessible population was patients (18 years and above) receiving oral health care from of Sri Ramachandra University Dental College Hospital, Chennai, India
* The intended sample was adults receiving new conventional removable dentures from the Department of Prosthodontics within the teaching hospital who have given a written consent.
* The intended sample comprised both those adults receiving full and partial removable dentures. Despite the difference in clinical and subjective outcomes in these two types of denture wearers, both were included within the intended sample. Firstly, because, one of the main objectives of this study was to identify the determinants of conventional removable denture success. Both full and partial removable dentures are widely used, therefore at a population oral health level, knowledge of denture success that excludes either of these will incomplete. Secondly, a pragmatic decision to recruit an adequate number of participants for the study to be adequately powered. Finally, differences between these two groups could be accounted for in multiple regression analysis by treating denture type as a covariate. Thus, adults receiving both full and partial dentures were included and a clinical variable prosthetic treatment need (Fig 4-1) was included in the analysis. Any differences observed between the two groups in the analysis would be highlighted in the results.
* The exclusion criteria were patients aged below 18 years of age, those who declined to participate, receiving implant supported dentures, fixed dentures and dental implants and those who have already completed the try-in of their new dentures at the point of recruitment.

### Recruitment

Potential participants were approached via two channels. Firstly, the outpatient surgery of the department of oral medicine and secondly, existing patients in the Department of Prosthodontics undergoing treatment for conventional dentures.

Flyers, Information posters, circulars about the study were posted on notice boards, waiting halls and receptions of various departments of the dental school. With the help of colleagues from the department of oral medicine (where the outpatients are screened) an explanatory note about the study was circulated to interested patients, who were then referred to the department of prosthodontics.

The second group comprised patients already undergoing treatment for conventional dentures in the department of prosthodontics, with the exception of patients later than the try-in stage were approached by the researcher directly. Interested participants from both channels were informed about the study by the researcher and were provided with the information sheet and a consent form. For patients who could not read, the researcher read out the information sheet and thumb impressions were sought instead of signatures for obtaining consent. The researcher confirmed patients’ next appointments and referral to the department of prosthodontics. On the day of their appointment, consented participants were clinically examined by the staff or students at the Department of Prosthodontics. The researcher asked the participants to complete the questionnaire and provide their contact details and availability. For participants who could not read, the questions were read out either by a clinical assistant or by a trusted attendant of the participant if they had one. Participants were given the choice of opting out of the study at any time. As a token of acknowledgement for their participation, participants were given a token for a lucky draw at both stages of the study.

A preliminary assessment of patient flow at the department of prosthodontics in May 2012 indicated 11,573 appointments and 4721 new patients at the prosthodontic unit over the preceding year. Among those, approximately 373 patients were treated with complete and 7863 for partial dentures. Approximately, 10%-20% of patients were treated by postgraduate and 30% by the undergraduate students and 50% by staff members directly or by combination of students and staff.

Completed dentures were delivered in 6 appointments, removable partial dentures in 3-4 appointments with an average of 3 days between appointments. Considering these data, it was assumed that it took between 3-4 weeks for a new conventional denture. Prosthodontic treatments were provided at distant locations as well through community dental camps (equivalent to outreach programmes in the UK). Only removable conventional prostheses were delivered in such camps. However, none of the participants of this study included patients from such camps.

### Sampling

The sample size was based on calculating an effect size between two continuous variables (i.e.) coping strategies in conventional denture wearers and oral health related quality life. The point estimation of this association for the present sample was done using the sample data from the Heydecke and colleagues (2004) study. The variables used were the denial coping factor and OHQoL in edentulous adults which had an unstandardized correlation co-efficient of 1.208. Using these values an effect size 0.152 was calculated. With 20 independent variables, a final sample size of 152 people will yield an 80% power to detect a difference as significant for a threshold for p at 0.05 (Cohen et al., 2013, Soper, 2014).

Based on the numbers of participants per variable for studies involving a factor analysis where studies recommend a minimum of 5 participants per variable (Gorsuch, 1983, Streiner, 2013) most suggest 10 participants per variable (Jöreskog and Sörbom, 1989, Floyd and Widaman, 1995).

Based on the power calculation and anticipating a considerable number of participants declining from the study, loss to follow up and assuming that the associations may not be very significant, this study allowed 10 participants per variable and aimed to recruit 200 participants.

### Permission and Liaison

The permission and approval to conduct this study was obtained from

* University of Sheffield Research Ethics committee, UK
* Sri Ramachandra Dental College Management, Chennai, India
* Participant informed consent.
* Liaison with staff and students of all relevant departments at the Ramachandra Dental College

## Variables

The variables chosen for measurement in this study were derived from the literature review and populated within the framework as seen in Figure 4-1.

Demographic variables included age, gender, marital status, occupation, income, religion and caste and education and were grouped under individual (age, gender, marital status) and social variables (occupation, income, religion and caste).

Occupation was classified using the revised version of Kuppuswamy’s socio-economic scale which is a widely used scale in India. This ordinal scale groups occupations into professional; semi-professional; clerk, shop-owner, farmer; skilled worker; semi-skilled worker; unskilled worker; unemployed categories (Mishra and Singh, 2003). Monthly income was recorded using Kumar and colleagues (2012) income ranges

.

**Figure 4‑1 Study framework adapted from Wilson and Cleary (1995) and Lazarus and Folkman (1984)**

**INDIVIDUAL CHARACTERISTICS**

Age, Gender, Marital status, Subjective SES, Concern about oral health, ageing expectations, perceived stress

**BIOLOGICAL & CLINICAL VARIABLES**

Prosthetic status & Rx need

Teeth present

Occluding pairs

Denture expertise

Time since tooth loss

**COPING**

Coping strategies

**OUTCOMES**

OHQoL

Denture satisfaction

Chewing scales

**ENVIRONMENTAL CHARACTERISTICS**

Education, Income, Occupation, Religion, Caste

Level of education attainment was assessed using ordinal mutually exclusive categories classified as profession or honours, graduate or postgraduate, intermediate or post high school diploma, high school certificate, middle school certificate, primary school certificate, non-reader (Mishra and Singh, 2003).

### Clinical Variables

Clinical variables, mucosal lesions and prosthetic need were measured using the World Health Organization’s oral health survey criteria (World Health Organization, 2013). All patients receiving new dentures were caries free. Teeth present and the number of occluding pairs were measured.

### Independent variables

#### Coping Strategies

The transactional model developed by Lazarus and Folkman (1987) has been widely accepted to measure coping strategies as problem or emotion-focussed.

The Brief COPE questionnaire (Carver, 1997) was used. This abbreviated form of the COPE inventory (Carver et al., 1989) comprises 14 conceptually different scales: Active coping, Planning, Positive reframing, Acceptance, Humour, Religion, Use of emotional support, Use of instrumental support, Self-distraction, Denial, Venting, Substance misuse, Behavioural disengagement and self-blame. Each sub scale has two items giving 28 items overall. The alphas of these subscales range between 0.50 and 0.90 showed considerable internal reliability. The inventory has a 4-point response format Likert-type scale: 1- (I haven’t been doing this at all) to 4- (I have been doing this a lot). Hence, the sum of each subscale score ranges from 28- 112. Subscale scores are combined and grouped under wider problem based, emotion based and dysfunctional coping strategies. Thus the total scores reflect widely practised coping strategies (Carver, 1997).

Cooper and colleagues (2008) assessed the validity and reliability of the 3 subscales. They showed good internal consistency (α = 0.72, 0.84 and 0.75 respectively) and test-retest reliability. Translated versions of Brief COPE exist in Spanish (Perczek et al., 2000), French, Greek and Malay (Muller and Spitz, 2003) and have shown good psychometric properties. This instrument has also been tested in Nepal, Malaysia, Kenya (Yusoff, 2011, Kimemia et al., 2011) that are culturally different from European and American countries. No studies report the use of this questionnaire in India, although in one study part of the sample was Indian (Aitken and Crawford, 2007). Heydecke and colleagues (2004), used this questionnaire to assess coping strategies amongst edentulous patients and their effects on OHQoL.

It has been suggested that the scale Brief COPE is not designed to obtain an overall score but rather factors are to be created using the data obtained in a study to determine the composition of coping strategies (Carver, 1997). With coping strategies being the key independent variable, the factor structure of the Brief COPE was explored to test its internal consistency in the present sample. The latent variables that might cause the manifest variables to vary were considered important. Hence, exploratory factor analysis was used instead of components analysis (which is used merely for data reduction) (Costello and Osborne, 2011). The factors extracted from the Brief COPE scale were used as separate variables in the analyses.

#### Other variables

Subjective SES was measured using the MacArthur Scale of Subjective Social Status (Adler et al., 2000). The scale is a single-item measure of a person's current self-perceived social position. Participants are asked to place a cross on the rung of a 10-rung ladder that best represents their perceived position relative to other people in the society.

Higher SES scores were related to better health. The instrument has been used in health and oral health research (Operario et al., 2004, Sanders et al., 2006a) and has shown a good test-retest reliability with Spearman’s coefficient 0.62 (p<0.01) (Operario et al., 2004). Only one study used this instrument in an Indian population assessing the associations between subjective and objective SES and metabolic syndrome (Suchday, 2008). Subjective and objective SES were correlated (r= 0.24, P<0.04) suggesting the use of this instrument as an acceptable indicator of SES in India.

Concern about oral health was measured using a 6-item scale based on Maslow’s (1943) theory of hierarchy of needs mainly and the dental indifference scale designed by Nuttall and colleagues (1996). There are five levels of needs: physiological, safety, social, esteem and self-actualisation, and thus five questions were framed within his framework related to the mouth and teeth. A sixth question related to overall concern about the mouth and teeth (My mouth and teeth really matter to me) was included.

The scale used a 4 point Likert scale from 1 - Strongly agree to 5 – Strongly disagree with. Items 4, 5 and 6 were reverse scored. The sum of the scores was used to reflect the total level of concern an individual had towards his/her oral health. Higher scores indicated greater concern. This scale was used by Marshman and colleagues (2014) in their study to observe whether dental indifference determined OHQoL.

Expectations regarding ageing was measured using the short form of the Expectations regarding Ageing (ERA -12), a 12 item questionnaire developed by Sarkisian and colleagues (2005). This was a shortened version of ERA-38 (Sarkisian et al., 2002a). The self-administered questionnaire has three domains: physical health, mental health and cognitive function (four items each). It uses 4-point Likert scales for responses: (1) deﬁnitely true, (2) somewhat true, (3) somewhat false and (4) deﬁnitely false. However the entire scale was reverse coded in this study.

This questionnaire has been translated into Korean with good internal reliability of α = 0.78- 0.86 for the subscales and 0.89 for the entire scale (Kim, 2009). The scale has also been tested in a Singaporean population and showed a good internal reliability α = 0.7 (Joshi et al., 2010). To date no studies conducted in India using the ERA 12 have been identified.

Perceived stress was assessed using the short form of the Perceived stress scale PSS-4 (4 item version of the PSS-14 scale). It was designed by Cohen and colleagues (1983) to measure the degree to which life situations are appraised as stressful. It also explores the extent to which people perceive their lives to be unpredictable, uncontrollable, and overloading. Participants answered items on a five–point Likert scale that ranged from ‘never’ (1) to ‘very often’ (5). Items 2 and 3 were reverse coded in this study. PSS scores are obtained by reversing the scoring of the second and third items and summing the item codes. High scores indicate higher levels of stress.

This version of the scale was designed for data collected over telephone and for repeated testing in large samples. In this study, this shorter version was used to reduce the overall time taken to complete all the questionnaires. This questionnaire demonstrated adequate reliability (Cohen et al., 1986). In another study with 2387 people in the United States the PSS-4 showed a reliability of α = 0.60. Mitchell and colleagues (2008) found the Cronbach’s alphas for the 14-item, 10-item, and 4-item PS Scales as 0.89, 0.91, and 0.82 respectively. In a study with Chinese population the PSS-4 scale demonstrated an internal reliability of 0.77 and 0.51 for the positive and negative subscales respectively (Leung et al., 2010). Several studies conducted in India have used the Perceived stress scale. Most have evaluated yoga and meditation based interventions (Banerjee et al., 2007, Satyapriya et al., 2009, Khalsa et al., 2008, Chattha et al., 2008). They neither used the short version (PSS-4) nor were translated into any Indian languages.

Oral health related quality of life was measured using a modified short form of the *Oral Health Impact Profile* (OHIP-EDENT) designed to capture impacts from edentulous patients (Allen and Locker, 2002). This scale has 19 items that measure the impact of edentulousness on everyday physical, psychological and social functioning on seven subscales: Functional limitations, physical and psychological discomfort, physical, psychological, social disability and handicap. The items asked participants are whether they have experienced the problem described by each item in the past three months. The participants rated their problems on a five-point Likert scales coded as never (score 1), hardly ever (2), occasionally (3), fairly often (4) and very often (5). Higher scores indicated worse OHQoL. The discriminant validity of OHIP EDENT was similar to OHIP-14 and OHIP-49 (Allen and Locker, 2002).

The questionnaire has demonstrated good psychometric properties. The Brazilian version showed good internal consistency of 0.86 and 0.90 in various appointments and test-retest reliability with an intra-class correlation co-efficient of 0.57 (Souza et al., 2007).

OHIP-EDENT has been rarely used to assess OHQoL in partially edentulous populations as it was designed with completely edentulous patients in mind. A recent study (Gjengedal et al., 2011) used OHIP- EDENT in partially edentulous and completely edentulous patients. Differences were found in the number and nature of significant variables associated with reported oral health and denture satisfaction between the two groups.

This scale has also hardly been used in Indian populations. Keppanasseril and colleagues (2011), claimed the first study to use it in India. Although the study mentions translation of the questionnaire into the south Indian language of Malayalam, there are no details about its validation. Two other studies in India have mentioned OHIP EDENT, but have used different measures (Shigli and Hebbal, 2010, Bajoria et al., 2012). Thus OHIP-EDENT is a relatively new instrument to be used in the Indian population.

Satisfaction with dentures is a secondary outcome in the study assessed using the 9 item denture satisfaction scale. de Liz Pocztaruk and colleagues (2006) compared denture satisfaction between people wearing conventional and implant retained dentures by means of this questionnaire. It contains 5 point Likert scales rating satisfaction levels between 1 for total satisfaction and 5 for total dissatisfaction. The scale was however recoded in this study (i.e.) 5 for total satisfaction and 1 for total dissatisfaction

Although there are no data on its psychometric properties, a study in India has used a similar approach to assess satisfaction in people wearing dentures. Bajoria and colleagues (2012) followed a similar approach to assess denture satisfaction and masticatory ability in denture wearers. The items used were very different from the scale used in the study by (de Liz Pocztaruk et al., 2006).

The other secondary variable was chewing ability. The index of chewing ability (Leake, 1990) uses a 5 item scale of about the five most difficult foods to chew. (Carrot, lettuce or spinach salad, firm meat, boiled vegetables, fresh whole apple) in the order of from easy to difficult to chew. The items are scored 0 to 5 where the individual self- reports their ability to chew the most difficult of the five foods at a given time. The harder food they choose the higher would be their score.

Leake’s index demonstrated good reproducibility based on Guttmann Scalogram analysis (Leake, 1990). Dichotomising the index responses with four of the foods as resulted in a diagnostic test with a sensitivity and specificity of 0.66 and 0.82 respectively. This index has been used in various studies and had good psychometric properties (Feine and Lund, 2006, Brennan et al., 2008). As the diet mentioned in the index was specific to Canada, United States and Northern Europe researchers are advised to adapt it to a diet pattern relevant to the population under study. However, the use of this scale in an Indian population could be found. The questions were modified to reflect the diet of southern India. For example, idly (rice cake) as a substitute for boiled vegetables.

## Challenges with the measures used

Questionnaires used in research must be appropriate, comprehensible, non-equivocal, resistant to distortion, capable of covering all possible answers and easy to be coded (Segù et al., 2005). This research used a total of eight questionnaires including the subjective SES MacArthur scale and Leake’s chewing index, which had an item each. Most of these questionnaire had good psychometric properties as described in the previous section and some of them have been extensively used in cross-cultural studies and also in Indian populations, where they have shown acceptable cross-cultural validity. However, all of these questionnaires were originally developed, designed and validated in populations that were culturally and demographically different from the target population of this study.

The target population here was in the state of Tamilnadu in India. The use of these questionnaires in a Tamil language speaking population was certainly a challenge considering the minimal literature to draw upon in terms of cross cultural validity in similar populations. With the lack of strong basis to develop new culturally sensitive questionnaires and given the time constraints of this study, generic questionnaires had to be used. Those chosen (such as the OHIP-EDENT and Brief COPE), have been widely used and validated across many populations.

In order to validate the questionnaire for use in the target population, a rigorous translation process using back the translation method (Brislin, 1970) was carried out followed by a pilot study in a preliminary sample who were representative of the target sample.

For the Brief COPE questionnaire, which measured the main independent variable of coping strategies, a factor analysis was carried out post data collection to increase its validity in the study population (section 5.2.4.2).

## Translation of the measures

Questionnaires adapted to the Tamil language by means of back translation method (Brislin, 1970, Schmidt and Bullinger, 2003). To achieve cross-cultural equivalence, a phase of translation involved items being translated from an original source language (i.e.) English to Tamil and was translated back to English.

A consensus Tamil version was produced by independent bilingual speakers, which was then translated back into English by another translator who has not seen the original version. The original and back translated versions were then checked for discrepancies by two bilingual dentists. The entire process of translation was repeated until an acceptable Tamil version was achieved. The back translated version was tested in 10 Tamil speaking people living in the UK. A final test was done in a sample of 10 patients attending the Department of Oral Medicine at Ramachandra Dental College. A confirmatory test of the Tamil version was conducted 4 weeks before the study with 10 participants within the University. All the recommendations by the respondents were noted and a final version was produced before commencing the pilot study.

## Conduct

### Pilot Study

The pilot testing of the questionnaires was carried out in a convenience sample of 10 participants from a private dental practice in Chennai city, India. The back translated Tamil-versions of the questionnaires were given the participants to be filled and were asked for a feedback. Participants did raise concerns regarding the meaning of certain items in the questionnaires. Their concerns were duly noted and amendments were made to the translation using an independent bilingual dentist accordingly. Further testing was done again in 5 more random participants from Ramachandra University. Their suggestions and comments that were noted and accordingly incorporated into the questionnaires for the main data collection.

### Data Collection

1. With the help of colleagues from participating departments i.e. Oral medicine (outpatients’ first point of contact), Public Health Dentistry (patients referred from outreach camps), Oral Surgery (where post dental extraction patients would follow up), Prosthodontics (patients already undergoing treatment for a conventional prosthesis, notice about the study was circulated in the form of flyers, pamphlets and mini posters etc. to reach as many people potential participants as possible.
2. Patients expressing interest from other departments were referred to the Department of Prosthodontics on the same day. The participants were informed about the study by (KP) and provided with an Information Sheet. Non-reader patients were read the contents of the Information Sheet.
3. Consent was obtained from participants after explanation about the study and after KP had ensured that they understood it completely. A thumb impression was obtained from non-reader patients. KP fixed appointments and collected the contact details of consented participants. Participants were sent a reminder a week and a day ahead of their appointments.
4. Other possibilities for recruitment were explored through outreach programmes of the dental college with the help from the Department of Public Health Dentistry.
5. On the day of their first appointment the principal researcher (KP) ensured the clinical examinations were conducted as per the WHO diagnostic criteria (World Health Organisation, 2013) by either the trainee students or staff members.
6. Trainee dental students or staff conducted the clinical examination. All clinical examinations were conducted on a well-equipped dental chair with a clinical light. The examiner called out the upper teeth present starting at the top right and go to top left then call out lower teeth starting at lower left moving to lower right. All the data were entered into a clinical examination form by a trainee dentist or a dental chairside nurse (assistant).
7. Participants were then given the questionnaire to be completed. They were overseen by another trainee dentist or chairside dental nurse (assistant) along with investigator KP.
8. Questions and their choices were read to the people who were unable to read and understand the questionnaires. A separate variable was recorded for such participants to test whether literacy level was a confounder.
9. After completion of the questionnaires, participants were informed about the follow up study 3 months after denture insertion. Appointments were arranged accordingly.
10. Consistency of the clinical data were checked by re-examining patients straight after the clinical examination was completed. Random selection of patients was done by rolling a ten sided dice.
11. The questionnaires were given again to participants to be filled 3 months after denture insertion as follow-up data. No clinical examinations and data were recorded at follow-up (T2).
12. Appointments were given for follow up with regular reminders. Participants who were unable to attend for follow up were contacted for a home visit by KP and address details were duly obtained.

### Problems and Pitfalls

Participant dropout within the three-month follow-up period was anticipated as they may prefer not to participate. Hence, participants were given verbal information apart from the information sheets regarding the benefits they could bring by taking part in the study. Every possible effort was made to keep the participants involved with the study by giving them regular reminders by mail, phone. Inducements in the form of a prize draw were offered to the participants in order to keep them interested with their participation of the study.

Participants were treated by trainee undergraduate/ postgraduate dental students. Hence, there were long gaps between appointments. In constant liaison with the supervisors and overseers of students, every effort was made to expedite patient appointments.

### Data transfer

Researcher KP transferred all the clinical and questionnaire data into the SPSS software. Professor Sarah Baker and the researcher (KP) randomly checked 10% of the chosen questionnaires against the SPSS files. A preliminary analysis of data was done to check the quality of the data transfer.

**Table 4‑1. List of variables used in the study at both stages**

|  |  |
| --- | --- |
| **Variables measured at Baseline T1** | **Variables measured collected at T2** |
| Number of teeth present, Occluding pairs, Prosthetic status and need, Denture expertise, Time since tooth loss | Not collected at T2 |
| Age, Gender, Income, Occupation, Education, Marital status, Religion, Caste and Subjective SES | Not collected at T2 |
| Coping strategies | Coping strategies |
| Concern about oral health, Ageing expectations, Perceived stress. | Concern about oral health, Ageing expectations, Perceived stress. |
| OHQoL  Denture satisfaction  Chewing ability | OHQoL  Denture satisfaction  Chewing ability |

## Data management

For all the individual variables measures were added to total scores. For example, in Brief COPE, all the items were computed to generate a total score (items that had emotion focussed coping strategies ere reverse scored). Higher scores indicated greater use of problem focussed coping strategies. The same process was repeated for the other variables

OHQoL was measured using OHIP-EDENT; items were added to generate total scores. Higher scores indicated greater levels of impact and a worse oral health quality of life. The same procedure was followed for the outcome variables.

## Data Analysis

Data analysis was conducted in three stages;

### Descriptive analysis

This stage involved measures of central tendency and distribution of independent and outcome variables at baseline and follow-up. Coping strategies, ageing expectations, concern about oral health, perceived stress, OHQoL, denture satisfaction and chewing ability scores at baseline (T1) and 3 months follow up (T2) were calculated by summing the item scores.

Individual and environmental factor measures were summed to generate total raw scores where some items are reverse scored and then added to achieve a total score. The psychometric properties of all the questionnaires were assessed including test retest reliability, internal reliability and construct validity.

### Bivariate analysis

Bivariate analysis was conducted screen lagged associations between variables populated within the framework developed adopting the Wilson and Cleary (1995) model at baseline (T1) and 3-month follow-up (T2).

Whether coping strategies determined successful denture treatment outcomes was tested using appropriate bivariate analyses. Pearson’s correlation and spearman’s rank correlation as appropriate to test the associations between coping strategies baseline (T1) with OHQoL, Denture satisfaction and Chewing ability at follow-up (T2).

The Wilson and Cleary model was adopted for analysis as shown below in Figure (4-4). This model draws a hypothesis that C is predicted by A, B, D and E. Hence the presence/absence of associations were explored between A, B, D and E at T1 stage and C at T2 stage. The model also hypothesised that B is predicted by A, D and E. Hence the presence/absence of the association was explored between A, B, D and E at T1 stage with B at T2 stage.

**Figure 4‑2. Analytical strategy based on Wilson and Cleary (1995) model**

B

A

C

E

D

Associations between clinical status and individual, environmental factors at baseline (T1) were also tested for associations with the outcomes (OHQoL, Denture satisfaction and Chewing ability) at follow up (T2).

To assess if there were confounding factors influencing coping strategies, clinical status and individual, environmental factors baseline (T1) were tested for associations with coping strategies at follow up (T2).

### Multiple regression Analysis

As bivariate analyses are unlikely to capture entire complex interrelationships within theoretical model, multiple regression analysis was carried out to examine direct and indirect associations between key individual and environmental variables and the outcome variables. The associations hypothesised within the model (Wilson and Cleary) was tested by using baseline data at T1 stage to predict scores at the 3-month follow-up stageT2 in the lagged analyses.

A series of lagged forward stepwise multiple linear regression analyses were conducted to look for longitudinal relationships amongst various set of variables identified from the bivariate analyses.

# CHAPTER FIVE RESULTS

## Introduction

In total, 201 participants registered in the study at baseline (T1), during the period September–February 2014. The 3-month post denture-insertion follow up stage (T2) lasted from December 2014 to June 2015. Eight participants discontinued with their new dentures due to clinical reasons such as denture failure, fractures and loss. Hence they were excluded at the follow up stage (T2). One participant opted out of the study. A further participant could not be traced using the contact details provided by them. Thus, the total participants involved in the follow up stage was 191.

This chapter presents the results in three sections:

Section 5.2 describes demographic and clinical data among the study sample as distributions of all the variables collected at baseline and follow-up. Where relevant, the reliability (internal; test-retest) of the measures used in the study is outlined.

Section 5.3 outlines the bivariate analyses between the independent and the dependant variables in lagged analyses between baseline (T1) and follow-up (T2). The model adapted from Wilson and Cleary guided the analyses to test the hypothesised relationships. Student t-tests, Pearson’s correlation and Spearman’s rank correlation were used as appropriate.

Section 5.4 presents the results from the primary analyses of the study; the multiple regression analyses to test the interrelationships between the variables whilst accounting for confounding. An additional series of analyses to test the predictors of coping strategies at follow-up (T2) was also done.

## Descriptive analysis

### Demographic information

Table 5‑1 summarises the demographic characteristics of the participants. Their mean age was 58.5 years (range 27-85). Most were female and had a living life partner (73.6% n= 148). The majority identified themselves as following the Hindu faith and were from the backward castes as per the Tamilnadu government’s caste classification (TNPSC, 2015) and were either retired or unemployed. More than three-fourth of the participants had a monthly income less than 7594/- rupees (approximately £76). Ninety percent of all participants were educated only up to school level.

### Clinical characteristics

Table 5‑2 summarises the clinical characteristics of participants at baseline (T1). The dentures were fabricated and provided mostly by undergraduate dental students. More than half of the participants were completely edentulous. Almost seventy percent had no occluding pairs of teeth. Just above half of the participants sought new dentures within a year of a tooth loss episode. Only 2% of the denture wearers had mucosal disease.

Table 5‑3 lists participants’ prosthetic status and prosthetic treatment need at baseline (T1). Nearly half (44.8%) had no history of denture wearing in both arches. More than half (53.7%) required new/replacement full dentures in both arches. The clinical and demographic data were recoded to facilitate data analysis. For example, Age was not normally distributed so this variable was dichotomised around the median age (Table 5-4)

**Table 5‑1. Demographic characteristics of 201 participants at baseline (T1)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Participants** | **n** | **%** | |
| **Gender** |  | |  |
| Female | 115 | | 57.2 |
| Male | 86 | | 32.8 |
|  |  | |  |
| **Age** |  | |  |
| 18-29 | 1 | | 0.5 |
| 30-39 | 7 | | 3.5 |
| 40-49 | 37 | | 18.4 |
| 50 and above | 156 | | 77.6 |
|  |  | |  |
| **Monthly income in (₹) rupees (1 rupee = £0.01)** |  | |  |
| 1520 or less | 50 | | 24.9 |
| 1521-4555 | 59 | | 29.4 |
| 4556-7593 | 50 | | 24.9 |
| 7594-11631 | 20 | | 10.0 |
| 11362-15187 | 13 | | 6.5 |
| 15188-30374 | 8 | | 4.0 |
| 30375 or more | 1 | | 0.5 |
|  |  | |  |
| **Education** |  | |  |
| Profession or Honours degree | Nil | | Nil |
| Graduate or Postgraduate degree | 13 | | 6.5 |
| Intermediate or post high school diploma | 6 | | 3.0 |
| High school certificate | 52 | | 25.9 |
| Middle School certificate | 75 | | 37.3 |
| Primary School certificate | 40 | | 19.9 |
| Illiterate | 15 | | 7.5 |
|  |  | |  |
| **Occupation** |  | |  |
| Professional | 4 | | 2.0 |
| Semi professional | 3 | | 1.5 |
| Clerical , shop owner, farmer | 34 | | 16.9 |
| Skilled worker | 11 | | 5.5 |
| Semi-skilled worker | 11 | | 5.5 |
| Unskilled worker | 16 | | 8.0 |
| Not employed / retired | 122 | | 60.7 |
|  |  | |  |
| **Religion** |  | |  |
| Hindu | 169 | | 84.1 |
| Muslim | 13 | | 6.5 |
| Sikh | Nil | | Nil |
| Christian | 18 | | 9.0 |
| Others | 1 | | 0.5 |
|  |  | |  |
| **Caste** |  | |  |
| Forward | 39 | | 19.4 |
| Backward | 105 | | 52.2 |
| Most backward | 35 | | 17.4 |
| Scheduled caste/ Tribe | 9 | | 4.5 |
| Other | 13 | | 6.5 |

**Table 5‑2. Clinical data among 201 participants at baseline (T1)**

|  |  |
| --- | --- |
| **Clinical data** | **%** |
|  |  |
| **No. of missing teeth** |  |
| 29-32 | 2.5 |
| 25-28 | 8.0 |
| 21-24 | 8.5 |
| 17-20 | 6.0 |
| 13-16 | 5.0 |
| 9-12 | 4.0 |
| 5-8 | 8.5 |
| 1-4 | 3.5 |
| No natural teeth | 54.2 |
|  |  |
| **No. of occluding pairs of teeth** |  |
| 13-16 | 3.0 |
| 9-12 | 12.9 |
| 5-8 | 10.9 |
| 1-4 | 4.5 |
| None | 68.7 |
|  |  |
| **Mucosal disease** |  |
| Present | 2.0 |
|  |  |
| **Time since last tooth loss episode** |  |
| <1year | 56.7 |
| <5 years | 23.4 |
| <10 years | 9.5 |
| >10 years | 9.5 |
| Loss due to other reasons | 1.0 |
|  |  |
| **Operator** |  |
| Postgraduate trainee | 17.4 |
| Interns | 5.0 |
| Undergraduates | 77.6 |
|  |  |

**Table 5‑3. Prosthodontic status and treatment need of 201 participants at baseline (T1)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Clinical data** | | **Upper %** | **Lower %** | |
|  | |  |  | |
| **Prosthetic status** | |  |  | |
| No prosthesis | | 48.3 | 53.2 | |
| Bridge | | 0.5 | 0.5 | |
| Partial denture | | 19.9 | 18.9 | |
| Both bridge and partial denture | | 0.5 | 1.0 | |
| Full removable denture | | 30.8 | 26.4 | |
|  | |  |  | |
| **Prosthetic need** | |  |  | |
| No prosthesis needed | | 5.5 | 3.0 | |
| Need for one unit prosthesis | | 3.5 | 0.5 | |
| Need for multi-unit prosthesis | | 26.4 | 37.3 | |
| Need for a combination of one & multi-unit | | 1.0 | 1.0 | |
| Need for a full unit prosthesis | | 63.7 | 58.2 | |
|  |  | | |  |

For analytical reasons, the demographic and clinical data were recoded for later analyses into smaller groups as listed in the Tables (5-4, 5-5 & 5-6)

**Table 5‑4. Recoded demographic data of 201 participants**

|  |  |
| --- | --- |
| **Participants** | **%** |
|  |  |
| **Age (Median split)** |  |
| 18-58 | 51.7 |
| 59 & above | 48.3 |
|  |  |
| **Marital status** |  |
| Married with living partner | 73.6 |
| Single/ separated or divorced /widowed | 26.4 |
|  |  |
| **Monthly income in (₹) rupees (1 rupee = £0.01)** |  |
| Upto 4555 | 54.2 |
| 4556 and above | 45.8 |
| **Education** |  |
| High school and above | 35.3 |
| School drop outs/ Illiterate | 64.7 |
|  |  |
| **Occupation** |  |
| Employed | 39.3 |
| Unemployed/retired | 60.7 |
|  |  |
| **Caste** |  |
| Forward / open category | 25.9 |
| Historically oppressed backward castes | 74.1 |

**Table 5‑5. Recoded clinical data among 201 participants**

|  |  |
| --- | --- |
| **Clinical data** | **%** |
|  |  |
| **Missing teeth** |  |
| 21 or more teeth (functional dentition) | 18.9 |
| Less than 21 teeth | 26.9 |
| No teeth present | 54.2 |
|  |  |
| **Occluding pairs** |  |
| Present | 31.3 |
| No occluding pairs | 68.7 |
|  |  |
|  |  |
| **Time since last tooth loss episode** |  |
| Less than 1 year | 56.7 |
| More than a year | 43.3 |
|  |  |
| **Operator expertise** |  |
| Undergraduates | 77.6 |
| Other | 22.4 |
|  |  |

**Table 5‑6. Recoded prosthetic status and need in 201 participants**

|  |  |  |
| --- | --- | --- |
|  | **Percentage %** | |
| **Upper** | **Lower** |
|  |  |  |
| **Prosthetic status** |  |  |
| None | 48.3 | 53.2 |
| Wearing dentures | 51.7 | 46.8 |
|  |  |  |
| **Prosthetic need** |  |  |
| Partial dentures/ none needed | 36.3 | 41.8 |
| Need for a full prosthesis | 63.7 | 58.2 |
|  |  |  |

### Coping strategies

#### Brief COPE

Coping strategies were measured with the 28– item Brief COPE (Carver, 1997) with 14 coping strategies grouped under their respective subscales (2 items per subscale) (Table 5-7). Higher scores meant that the specific coping strategy was used more. The scores were measured at both stages T1 and T2 (Table 5-7). Active coping and acceptance were the most used strategies at baseline and follow-up respectively. While the least used was substance misuse in both stages.

**Table 5‑7. Mean scores of Brief COPE overall and subscales at baseline (T1) and follow up (T2)**

|  |  |  |
| --- | --- | --- |
| **Coping strategies/**  **Subscales** | **Potential Range 2-8** | |
| **Mean (SD)**  **Baseline n=201** | **Mean (SD)**  **Follow-up n=191** |
|  |  |  |
| Active | 6.5 (1.5) | 5.2 (1.9) |
| Planning | 5.6 (2) | 4.2 (1.6) |
| Positive reframing | 5.8 (1.7) | 4.6 (1.8) |
| Acceptance | 6.3 (1.8) | 5.5 (1.9) |
| Humour | 2.4 (1.1) | 2.5 (1) |
| Religion | 5.1 (2.4) | 4.6 (2.1) |
| Emotional support | 4.3 (2.0) | 3.3 (1.5) |
| Instrumental support | 3.8 (1.9) | 3.6 (1.5) |
| Distraction | 3.6 (1.7) | 3.4 (1.2) |
| Denial | 2.9 (1.7) | 2.5 (1.1) |
| Venting | 3.8 (1.4) | 2.8 (1.1) |
| Substance misuse | 2.1 (0.7) | 2.1 (0.4) |
| Behavioural disengagement | 2.6 (1.3) | 2.6 (1.3) |
| Self-blame | 3.8 (2.2) | 2.9 (1.2) |
|  |  |  |

#### Factor analysis

Rationale

With 14 subscales and 28 items in the Brief COPE questionnaire, explaining the variance and its associations with other variables becomes complex. For instance, analysing each subscale separately would lead to many analyses and the risk of Type I error. Moreover, two item scales would be unreliable, leading to Type II error. A simpler, smaller set of latent constructs (factors) can be used to explain such large measures with varied subscales. Such parsimonious solutions have a better external validity (Henson and Roberts, 2006).

Thus, factor analysis was used to synthesise the domains of Brief COPE scale. Coping strategies were normally distributed in both the stages T1 and T2 (Appendix 8 – Coping strategies). The baseline data were extracted using ML extraction using SPSS software (version 22). The factor analysis with ML extraction, Kaiser Normalisation and oblique rotation yielded eight factors with Eigen values greater than 1 (Table 5‑8). Factor 1 (Active, Planning and Positive Reframing) can be considered as a positive/active coping, Factor 2 (Self-Distraction, Denial) are Negative/Avoidance coping. Factor 3 (Emotional Support and Instrumental Support) which is seeking social support. Although, there is an inherent difference as instrumental support is a problem-focussed strategy and the other one is an emotion-focussed coping strategy. Factor 4 (Substance Misuse, Behavioural Disengagement) is again a Negative/ Avoidance form of coping. The rest of the factors were restricted to each subscale (Factor 5 – Self-Blame; Factor 6 – Humour; Factor 7 – Religion; Factor 8 – Acceptance). The distributions of these eight factors were varied and repetitive sometimes (as seen in factors 2 & 4) although they were not necessarily the same coping strategies

According to Kaiser-Guttmann criterion, usually factors with Eigen values greater than 1 are suggested to be used in the analysis. The results (Table 5 8) suggest that not all factors appear to be relevant and need to be included in the analysis.

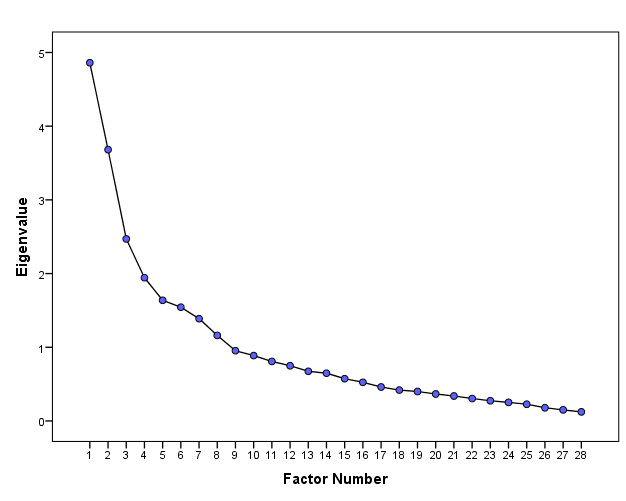
**Table 5‑8. Factor structure matrix of Brief COPE at T1**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Coping strategies/ item no.** | | **Factor** | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Active coping | 1 | .558 | -.164 | .011 | -.138 | .317 | -.048 | .137 | .301 |
| 2 | .665 | .025 | .115 | -.280 | .131 | -.020 | .153 | .296 |
| Planning | 3 | .784 | .013 | .185 | -.078 | .171 | .044 | .151 | .250 |
| 4 | .769 | .128 | .241 | .063 | .135 | .053 | .185 | .248 |
| Positive Reframing | 5 | .592 | .052 | .009 | -.049 | .250 | .007 | .166 | .238 |
| 6 | .429 | .136 | .210 | .030 | .173 | -.034 | .156 | .234 |
| Acceptance | 7 | .362 | .070 | .218 | -.029 | .076 | .010 | .049 | .996 |
| 8 | .351 | .129 | .141 | -.040 | -.092 | .060 | .047 | .612 |
| Humour | 9 | .033 | .205 | .109 | .277 | .051 | .855 | .094 | .035 |
| 10 | .025 | .256 | .130 | .205 | .082 | .922 | .079 | .007 |
| Religion | 11 | .229 | .245 | .159 | .088 | .163 | .100 | .912 | .000 |
| 12 | .195 | .330 | .250 | .112 | .131 | .072 | .915 | .054 |
| Emotional | 13 | .198 | .184 | .605 | .091 | -.047 | .134 | .277 | .114 |
| 14 | .160 | .233 | .672 | -.043 | -.132 | .068 | .181 | .129 |
| Instrumental | 15 | .175 | .308 | .677 | .095 | -.002 | .085 | .078 | .150 |
| 16 | .070 | .286 | .762 | .135 | .121 | .072 | .107 | .149 |
| Self-distraction | 17 | .160 | .520 | .324 | .171 | .137 | .099 | .178 | .005 |
| 18 | .172 | .515 | .262 | .205 | .184 | .245 | .352 | -.024 |
| Denial | 19 | -.045 | .830 | .294 | .278 | .041 | .151 | .215 | .105 |
| 20 | .041 | .800 | .218 | .322 | .035 | .251 | .207 | .051 |
| Venting | 21 | .237 | .184 | -.001 | .031 | .345 | .036 | .288 | .080 |
| 22 | .066 | .566 | .183 | .439 | .061 | .207 | .207 | .097 |
| Substance misuse | 23 | -.016 | .272 | .025 | .458 | .095 | .458 | .037 | -.119 |
| 24 | -.081 | .210 | .020 | .589 | .096 | .387 | .068 | -.072 |
| Behavioural disengagement | 25 | -.064 | .277 | .068 | .852 | .098 | .206 | .094 | -.051 |
| 26 | -.065 | .375 | .139 | .733 | .106 | .102 | .076 | .009 |
| Self-blame | 27 | .229 | .088 | -.044 | .190 | .909 | .078 | .137 | -.036 |
| 28 | .261 | .093 | .030 | .078 | .906 | .096 | .159 | .043 |

- Eigen values above 1

Previous studies using Brief COPE and a visual test of the scree plot (Figure 5-1) for Brief COPE at T1 in this study suggested reduction and grouping of the data under four factors.

**Figure 5‑1. Scree plot of Brief COPE scale scores at T1**



The factor analysis was hence rerun to reduce to force the items into 4 factors only. The factor structure matrix after reduction is shown in (Table 5-9). The first factor comprised the items of subscales for Self-distraction, Substance Misuse, Behavioural Disengagement and Humour. The loadings were significant, ranging from (r= 0.402 – 0.675). Based on past studies these items were labelled as Avoidant/ Negative coping strategies. The second factor comprised Active Coping, Planning, Positive Reframing and Acceptance. The loadings varied within significant levels (r= 0.447- 0.887). It was labelled as Positive/Adequate coping in keeping with Heydecke and colleagues (2004) study. The third factor had Self-Blame items alone with a highly significant loading (r= 0.849 and 0.945).

**Table 5‑9. Factor structure of Brief COPE at T1 after factor reduction**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Coping strategies/ item no.** | | **Factor** | | | |
| 1 | 2 | 3 | 4 |
| Active coping | 1 | -.189 | **.554** | .321 | .147 |
| 2 | -.108 | **.678** | .121 | .165 |
| Planning | 3 | -.010 | **.718** | .160 | .168 |
| 4 | .126 | **.697** | .137 | .213 |
| Positive Reframing | 5 | -.012 | **.554** | .236 | .167 |
| 6 | .088 | **.462** | .142 | .177 |
| Acceptance | 7 | .079 | **.473** | .004 | .089 |
| 8 | .096 | **.447** | -.132 | .077 |
| Humour | 9 | **.402** | .036 | .019 | .087 |
| 10 | **.409** | .046 | .046 | .078 |
| Religion | 11 | .214 | .221 | .126 | **.861** |
| 12 | .292 | .222 | .082 | **.956** |
| Emotional | 13 | .288 | .292 | -.096 | .310 |
| 14 | .267 | .296 | -.200 | .237 |
| Instrumental | 15 | .354 | .291 | -.074 | .151 |
| 16 | .370 | .217 | .027 | .165 |
| Self-distraction | 17 | **.454** | .221 | .068 | .245 |
| 18 | **.508** | .178 | .124 | .388 |
| Denial | 19 | **.657** | .063 | -.052 | .274 |
| 20 | **.675** | .094 | -.040 | .261 |
| Venting | 21 | **.128** | .225 | .331 | .270 |
| 22 | **.603** | .091 | -.007 | .238 |
| Substance misuse | 23 | **.470** | -.058 | .080 | .046 |
| 24 | **.462** | -.133 | .092 | .061 |
| Behavioural disengagement | 25 | **.499** | -.107 | .095 | .105 |
| 26 | **.527** | -.072 | .074 | .115 |
| Self-blame | 27 | .124 | .137 | **.945** | .122 |
| 28 | .105 | .211 | **.849** | **.14**5 |

- Eigen values above 1

The fourth factor had items from the Religion sub-scale alone with high significant loadings (r= 0.861 and 0.956). With these 4 factors reduced, the other sub-scales (Emotional coping, Instrumental support and Venting) within Brief COPE scale were dropped from further analysis.

The mean scores of the 4 extracted reduced factors are summarised in Table 5-10. It may be noticed that all coping strategies decreased at follow-up. Especially, positive coping reduced by almost 4 points at follow-up. However, in terms of the range, positive coping strategies were more on the higher side in comparison to the other strategies.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Factors** | **Coping strategies** | **Score range**  **(min –max)** | **Mean (SD)** | |
| **Baseline (T1)** | **Follow-up (T2)** |
| Negative/ inadequate/ avoidance | Self-distraction, Denial, Venting, Substance misuse, Behavioural disengagement and Humour | 12-48 | 17.50 (5.06) | 16.02 (3.48) |
| Positive/ adequate | Active coping, planning, Positive reframing and Acceptance. | 8-32 | 24.23 (5.25) | 19.60 (4.57) |
| Self-blame | Self-blame | 2-8 | 3.79 (2.16) | 2.96 (1.21) |
| Religion | Religion | 2-8 | 5.07 (2.38) | 4.60 (2.05) |

**Table 5‑10. Mean scores of extracted Brief COPE factors at both stages**

### Individual factors

#### Subjective SES

The MacArthur Scale of Subjective Social Status was used to measure subjective SES (Adler and Stewart, 2007). Participants were required to mark on one of the ten rungs of a pictorial ladder. As Adler and Stewart (2007) outlined, the first four rungs from the bottom were assigned with a value of 1 (indicating the lowest status); rung five was assigned a value of 2; rung six with 3; rung seven with value 4 and the scores for rungs eight to ten were assigned with a value 5 (highest subjective social status).

Almost half (49.3 %) of the participants perceived themselves to be of the lowest social status; almost a fifth (19%) in a low moderate status; little less than a quarter (21%) in a moderate social status. Slightly more than one tenth of participants perceived themselves as of high-moderate (6.5%) and high social status (4.5%).

**Table 5‑11. Outcome variable scores at baseline (T1) and follow-up (T2)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Variables** | **Score range**  **(min-max)** | | **Measures** | | **Mean (SD)**  **Baseline**  **n=201** | **Mean (SD)**  **Follow-up**  **N=191** | |
|  |  | |  | |  |  | |
| Subjective SES | 1-5 | | Macarthur ladder | | 4.02 (1.17) | -NA- | |
| Concern about oral health | 5-30 | | Maslow’s needs | | 13.53(4.22) | 14.29 (3.78) | |
| Ageing expectations | 12-48 | | ERA-12 | | 40.86(5.94) | 37.46 (5.93) | |
| Perceived stress | 4-20 | | PSS-4 | | 12.17 (3.25) | 12.77(2.42) | |
|  |  | |  | |  |  | |
| **Outcome variables** |  | |  | |  |  | |
| OHQoL | 19-95 | | OHIP- EDENT | | 44.32 (13.16) | 36.64 (11.13) | |
| Denture satisfaction | 9-45 | | de Liz Pocztaruk | | 28.22 (10.37) | 20.77 (8.501) | |
| Chewing ability | 0-5 | | Leake’s index | | 1.83 (1.29) | 2.44 (1.37) | |
|  | |  | |  |  | |  |

#### Concern about oral health

Concern about oral health was measured using a 6-item scale derived from Maslow’s hierarchy of needs (1943) and the scale used by Marshman and colleagues (2014) to measure dental indifference. Higher scores indicated less concern about one’s own oral health. The maximum score possible for the scale was 30 while the lowest was 6. The mean scores were 13.53 (T1) and 14.29 (T2) (Table 5-11). There was a slight decrease with participants concern about oral health at follow-up. The scores had a normal distribution at both baseline and follow-up period.

#### Ageing expectations

Ageing expectations were measured using the short form 12-item, Expectations Regarding Ageing (ERA -12) questionnaire (Sarkisian et al., 2005). The minimum possible score was 12 and the maximum 45. Higher scores indicated lower expectations about ageing (Table 5-11). The mean scores were 40.86 (T1) and 37.46 (T2). This suggested that expectations increased slightly at follow-up, although, mean scores were close to the higher end of the possible range suggesting overall low expectations regarding ageing. Mean scores had a slightly negative skew at baseline but were normally distributed at follow–up.

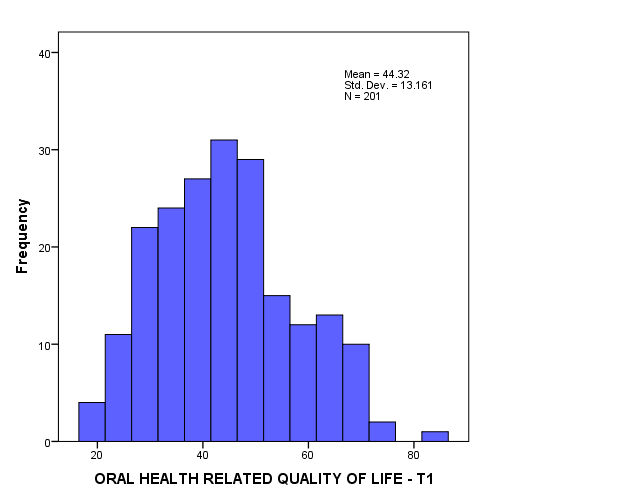
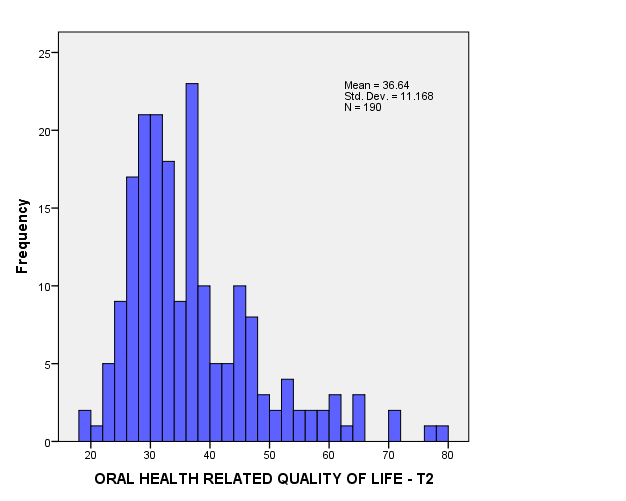
#### Perceived stress

Perceived stress was measured with short form of Cohen (1983)’s perceived stress scale (PSS- 4). The minimum possible score in this scale is 4 and the maximum is 20. Higher scores indicated higher levels of perceived stress. The mean scores were 12.17 (T1) and 12.77 (T2). The distribution of scores were normal both baseline and follow up stages (Table 5-11).

### Subjective outcomes

#### Oral health related quality of life (OHQoL)

OHIP EDENT scale used to measure OHQoL, the main outcome variable (Allen and Locker, 2002). It is a 19 item scale with seven subscales; Functional Limitation, Physical Pain, Psychological Discomfort, Physical Disability, Psychological Disability, Social Disability and Handicap. The possible range for the scale is 9 to 95 with higher scores indicating poorer OHQoL. The mean scores were 44.32 (T1) and 36.64 (T2). This suggested that OHQoL in participants (i.e.) improved during the study. Scores were normally distributed at baseline (T1). There was a slight positive skew at follow-up (T2) (Figure 5-2).



**Figure 5‑2. Distribution of OHQoL scores at baseline (T1) and follow-up (T2)**

#### Denture satisfaction

Denture satisfaction was measured using a 9-item questionnaire (de Liz Pocztaruk et al., 2006). The possible range for this scale is 9 to 45 and higher scores indicate lower satisfaction. The maximum score for the scale was 45. The mean scores were 28.22 (T1) and 20.77 (T2), indicating increased satisfaction at follow-up (T2). Scores were normally distributed in both stages.

#### Chewing ability

Chewing ability was measured using Leake’s (1990) index comprising of a food list ranging from a soft to a harder diet. The possible is 0 to 5 and higher scores indicate the ability to chew harder foods. The mean scores were, 1.83 (T1) and 2.44 (T2) respectively, indicating slight improvement with chewing ability at follow-up (T2). The scores had a slight positive skew at baseline (T1) and normal distribution at follow up.

### Reliability of scales

Cronbach’s alphas for all scales were assessed to test their internal reliability. Except for perceived stress at baseline (0.50), the reliability coefficients for all scales were above 0.6 and thus considered acceptable. The test–retest reliability of the scales was measured using intra-class correlation coefficients (ICC) (Table 5‑12). Almost all ICCs were greater than 0.40 and were significant.

**Table 5‑12. Reliability of the scales used in the study**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Individual factors** | **Measures** | **Cronbach’s reliability co-efficient**  **(baseline)**  **n=201** | **Cronbach’s reliability co-efficient**  **(follow-up)**  **n=191** | **Test-retest correlation**  **(ICC)** |
| Concern about oral health | Maslow’s needs | 0.62 | 0.67 | 0.70\*\* |
| Ageing expectations | ERA-12 | 0.85 | 0.87 | 0.84\*\* |
| Perceived stress | PSS-4 | 0.50 | 0.60 | 0.70\*\* |
| OHQoL | OHIP- EDENT | 0.86 | 0.92 | 0.45\*\* |
| Denture satisfaction | de Liz Pocztaruk | 0.92 | 0.95 | 0.40\*\* |
|  |  |  |  |  |

\*\**correlation is significant at the 0.01 level (2 tailed)*

The perceived stress scale with only 4 items, had low internal consistency but better test-retest reliability ICC (0.70). Hence, the reliability of the scale was still deemed acceptable (Table 5-12). The ICCs were lower for OHQoL and denture satisfaction, which may be due to all the participants receiving new dentures during the study. The reliability scores for Brief COPE scale are listed in Table (5-13)

**Table 5‑13. Reliability of Brief COPE factors**

|  |  |  |  |
| --- | --- | --- | --- |
| **Factors/** Brief COPE | **Cronbach’s reliability co-efficient**  **(T1)**  **n=201** | **Cronbach’s reliability co-efficient**  **(T2)**  **n=191** | **Test-retest correlation**  **(ICC)** |
|  |  |  |  |
| Negative/inadequate/avoidance | 0.80 | 0.71 | 0.33\*\* |
| Positive/adequate | 0.76 | 0.71 | 0.27\*\* |
| Self-blame | 0.90 | 0.53 | 0.44\*\* |
| Religion | 0.91 | 0.84 | 0.81\*\* |
|  |  |  |  |

## Bivariate analyses

Appropriate bivariate analyses were used to assess the lagged associations between the study variables populated in the model preliminarily (Figure 2‑1).

1. Pearson’s (r) correlation was used as appropriate to assess the associations between baseline independent continuous variables, outcomes and dependant variables at follow-up. Although Pearson’s correlation assumes finite variances and covariances, it does not assume normality. In this study, certain variables (such as ageing expectations) had skewed distributions which needed recoded and normality transformation (Appendix H). Spearman's correlation (ρ) was used in for those variables to test the associations. Even though it is a non-parametric test based on medians, it applies to ranks and provides a measure of a monotonic relationship between two continuous random variables and is robust to outliers (unlike Pearson's correlation) (Chok, 2010).
2. Student’s t-tests were used to identify the relationships between recoded clinical variables (occluding pairs, tooth loss episode, prosthetic status, prosthetic treatment need, operator expertise); all demographic variables (individual- age, marital status; environmental - income, education, occupation, caste) recorded (only) at baseline and dependant continuous variables (Coping strategies, OHQoL, Denture satisfaction, Chewing ability) at follow-up (T2)
3. The Analysis of Variance (ANOVA) -F test was used analyse the relationships between the clinical factors (dentition status – no of missing teeth) at baseline (T1) and dependant continuous variables (Coping strategies, OHQoL, Denture satisfaction, Chewing ability) at follow-up (T2)

### Bivariate analyses between Brief COPE factors at baseline (T1) and OHQoL, Denture satisfaction and chewing ability at follow-up

The factor analysis reported in section (5.2.3.2) extracted four factors from the Brief COPE scale: Negative/ Inadequate/Avoidance coping, Positive/ Adequate coping, Self-blame and Religion. The relationship between these factors and OHQoL, denture satisfaction and chewing ability was explored.

As seen in Table 5.14, none of the Brief COPE factors showed no significant associations with the outcome variables at follow-up stage (T2) of this study

**Table 5‑14. Lagged analysis: Bivariate associations between factors of Brief COPE scale at baseline (T1) and outcomes (OHQoL, Denture satisfaction and Chewing Ability) at follow-up (T2)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Factors (Brief COPE)**  **Baseline T1** | **Follow-up T2** | | |
| OHQoL | Denture satisfaction | Chewing ability |
| Inadequate/negative/avoidance | 0.118 | 0.128 | 0.000 |
| Adequate/positive | 0.058 | - 0.038 | - 0.019 |
| Self-blame | - 0.034 | - 0.056 | - 0.048 |
| Religion | 0.055 | 0.023 | - 0.090 |

### Bivariate analyses between clinical factors, coping strategies, individual variables, environmental variables, outcome variables at baseline (T1) and OHQoL at follow-up (T2)

Table 5-15 outlines the lagged analyses between coping strategies, individual factors and outcome variables at baseline and OHQoL at follow-up. Worse OHQoL, moderate satisfaction and reduced chewing ability at baseline were significantly associated with worse OHQoL (high OHIP scores) at follow-up. Clinically, the having fewer natural teeth, fewer occluding pairs, experience of wearing dentures and also needing larger unit dentures in the upper arch were significantly associated with higher (worse OHQoL) OHIP EDENT scores at follow-up.

**Table 5‑15. Lagged analysis: Bivariate associations between coping strategies, individual factors, outcome variables at baseline (T1) and OHQoL at follow-up (T2)**

|  |  |
| --- | --- |
| **Independent variables**  **(baseline)** | **ρ** |
|  |  |
| **Coping strategies** |  |
| Inadequate/ negative/ avoidance | 0.125 |
| Positive/ adequate | -0.001 |
| Self-blame | -0.034 |
| Religion | 0.069 |
|  |  |
| **Individual factors** |  |
| Subjective SES | -0.072 |
| Concern about oral health | -0.076 |
| Ageing expectations | -0.058 |
| Perceived stress | 0.008 |
|  |  |
| **Baseline outcome variables** |  |
| OHQoL | 0.341\*\* |
| Denture satisfaction | 0.187\*\* |
| Chewing ability | -0.174\* |
|  |  |

*\*\* Spearman’s correlation is significant at the 0.01 level (2-tailed)*

*\* Spearman’s correlation is significant at the 0.05 level (2-tailed)*

Tables 5-16 and 5-17 summarise the possible relationships between independent variables (clinical status, demographic and environmental factors) at baseline and OHQoL at follow-up.

There were significant associations between the number of occluding pairs, prosthetic need (what type of removable dentures they were receiving) in the upper arch and the number of teeth present and the number of teeth present at baseline (T1) with OHQoL at follow- up (T2).

**Table 5‑16. Bivariate associations between clinical status, demographic variables at baseline (T1) and OHQoL at follow up (T2)**

|  |  |  |
| --- | --- | --- |
|  | **t** | **Mean (SD)** |
| **CLINICAL STATUS** |  |  |
| **Occluding pairs** |  |  |
| Present | 2.473+ | 39.55 (11.55)+ |
| None | 35.31 (10.73)+ |
|  |  |  |
| **Prosthetic status** |  |  |
| No dentures (upper) | 1.931 | 38.26 (11.53) |
| previous experience (upper) | 35.17 (10.61) |
| No dentures (lower) | 0.535 | 37.06 (11.25) |
| Previous experience (lower) | 36.20 (11.06) |
|  |  |  |
| **Prosthetic need** |  |  |
| Partial or no dentures (Upper) | 2.835 | 39.66 (12.05)+ |
| Full dentures (upper) | 34.98 (10.27)+ |
| Partial or no dentures (lower) | 1.742 | 38.27 (11.54) |
| Full dentures (lower) | 35.45 (10.72) |
|  |  |  |
| **Time since last tooth loss episode** |  |  |
| Within a year | 1.266 | 37.54 (11.56) |
| More than a year | 35.48 (10.52) |
| **Operator expertise** |  |  |
| Graduates and above | -0.882 | 37.49 (13.52) |
| Undergraduate students | 36.40 (10.39) |
|  |  |  |
| **DEMOGRAPHIC FACTORS** | t | Mean (SD) |
| **Age – (years)** |  |  |
| 18- 58 | 0.605 | 37.51 (11.75) |
| 59 and above | 35.72 (10.42) |
|  |  |  |
| **Marital status** |  |  |
| Married with living partner | 0.153 | 36.91 (11.83) |
| Single/ separated or divorced /widowed | 35.94 (9.10) |
|  |  |  |
| **Education** |  |  |
| High school and above | -0.316 | 36.30 (12.06) |
| School dropout/ Illiterate | 36.84 (10.63) |
|  |  |  |
| **Income (rupees)** |  |  |
| ₹ 4556 and above | 0.399 | 37.00 (10.88) |
| Upto ₹4555 per month | 36.34 (11.40) |
|  |  |  |
| **Occupation** |  |  |
| Employed | -0.431 | 36.22 (9.93) |
| Unemployed/ Retired | 36.93 (11.92) |
|  |  |  |
| **Caste** |  |  |
| Open category (with no state sponsored social benefits) | -0.073 | 36.54 (11.40) |
| Socially oppressed castes | 36.68 (11.10) |
|  |  |  |

*+p value significant at <0.05 (Independent t-test)*

**Table 5‑17. Bivariate association clinical status at baseline (T1) and OHQoL at follow-up (T2)**

|  |  |  |
| --- | --- | --- |
| **Clinical status** | **F** | **Mean (SD)** |
| **No. of teeth present** |  |  |
| Functional dentition (>21 teeth) | 3.452\* | 40.30 (12.64) |
| < 21 teeth | 37.50 (11.64) |
| No teeth | 34.93 (11.13) |
|  |  |  |

*\*p value significant at <0.05 (One Way ANOVA)*

### Bivariate analyses between clinical factors, coping strategies, individual variables, environmental variables, outcome variables at baseline (T1) and denture satisfaction at follow-up (T2)

Table 5-18 presents the lagged analyses between coping strategies, individual factors and outcome variables (OHQoL, denture satisfaction, chewing ability) at baseline with denture satisfaction at follow-up.

**Table 5‑18. Lagged analysis: Bivariate associations between coping strategies, individual factors, baseline (T1) outcome variables and denture satisfaction at follow-up (T2)**

|  |  |
| --- | --- |
| **Independent variables**  **(baseline)** | **r** |
|  |  |
| **Coping strategies** |  |
| Inadequate/ negative/ avoidance | 0.097 |
| Positive/ adequate | - 0.077 |
| Self-blame | - 0.048 |
| Religion | 0.024 |
|  |  |
| **Individual factors** |  |
| Subjective SES | 0.001 |
| Concern about oral health | 0.012 |
| Ageing expectations | 0.016 (ρ) |
| Perceived stress | - 0.113 |
|  |  |
| **Baseline (T1) outcome variables** |  |
| OHQoL | - 0.149\* |
| Denture satisfaction | - 0.253\*\* |
| Chewing ability | - 0.159\* |
|  |  |

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

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

Significant associations were observed between individuals who were younger, had worse OHQoL (higher OHIP scores), higher denture satisfaction, moderate chewing ability at baseline and worse (higher scores) denture satisfaction at follow up.

Tables 5-19 and 5-20 summarise the possible relationships between independent variables (clinical status, individual factors and environmental factors) at baseline and denture satisfaction at follow-up. There were significant associations between clinical factors such as the presence or absence of occluding pairs and prosthetic need variables with denture satisfaction.

**Table 5‑19. Bivariate association between number of teeth present and denture satisfaction at follow-up (T2)**

|  |  |  |
| --- | --- | --- |
| **Clinical factor** | **F** | **Mean (SD)** |
| **No. of teeth present)** |  |  |
| Functional dentition (>21 teeth) | 1.682 | 22.03 (9.27) |
| < 21 teeth | 21.98 (9.00) |
| No teeth | 19.74 (7.90) |
|  |  |  |

*^p value significant at F <0.05 (One Way ANOVA)*

**Table 5‑20. Bivariate associations between clinical status, demographic variables at baseline (T1) and denture satisfaction at follow up (T2)**

|  |  |  |
| --- | --- | --- |
|  | **t** | **Mean (SD)** |
| CLINICAL STATUS |  |  |
| **Occluding pairs** |  |  |
| Present | 2.161+ | 22.72(9.31)+ |
| None | 19.88 (7.98)+ |
| **Prosthetic status** |  |  |
| No dentures (upper) | 2.149+ | 22.14 (9.05) |
| previous experience (upper) | 19.52 (7.80) |
| No dentures (lower) | 1.256 | 21.52 (8.60) |
| Previous experience (lower) | 19.97 (8.37) |
| **Prosthetic need** |  |  |
| Partial or no dentures (Upper) | 1.816 | 22.26 (9.26) |
| Full dentures (upper) | 19.94(7.96) |
| Partial or no dentures (lower) | 2.024+ | 22.21 (9.00)+ |
| Full dentures (lower) | 19.71 (7.98)+ |
| **Time since last tooth loss episode** |  |  |
| Within a year | 2.069+ | 21.89 (8.75)+ |
| More than a year | 19.34 (7.97)+ |
| **Operator expertise** |  |  |
| Graduates and above | 0.015 | 20.79 (8.90) |
| Undergraduate students | 20.77 (8.41) |
|  |  |  |
| DEMOGRAPHIC FACTORS |  |  |
| **Age – (years)** |  |  |
| 18- 58 years | 1.424 | 21.62 (8.80) |
| 59 and above | 19.87 (8.12) |
| **Marital status** |  |  |
| Married with living partner | 1.405 | 21.30 (8.90) |
| Single/ separated or divorced /widowed | 19.37 (7.25) |
| **Education** |  |  |
| High school and above | 0.046 | 20.81 (8.47) |
| School dropout/ Illiterate | 20.75 (8.54) |
| **Income – (rupees)** |  |  |
| ₹ 4556 and above | 0.292 | 20.97 (9.16) |
| Upto ₹4555 per month | 20.60 (7.90) |
| **Occupation** |  |  |
| Employed | 0.441 | 21.10 (8.97) |
| Unemployed/ Retired | 20.55 (8.19) |
| **Caste** |  |  |
| Open category (no social benefits) | -1.036 | 19.66 (7.98) |
| Socially oppressed castes (social benefits) | 21.14 (8.65) |
|  |  |  |

*+p value significant at <0.05 (Independent t-test)*

### Bivariate analyses between clinical factors, coping strategies, individual variables, environmental variables, outcome variables at baseline (T1) and chewing ability at follow-up (T2)

Table 5-21 presents the lagged analyses between coping strategies, individual, environmental and outcome variables at baseline with chewing ability at follow-up.

|  |  |
| --- | --- |
| **Independent variables**  **(baseline)** | **r** |
|  |  |
| **Coping strategies** |  |
| Inadequate/ negative/ avoidance | 0.000 |
| Positive/ adequate | -0.019 |
| Self-blame | -0.048 |
| Religion | -0.090 |
|  |  |
| **Individual factors** |  |
| Subjective SES | -0.016 |
| Concern about oral health | -0.006 |
| Ageing expectations | -0.080 (ρ) |
| Perceived stress | -0.104 |
|  |  |
| **Baseline (T1) outcome variables** |  |
| OHQoL | -0.294\*\* |
| Denture satisfaction | -0.227\*\* |
| Chewing ability | 0.669\* |
|  |  |

**Table 5‑21****. Lagged analysis: Bivariate associations between coping strategies, individual factors, environmental factors, OHQoL, denture satisfaction, chewing ability, clinical factors at baseline (T1) and chewing ability at follow-up (T2)**

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

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

Significant associations were seen between lower age, having skilled jobs, better OHQoL (lower OHIP scores), denture satisfaction and good chewing ability at baseline and better (higher scores) chewing ability at follow up. Clinically, number of natural teeth present, occluding pairs and needing smaller units of partial dentures in both arches and seeking dentures after a recent tooth loss episode were associated with better chewing ability (i.e. higher scores) at follow up.

Tables 5-22 and 5-23 summarise the possible relationships between independent variables (clinical status, individual factors and environmental factors) at baseline and chewing ability at follow-up. There were significant associations between clinical factors (occluding pairs, prosthetic treatment need in both the arches) and number of teeth present, individual factors (age) and environmental factors (occupation)

**Table 5‑22.** **Bivariate association number of teeth present and chewing ability at follow-up (T2)**

|  |  |  |
| --- | --- | --- |
| **Clinical status** | **F** | **Mean (SD)** |
| **No. of teeth present)** |  |  |
| Functional dentition (>21 teeth) | 19.158\* | 3.54 (1.64) |
| < 21 teeth | 2.44 (1.30) |
| No teeth | 2.05 (1.07) |
|  |  |  |

*\*p value significant at <0.05 (One Way ANOVA)*

**Table 5‑23. Bivariate associations between clinical status, demographic variables at baseline (T1) and chewing-ability at follow-up (T2)**

|  |  |  |
| --- | --- | --- |
|  | **T** | **Mean (SD)** |
| CLINICAL STATUS |  |  |
| **Occluding pairs** |  |  |
| Present | 5.853\* | 3.23 (1.63)\* |
| None | 2.08 (1.06)\* |
| **Prosthetic status** |  |  |
| No dentures (upper) | - 0.318 | 2.41 (1.47) |
| previous experience (upper) | 2.47 (1.29) |
| No dentures (lower) | 1.103 | 2. 55 (1. 51) |
| Previous experience (lower) | 2.33 (1.21) |
| **Prosthetic need** |  |  |
| Partial or no dentures (Upper) | 4.900\* | 3.06 (1.62)\* |
| Full dentures (upper) | 2.10 (1.08)\* |
| Partial or no dentures (lower) | 5.147\* | 3.00 (1.55)\* |
| Full dentures (lower) | 2.03 (1.05)\* |
| **Time since last tooth loss episode** |  |  |
| Within a year | -1.653 | 2.30 (1.38) |
| More than a year | 2.63 (1.34) |
| **Operator expertise** |  |  |
| Graduates and above | - 0.492 | 2.35 (1.19) |
| Undergraduate students | 2.47 (1.42) |
| DEMOGRAPHIC FACTORS |  |  |
| **Age – years** |  |  |
| 18- 58 years | 3.177\* | 2.74 (1.46)\* |
| 59 and above | 2.12 (1.19)\* |
| **Marital status** |  |  |
| Married with living partner | 1.287 | 2. 52 (1.41) |
| Single/ separated or divorced /widowed | 2.23 (1.26) |
| **Education** |  |  |
| High school and above | 1.390 | 2.62 (1.44) |
| School dropout/ Illiterate | 2.34 (1.32) |
| **Income – rupees** |  |  |
| ₹ 4556 and above | 0.723 | 2.52 (1.44) |
| Upto ₹4555 per month | 2.37 (1.31) |
| **Occupation** |  |  |
| Employed | 2.857\* | 2.78 (1.42)\* |
| Unemployed/ Retired | 2.21 (1.30)\* |
| **Caste** |  |  |
| Open category (no social benefits) | 0.592 | 2.54 (1.38) |
| Socially oppressed castes (social benefits) | 2.41 (1.37) |

*\*p value significant at <0.05 (Independent t-test)*

### Associations between baseline clinical factors, coping strategies, individual variables, environmental variables with coping strategies at follow-up (T2)

In the bivariate analyses between clinical status and the coping strategies at follow-up is described in Table 5.24. Individuals who likely wore dentures in the past, who required partial dentures in the upper arch used lesser negative/adequate/avoidance coping strategies at baseline. Individuals with more teeth (functional dentition and above) and occluding pairs also used less inadequate/negative coping strategies. Individuals who required partial dentures with more occluding pairs used more positive coping strategies.

**Table 5‑24. Bivariate associations between clinical status at baseline (T1) and Brief COPE factors at follow-up (T2)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Factors  (Brief COPE)  At follow-up (T2) | Prosthetic status | | Prosthetic Rx need | | Teeth present | Occluding  pairs | Time since tooth loss | Operator expertise |
| Upper | Lower | Upper | Lower |
| Inadequate/negative/avoidance | -0.174\* | -0.110 | - 0.233\*\* | -0.131 | -0.231\*\* | -0.195\*\* | 0.011 | 0.086 |
| Adequate/positive | 0.082 | 0.077 | 0.178\* | 0.170\* | 0.176\* | 0.194\*\* | -0.058 | 0.062 |
| Self-blame | -0.120 | -0.062 | -0.071 | -0.100 | -0.101 | -0.033 | -0.083 | -0.050 |
| Religion | 0.032 | 0.046 | 0.019 | -0.034 | 0.033 | 0.043 | -0.029 | -0.020 |

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

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

Table 5-25 presents the lagged bivariate analyses between coping strategies, individual factors at baseline (T1) with coping strategies at follow-up using Pearson’s correlation (Spearman’s correlation for ageing expectations). All coping strategy factors at baseline (T1) were associated significantly with their respective factors at follow-up (T2). Self-blame coping factor during baseline was significantly associated with Negative/adequate/avoidance coping factor at follow-up. This suggested that people who tend to cope using self-blaming methods whilst receiving dentures tend to cope inadequately, in a negative and avoidant way over a period of time.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Independent variables**  **(baseline)** | Brief COPE factors at follow-up (T2) - R | | | |
| Inadequate/negative/ avoidance | Adequate/  positive | Self-blame | Religion |
| **Baseline (T1)**  **Brief COPE factors** |  |  |  |  |
| Inadequate/negative/  avoidance | 0.211\*\* | 0.019 | 0.126 | 0.080 |
| Adequate/positive | -0.069 | 0.159\* | -0.047 | 0.063 |
| Self-blame | -0.150\* | 0.056 | 0.332\*\* | 0.042 |
| Religion | 0.029 | 0.048 | 0.017 | 0.693\*\* |
| **Individual factors** |  |  |  |  |
| Subjective SES | -0.001 | -0.056 | -0.022 | 0.113 |
| Concern about oral health | -0.037 | 0.021 | -0.092 | 0.096 |
| Perceived stress | -0.068 | -0.025 | 0.027 | 0.116 |
| Ageing expectations (ρ) | 0.025 | -0.042 | 0.096 | 0.020 |
|  |  |  |  |  |

**Table 5‑25. Bivariate associations between Brief COPE factors and individual factors at baseline (T1) and Brief COPE factors at follow-up (T2)**

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

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

Table 5-26 summarises the relationships between demographic factors and environmental factors at baseline (T1) and coping strategies at follow-up (T2). There was significant association between occupational status and religious coping factor at follow-up. This suggested that people who were still in active employment used significantly lesser ways to cope with their dentures using religious/spiritual beliefs.

**Table 5‑26. Bivariate associations between demographic and environmental factors and coping strategies at follow-up (T2)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Independent variables**  **(baseline)** | Coping strategies at follow-up (T2) - t | | | |
| Inadequate/negative/ avoidance | Adequate/  positive | Self-blame | Religion |
| Age | 0.976 | -0.303 | 1.826 | -0.640 |
| Marital status | 0.598 | 0.063 | 0.379 | -1.265 |
| Education | -1.131 | 1.228 | -1.262 | -0.893 |
| Income | 1.363 | -0.021 | 1.168 | 0.344 |
| Occupation | 0.669 | 0.627 | 1.004 | -2.231\* |
| Caste | -1.773 | 1.082 | -0.274 | 0.434 |
|  |  |  |  |  |

*\*p value significant at <0.05 (Independent t-test)*

Figure 5.3 and 5-4 summarise the results of all the bivariate analyses.

OHQoL at follow-up was not predicted by coping strategies at follow-up.

OHQoL at follow-up was predicted by baseline number of teeth present, number of occluding pairs, wearing an upper denture, needing an upper denture, time since tooth loss, being dissatisfied with existing dentures (if present) and chewing ability.

Denture satisfaction at follow-up was predicted by baseline number of occluding pairs of teeth, wearing an upper denture, needing a lower denture, time since tooth loss, OHQoL, being dissatisfied with existing dentures (if present) and chewing ability

Similarly, Chewing ability at follow-up was determined by baseline age, occupation of the individual, number of teeth present, number of occluding pairs of teeth, needing dentures for both the arches, time since tooth loss episode, OHQoL, dissatisfied with denture (if present) and chewing ability.

Inadequate/negative coping strategies at follow-up were predicted by baseline wearing of upper denture, needing to wear an upper denture, number of teeth present, number of occluding pairs of teeth present, coping inadequately and by self-blaming of individuals themselves on their dental status.

Adequate/ positive coping strategies at follow-up was predicted by baseline needing to wear dentures on both the arches, number of teeth present, number of occluding pairs of teeth present and coping adequately in a positive way.

Self-blaming strategy at follow-up was predicted by baseline self-blaming strategy used by individuals on their dental status.

Religious coping strategy at follow-up was predicted by baseline occupation of the individual and coping strategy based on religious belief

**Figure 5‑3. Summary of significant bivariate relationships between baseline and outcome variables**

|  |  |  |
| --- | --- | --- |
| **BASELINE** |  | **FOLLOW UP** |
| * Number of teeth present^, number of occluding pairs+, prosthetic status (upper)+, prosthetic Rx need (upper)+, time since last tooth loss+ * OHQoL\*\*, Denture satisfaction\*, Chewing ability\* |  |  |
|  | OHQoL |
|  |  |
|  |  |  |
| * Occluding pairs+, prosthetic status (upper arch) +, prosthetic need (lower arch)+, time since last tooth loss episode+ * OHQoL\*, Denture satisfaction\*\*, Chewing ability\* |  |  |
|  |  |
|  | Denture satisfaction |
|  |  |
|  |  |
|  |  |

|  |  |  |
| --- | --- | --- |
| * Age+, Occupation+ * Number of teeth present^, number of occluding pairs+, prosthetic treatment need (both arches) +, time since last tooth loss episode+ * OHQoL\*\*, Denture satisfaction\*\*, Chewing ability\*\* |  |  |
|  |  |
|  | Chewing ability |
|  |
|  |  |
|  |  |
|  |  |

**Figure 5‑4 Summary of significant bivariate relationships between baseline variables and coping strategies at follow-up**

|  |  |  |
| --- | --- | --- |
| **BASELINE** |  | **FOLLOW UP** |
|  |  |  |
| Prosthetic status (upper)\*, prosthetic need (upper)\*\*, No. of teeth present\*, No. of occluding pairs\*\*, Inadequate /avoidance coping\*\*, self-blame coping\* |  |  |
|  | Inadequate/avoidance coping |
|  |  |
|  |  |  |
|  |  |  |
| Prosthetic need (both upper and lower)\*, No. of teeth present\*, No. of occluding pairs\*\*, Adequate/positive coping\* |  |  |
|  | Adequate positive coping |
|  |  |
|  |  |  |
|  |  |  |
| Self-blame coping\*\* |  |  |
|  | Self-blame coping |
|  |  |
|  |  |  |
|  |  |  |
| Religion\*\*, Occupation\* |  |  |
|  | Religion |
|  |  |

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

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

Although bivariate analyses showed significant associations between variables, they can be confounded by other factors. For example, number of occluding pairs of teeth is likely to be dependent on the number of teeth. Therefore regression analyses were used to account for possible confounding relationships between variables.

## Multiple regression analysis

### Regression analyses: Baseline predictors of outcome variables at follow-up (T2)

A series of lagged analyses were carried out using forward step-wise multiple regression model. Variables having associations with the follow-up variables in the bivariate analyses (as summarised in Figure 5-3) alone were tested in the model.

The best model for the baseline predictors of oral health related quality of life at follow up is presented in Table 5-27. Individuals with high OHIP EDENT scores (low oral health related quality of life), fewer teeth and lower chewing ability at baseline had worse (higher OHIP 19 scores) OHQoL at follow-up. The model explained 15.5% of the variation in OHQoL scores. Number of occluding pairs, the prosthetic status (upper arch), prosthetic need (upper arch), denture satisfaction and chewing ability were excluded from the model after testing.

**Table 5‑27. Stepwise forward multiple regression model for OHQoL at follow-up (T2)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Predictors of OHQoL at follow-up (T2)** | **β** | ***F*** | **R2** | **R2**  **Adjusted** | **R2**  **Change** |
|  |  |  |  |  |  |
| OHQoL (baseline) | 0.246\*\* | 17.742 | 0.086 | 0.081 | 0.086 |
| No. of teeth present | - 0.277\*\* | 13.582 | 0.126 | 0.117 | 0.040 |
| Chewing Index (baseline) | -0.194\* | 11.425 | 0.155 | 0.141 | 0.029 |
|  |  |  |  |  |  |
| Excluded variables |  |  |  |  |  |
| Occluding pairs of teeth,  Prosthetic status upper (experience based), Prosthetic need upper (denture type), denture satisfaction (baseline)  chewing index |  |  |  |  |  |

*\*\*Correlation significant at 0.01 level (2-tailed)*

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

Table 5-28 presents the best model for the predictors of denture satisfaction. Higher satisfaction was predicted by presence of occluding pairs and less chewing ability at baseline. The model explained 11.8 % of the variation in denture satisfaction. Baseline prosthetic status (both arches), prosthetic need (both arches), time since last tooth loss episode, OHQoL were not significant and excluded after testing.

**Table 5‑28. Stepwise forward multiple regression model for denture satisfaction at follow-up (T2)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Predictors of denture satisfaction at follow-up (T2)** | **β** | **F** | **R2** | **R2**  **Adjusted** | **R2**  **Change** |
|  |  |  |  |  |  |
| Denture satisfaction (baseline) | 0.204\*\* | 12.850 | 0.064 | 0.059 | 0.064 |
| Occluding pairs of teeth | -0.239\*\* | 9.632 | 0.093 | 0.084 | 0.029 |
| Chewing ability (baseline) | -0.182\* | 8.277 | 0.118 | 0.104 | 0.024 |
|  |  |  |  |  |  |
| Excluded variables |  |  |  |  |  |
| prosthetic status (both arches), prosthetic need (both arches), time since last tooth loss episode, OHQoL |  |  |  |  |  |

*\*\*Correlation significant at 0.01 level (2-tailed)*

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

Table 5-29 presents the best model for the predictors of chewing ability. Individuals with high chewing scores, more teeth and lower OHIP 19 scores (better OHQoL) at baseline had higher chewing ability scores at follow-up.

**Table 5‑29. Stepwise multiple regression model for chewing ability at follow-up (T2)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Predictors of Chewing ability at follow-up (T2)** | **β** | **F** | **R2** | **R2**  **Adjusted** | **R2**  **Change** |
|  |  |  |  |  |  |
| Chewing ability (baseline) | 0.569\*\* | 153.47 | 0.448 | 0.445 | 0.448 |
| Number of teeth present (dentition) | -0.163\*\* | 83.932 | 0.462 | 0.462 | 0.019 |
| OHQoL (baseline) | -0.116\* | 57.401 | 0.489 | 0.471 | 0.012 |
| Excluded variables |  |  |  |  |  |
| Age, occupation, no. of teeth present, occluding pairs, prosthetic need (both arches), time since last tooth loss episode, Denture satisfaction |  |  |  |  |  |
|  |  |  |  |  |  |

*\*\*Correlation significant at 0.01 level (2-tailed)*

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

The model explained 48.9% of the variation in chewing index scores at follow-up. Age, occupation, no. of teeth present, occluding pairs, prosthetic need (both arches), time since last tooth loss episode, denture satisfaction were tested in the model and excluded after testing.

### Regression analyses: Baseline predictors of Brief COPE factors at follow-up (T2)

The bivariate analyses (section 5.35) between baseline coping strategies clinical, individual, demographic, environmental variables and coping strategies at follow-up showed certain significant associations (Figure 5-3). To identify the predictors of coping strategies (Objective 4) a series of lagged analyses were carried out by using forward stepwise multiple regression model.

Table 5-30 presents the best model for the predictors of inadequate, negative and avoidant coping strategy factor at follow-up (T2).

**Table 5‑30. Stepwise forward multiple regression model for Inadequate/negative/avoidant Brief COPE factor at follow-up (T2)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Predictors of Inadequate/negative/avoidant factor at follow-up (T2)** | **Β** | **F** | **R2** | **R2**  **Adjusted** | **R2**  **Change** |
|  |  |  |  |  |  |
| Prosthetic need (upper arch) | -0.170\* | 10.861 | 0.054 | 0.049 | 0.054 |
| Inadequate/negative/avoidant factor (baseline) | 0.221\*\* | 8.376 | 0.082 | 0.072 | 0.027 |
| Self-blame factor (baseline) | -0.219\*\* | 8.705 | 0.123 | 0.108 | 0.041 |
| Prosthetic status (upper arch) | -0.157\* | 7.994 | 0.147 | 0.128 | 0.024 |
|  |  |  |  |  |  |
| Excluded variables |  |  |  |  |  |
| Number of teeth present, occluding pairs of teeth |  |  |  |  |  |
|  |  |  |  |  |  |

*\*\*Correlation significant at 0.01 level (2-tailed)*

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

Individuals with baseline need of dentures in the upper arch, coping inadequately, negatively by showing avoidance and self-blaming themselves, who already have worn a prosthesis in the upper arch had higher use of inadequate, negative and avoidant coping strategies at follow-up. The model explained 14.7% of the variation in inadequate, negative and avoidant coping scores at follow-up (T2). Number of teeth present and presence of occluding pairs of teeth were tested in the model and excluded post testing due to the lack of significant associations.

The best regression model for the predictors of positive and adequate coping strategy factor at follow up (T2) is presented in Table 5-31. Individuals who had baseline occluding pairs of teeth, used more positive and adequate coping strategies accounted for higher positive and adequate coping strategies at follow-up (T2). Positive and adequate coping scores accounted for 6.2% variance in the model. Prosthetic need (both upper and lower arches), number of teeth present were not significant and were excluded from the model.

**Table 5‑31. Stepwise forward multiple regression model for positive/ adequate Brief COPE factor follow-up (T2)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Predictors of positive/ adequate factor at follow-up (T2)** | **β** | **F** | **R2** | **R2**  **Adjusted** | **R2**  **Change** |
| Occluding pairs of teeth | 0.193\*\* | 7.4231 | 0.038 | 0.033 | 0.038 |
| Positive/adequate factor(baseline) | 0.157\* | 6.263 | 0.062 | 0.052 | 0.025 |
| Excluded variables |  |  |  |  |  |
| Prosthetic need (both upper and lower arches), Number of teeth present |  |  |  |  |  |
|  |  |  |  |  |  |

*\*\*Correlation significant at 0.01 level (2-tailed)*

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

The predictors of self-blaming coping strategy factor at follow up (T2) was analysed and is presented in Table 5-32. Individuals who used more baseline self-blaming coping strategies accounted for higher self-blame coping strategies at follow-up (T2). Self-blame coping scores accounted for 11% variance in the model. No other variables were used in the model from baseline (T1).

**Table 5‑32. Stepwise forward multiple regression model for self-blame factor at follow-up (T2)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Predictors of self-blame factor at follow-up (T2)** | **β** | **F** | **R2** | **R2**  **Adjusted** | **R2**  **Change** |
|  |  |  |  |  |  |
| Self-blame (baseline) | 0.332\*\* | 23.336 | 0.110 | 0.105 | 0.110 |
|  |  |  |  |  |  |

*\*\*Correlation significant at 0.01 level (2-tailed)*

Table 5-33 presents the best model for the predictors of religion coping at follow-up (T2). Individuals who used more baseline strategies based on religious and spiritual beliefs accounted for higher religion coping strategies at follow-up (T2). Religion coping scores accounted for 48% variance in the model. No other variables were used in the model from baseline (T1). Occupation of an individual was not significant and was excluded from the model

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Predictors of religion factor at follow-up (T2)** | **β** | **F** | **R2** | **R2**  **Adjusted** | **R2**  **Change** |
|  |  |  |  |  |  |
| Religion factor (baseline) | 0.693\*\* | 174.246 | 0.480 | 0.477 | 0.480 |
|  |  |  |  |  |  |
| Excluded variables |  |  |  |  |  |
| Occupation |  |  |  |  |  |
|  |  |  |  |  |  |

**Table 5‑33. Stepwise forward multiple regression model for Religion factor at follow-up (T2)**

*\*\*Correlation significant at 0.01 level (2-tailed)*

### Summary of key relationships

Figure 5-5 summarises the relationships identified in the regression models. The predictors of coping strategies at follow up were religious coping strategy at baseline alone. The predictors of OHQoL at follow up were OHQoL and chewing ability at baseline and the number of teeth present. The predictors of denture satisfaction at follow up were denture satisfaction and chewing ability at baseline and the number of occluding pairs present.

The predictors of chewing ability at follow up were OHQoL, and chewing ability at baseline and the number of teeth present. In the cross-sectional relationships age was associated with number of teeth present, prosthetic need (both arches), time taken to seek dentures since tooth loss and number of occluding pairs status. Also, concern about oral health had cross-sectional association with number of teeth present in an individual and the prosthetic treatment need of the lower arch. Education status of the individual had a cross-sectional association with the number of occluding pairs present.

**Figure 5‑5. Summary of predictors of denture outcomes at follow-up T2**

**FOLLOW-UP**

**BASELINE**

**CLINICAL STATUS**

No of teeth present

**OUTCOMES**

-0.277

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

-0.163

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

OHQoL

Occluding pairs

-0.239

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

Denture satisfaction

Denture satisfaction

Chewing ability

Chewing ability

**OUTCOMES**

0.246

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

-0.116

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

-0.182

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

OHQoL

0.569

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

0.204

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

-0.194

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

Denture satisfaction

Significant associations found in the analysis *p* < 0.05

Significant associations found in the analysis p < 0.05

Significant associations found in the analysis p < 0.05

Significant associations found in the analysis p < 0.05

Significant associations found in the anaysis p < 0.05

Significant associations found in the analysis p < 0.05

Significant associations found in the analysis p < 0.05

Significant associations found in the analysis p < 0.05

Chewing ability

**Figure 5‑6. Summary of predictors of coping strategies at follow-up T2**

**FOLLOW UP**

**BASELINE**

**CLINICAL STATUS**

-0.170

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

Prosthetic Rx need (upper arch)

-0.157

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

Prosthetic status (upper arch)

Inadequate- negative coping

**COPING STRATEGIES**

0.193

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

Occluding pairs

**COPING STRATEGIES**

Positive -adequate coping

0.221

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

0.157

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

Inadequate- negative coping

Self-blame

-0.219

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

Religion

Positive -adequate coping

0.332

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

Significant associations found in the analysis *p* < 0.05

Significant associations found in the analysis p < 0.05

Significant associations found in the analysis p < 0.05

Significant associations found in the analysis p < 0.05

Significant associations found in the anaysis p < 0.05

Significant associations found in the analysis p < 0.05

Significant associations found in the analysis p < 0.05

Significant associations found in the analysis p < 0.05

0.693

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

**- 0.277**

Self-blame

Religion

Self-blame

# CHAPTER SIX DISCUSSION

## Introduction

This research employed a prospective longitudinal clinical and questionnaire based observational study on a south Indian cohort receiving new removable dentures. The main aim of this study was to observe whether coping strategies of individuals determine denture success to improve their OHQoL. This study was the first to explore this association and along with the clinical, environmental and individual variables identified through a systematic literature review were tested by populating them within the Wilson and Cleary (1995) model. A secondary lagged stepwise multiple regression analysis was conducted to test these associations after preliminary a bivariate analysis.

The results showed that clinical factors namely, the number of teeth present and the number of occluding pairs of teeth were directly associated with successful outcomes (denture success) at follow-up. The main longitudinal observation between coping strategies and OHQoL showed no significant association.

This chapter discusses the results of this study in the light of information understood from the literature review, the present knowledge and the methodological limitations. This chapter is hence divided into four parts; Section 6.2 discusses on why and how the primary hypothesis of this research was not supported by the results. Section 6.3 discusses other associations that were anticipated but not found in the study. Section 6.4 discusses the observed significant associations in the study. Section 6.5 discusses the methodological issues and the possible limitations that arose out of it in this research. Section 6.5 briefly discussed the notable strengths of this study. A subsequent chapter summarises the conclusions and recommendations arising from these findings and future research.

## Do coping strategies determine denture success?

The primary hypothesis of this study (Objective 3) was to confirm whether coping strategies of individuals receiving new dentures predicted its successful outcome.

The results however suggested that there was no significant association. The dearth of this association will be discussed in this section under five sub sections (1) Do coping strategies really matter? - where the rationale of this hypothesis is revisited given the findings of this research and the contribution it makes to the existing knowledge is discussed (2) The study sample - the possibility of an underpowered sample and the nature of sample are discussed (3) Concept of coping – the conceptual understanding of coping in India and the use of Brief COPE questionnaire

### Do coping strategies really matter?

The main hypothesis of this study was arrived at on the basis of information gathered from previous literature. Receiving new dentures was considered a stressful life event requiring considerable coping skills from the individual both emotionally and functionally (Hogenius et al., 1992, Fiske et al., 1998, Davis et al., 2000b, Fiske et al., 2001, Klock and Haugejorden, 2002, Bellini et al., 2009). In addition, a previous study on denture wearers reported on association between coping strategies and OHQoL (Heydecke et al., 2004).

Individual attempts at coping and managing daily life, problems and even stressful, traumatic life-events have been in the focus of research, especially in the western psychology for decades (Heppner, 2008). In health psychology, coping strategies of individuals have been in the interests of researchers exploring the psychosocial aspects of chronic diseases and conditions such as arthritis, irritable bowel syndromes, post traumatic brain injury, breast cancer, chronic obstructive pulmonary disorder, cardiac disease, psoriasis etc. (Holahan et al., 1995, Downe-Wamboldt and Melanson, 1998, Schnoll et al., 1998, Drossman, 1999, Wahl et al., 1999, Finset and Andersson, 2000).

Coping strategies and associated behaviours have shown to strongly influence health outcomes in chronic conditions. In a study by Drossman and colleagues (2000) among 174 women patients with gastro-intestinal disorders, there was a strong association between maladaptive coping strategies and adverse health outcomes. The perceived ability to the individual to manage their symptoms was also associated.

The literature review of this thesis (Section 2.4.5) discussed how there exists a research gap on the exploration and observation of coping strategies within the aspects of oral health and the domains of OHQoL (Baker et al., 2008, Reissmann et al., 2012, Rodd and colleagues, 2012) despite evidences suggesting otherwise (Heydecke et al., 2004, Porritt et al., 2014).

Rodd and colleagues (2012) explored the psychosocial predictors of OHQoL in children during the transition to secondary school. Ninety-two children aged between 10-11 years completed Impact Short Form (ISF) -16 a short form of Child-perception questionnaire (CPQ) before entering secondary school and three months after the transition. Children with low self-esteem issues and who practised avoidant coping strategies experienced a lower OHQoL after transitioning to secondary school. The authors suggested further exploration of the causal pathways the association between coping strategies and OHQoL. However, the study was neither exploring any dental intervention nor was evaluating any oral health condition. The participants’ coping strategies was related only with change of school and the related transition.

Porritt and colleagues (2014) longitudinally observed if illness beliefs and coping strategies predicted OHQoL outcomes in individuals who self-reported symptoms of dentine hypersensitivity. One hundred and one individuals completed a series of questionnaires and repeated the process again in a month’s follow-up. A direct significant longitudinal pathway was observed between emotion-based coping strategies and worse OHQoL in individuals who experienced frequent sensations of dentine-hypersensitivity. The study did not evaluate a healthcare intervention nor was the condition (dentine hypersensitivity) similar to what of the present research is interested in (denture success).

One of the main premises under which coping strategies was considered as an important factor in the present study was the increasing importance of psychosocial determinants in oral health (Brondani and MacEntee, 2007). In addition, as pointed out earlier, there has been evidence from studies suggesting that receiving dentures a very stressful life event and will require considerable coping skills from individuals (Bergendal, 1989, Haugejorden et al., 1993)

In a study by Klock and Haugejorden (2002), 1490 individuals aged 25 years from 3 Norwegian counties were given a mail questionnaire to rank stressful life events. Ten items from the Social Readjustment Rating Questionnaire (SRRQ) and two dental items (tooth loss and receiving dentures) were presented as graphic rating scales ranging between 'not difficult at all' and 'more difficult than anything'. The total scores were used to rank the life events and for comparison with findings from the previous studies (Bergendal, 1989, Haugejorden et al., 1993) Participants found it difficult to cope with receiving new dentures compared man other daily life events. The study substantiated the existing evidence that receiving dentures was indeed a stressful life event that would require considerable coping skills (Bergendal, 1989, Haugejorden et al., 1993).

When the literature was further explored for studies involving coping strategies in in denture wearers, the only study that was to be found was that of Heydecke and colleagues (2004). This study was a cross-sectional observation on 249 fully edentulous patients who were already wearing dentures for an average for 3.2 years (received from University of Michigan dental school). Significant negative associations were found between the emotional coping strategies such as behaviour disengagement, substance abuse, denial, religion and their OHQoL. Emotional support alone showed a positive effect with OHQoL. The authors concluded by suggesting that certain emotional (emotional support) focussed coping strategies had significant association with OHQoL in individuals wearing dentures. However, this study was a cross-sectional observation based on postal mail survey method. This study remained as the only one to have explored the association between coping strategies and OHQoL in denture wearers at the time initiation of this current research study. This warranted us to propose the current hypothesis and test it longitudinally.

The results did not support the hypothesis by failing to find significant associations between coping strategies of individuals receiving new dentures and their post-insertion OHQoL and other outcomes. This finding can be interpreted in the following ways. Firstly, coping strategies do not determine denture success. Secondly, receiving dentures may not be that stressful and does not need considerable coping strategies from patients. Finally, there may be stronger predictors that determine success that may mask any effects of coping strategies.

However, these interpretations are not exhaustive and the results require a thorough discussion and introspection before arriving at balanced conclusions. Given this study was conducted in a sample culturally different from that of Heydecke and colleagues’ (2004), the first of its kind involving longitudinal observation of the variables, in a novel sample, recognising the conceptual difficulties, differences about coping need to be revisited. The following sections discuss the study sample, its demography and the sampling method used. These factors could have influenced the results.

### Study sample

This study recruited adult patients receiving new conventional removable dentures from the Department of Prosthodontics in Sri Ramachandra University Dental College Hospital, Chennai, India.

*Possible under powering of the study?*

The power of a study is primarily a function of its sample size, effect size and significance, and secondarily, the statistical method used. To adequately power a study, the primary factor that is readily modified is the sample size to achieve statistical significance. If the power and the statistical method used are appropriate for hypothesis testing, the interpretations of the study results are better facilitated (McHugh, 2008). However, the interpretation of results can become problematic when both the power is either very low or high and when a wrong statistical method is used.

In this study, the power calculation incorporated the effect size between coping strategies and OHQoL using the unstandardized correlation co-efficient value between denial coping and OHQoL (least significant value) in edentulous adults in Heydeckeand colleagues’(2004) study. With 20 independent variables used in this study, in order to yield 80% power to detect the minimum effect size, the calculation indicated a recruitment of 152 participants. However, by accounting for loss through follow-up, using an arbitrary calculation of 10 participants per variable, 200 participants was suggested. The desired sample size was achieved during recruitment.

The results of this study found no significant association between coping strategies and the outcome variables. One possibility is that the study could have been underpowered and the null hypothesis has been accepted falsely (Type II error). To test this, the power calculation was repeated using the results from this study. Based on a least significant association between self-blame coping strategy and OHQoL at follow –up (Table 5-31) the ρ value of -0.034 was used to yield an effect size of 0.0066. If we were to repeat this study again with similar set of variables in a similar population, in order to yield 80% power of detecting the minimum effect size the calculation suggests a minimum of 348 participants. Thus, it may be interpreted that the present study may have been slightly underpowered. However, given that this calculation was done in retrospect and that too for the least significant association, the probability of Type II error in this study is considered as negligible.

The next tangible area to reconsider in terms of this study sample is its nature or quality. The following section explores the characteristics of this study sample and discusses its possible effect on the results.

*Nature of the study sample*

The participants of this study were a convenience sample receiving dentures from a university teaching hospital at subsidised costs, The services were provided by dental students under the supervision of academic clinical staff. The descriptive data (Table 5-4) showed that approximately 60% of the participants were not in active employment but were either unemployed or retired. The employment figures for the geographical region (Chennai) showed that 60.9% of people were non-workers (IndiKosh, 2011). This was in line with this study sample.

Many participants were from a low socioeconomic background. Of only 39.3 % in active employment, only a meagre 3.5% were employed at a professional or semi-professional level. Only 35.3% had any formal education above high school level. The homogeneity of this study sample may have played a role in the influencing the results. Studies have shown strong associations between health knowledge, behaviour, attitudes and socio-economic status (Williams et al., 2002, Newton and Bower, 2005). The characteristics of populations are proximal causes of health disparities inequalities and associated behaviours (Riley et al., 2006). In the present study, most participants, owing to their lower SES, the associated attitudes and behaviours may have been readily willing to accept dentures for the following possible reasons. Firstly, for its subsidised cost. Secondly, the authority of the clinicians in the developing countries, where health interventions are still largely use biomedical downstream (top down) approaches (Watt, 2007) . Patients who are in a precarious position with low SES and vulnerability bear the onus for the treatment outcome. So there may have been underlying factors that played a role in the coping behaviour of the participants.

The sample used for this study, although line with local employment figures for the year 2011, is still quite a homogenous in terms of SES and does not necessarily represent the population proportionately. Hence, there is a possibility that the results of this study cannot be generalised to larger populations (even with Tamilnadu state, India). In retrospect, if this study recruited participants purposively with true representation of the population in terms of SES, the results may have been different. However, such a process would not have been feasible as it would not only be time consuming, but lead to other methodological issues. Also, the internal validity of this study will not be affected directly by the nature of this sample. The present study, thus provides a very robust evidence on the relationships between psychosocial factors and subjective oral health outcomes in a low SES population receiving new dentures.

### Conceptual, cross-cultural validity of coping in India and the Brief COPE questionnaire

The effect of cultural differences in a research that uses cross-cultural concepts, applications and instruments is significant. Understandably, its essential to account for them when discussing its findings (Heine and Norenzayan, 2006). The actual challenge of using coping strategies in this study cross-culturally was with the clarity of concept itself. Coping strategies in relation to health interventions has been researched only very recently in the Indian population. For example, coping in everyday lives of Tibetan refugees living in exile, coping with stress among people working in management sector (Sachs et al., 2008, Aitken and Crawford, 2007).

However, there have been no studies exploring the coping strategies of individuals who have an oral health condition or an intervention. The present study, was the first to focus on coping strategies of individuals receiving an oral health intervention. Given that it was relatively a new concept to be explored in individuals receiving new dentures in India, this study utilised instruments originally developed and designed in populations that were culturally different. The main instrument used was Brief COPE (to measure coping strategies).

Considering that Brief COPE scale has never been exclusively used in a denture wearing Indian population before, the items and questions were back translated and revised. The questionnaire was also piloted on a sample to enhance its content validity. Content validity is the degree to which items of the questionnaire are relevant and representative to the target construct. It is one of the most important characteristics of a good research instrument as it subsumes all categories of validity (Haynes et al., 1995). However, varied individual expectations and cultural differences can still influence the content validity of a scale (Touze et al., 2006).

#### Brief COPE

*Factor structure*

The Brief COPE scale used in this study was developed by Carver (1997) to measure coping strategies generically. Despite the scale being a shorter version of COPE scale, it had 14 subscales (7 under problem-focussed and 7 under emotion-focussed strategies) with 2 items each. The psychometric properties of the Brief COPE have been shown to be acceptable in Western populations (Perczek et al., 2000, Meyer, 2001, Fogel, 2004). However, the use of the scale has been very limited in non-western populations.

To understand the cultural differences of factors within the scale, studies using the Brief COPE in India were examined. A study conducted amongst medical students in south India extracted Brief COPE into seven factors; Positive Coping, Support Coping, Negative Coping, Blame, Humour, Religion, and Substance Misuse (Cherkil et al., 2013). This study suggested negative coping was a cultural aspect of the student population in south India compared to other world populations. In another recent study among people living with HIV/AIDS (PLHA) in Chennai (same geographical location as this study) assessed the cultural adaptation of Brief COPE (Mohanraj et al., 2015). Exploratory factor analysis yielded five factors; active planning, social support, avoidant emotions, substance use, religion. The study further stated that strategies such as Positive Re-framing, Behavioural-Disengagement and Self-Distraction were not strongly factored in south Indian PLHA on a cultural basis.

The only study that has used Brief COPE scale in individuals receiving dentures was that of Heydecke and colleagues’ (2004). In this study, they synthesised the Brief COPE subscales into 6 factors namely, Positive/adequate coping, Substance Abuse, Humour, Social support, Religion and Inadequate coping using factor analysis method based on Kaiser-Guttmann criterion. However, the study was based in a population culturally different from the target sample of this research study.

Some authors have used categorised subscales on the basis of coping constructs relevant to the clinical context, or have omitted or extended subscales and modified items to suit the population under question. By using factor analysis, factors can be deduced within the scale to suit the population that is to be observed. After a factor analysis (section 5.2.4.2) four coping factors (positive/adequate; negative/inadequate/avoidant; self-blame and religion) were deduced in this study. Whilst factor analysis reveals domains within the questionnaire they may still not be relevant to coping with dentures as noted in section 6.2.3 above. As noted in section 6.2.1, Heydecke and colleagues (2004) used a slightly different version of Brief COPE because of this.

*Test-retest reliability*

Section 5.2.6, noted the test-retest correlation of the Brief COPE factors (Table 5‑13) showed poor/moderate scores except for the fourth factor of religion. Various aspects need to be considered on what might affect the test-retest reliability. Whilst the Brief COPE scores might have been affected by the receipt of dentures, it is difficult to explain why receiving dentures might have changed participants’ generic coping strategies. An alternate explanation could be that the brief COPE measure was not reliable in this sample, which might have the effect of masking any relationships between coping strategies and patient reported outcomes. Another possible factor is the ‘carry over effect’ where the outputs from the participants in the T2 stage of the study might have been influenced by their responses at the T1 stage.

The internal consistency for all four factors of the Brief COPE scale was at acceptable levels at baseline and almost all factors at follow-up (except self-blame- 0.53). The ICC scores varied. The first two factors (negative-inadequate-avoidance and positive-adequate) had poor retest correlations (0.33 and 0.27). The third factor (self-blame) had a barely acceptable reliability score (0.44). The fourth factor (religion) had a strong test -retest reliability (0.81).

The variation in the test-retest reliability suggests inconsistencies in certain factors that necessarily may not be an error with the scale itself (as they have an acceptable internal consistency). Considering that test-retest reliability is of great importance used only when observing characteristics that do not change drastically over time (Kaplan and Saccuzzo, 2012) and acknowledging the fact that coping strategies are constant efforts to handle a situation that can keep changing constantly over time (Lazarus and Folkman, 1984), it may be understood why certain factors might have such low test-retest reliability with higher inconsistencies. The final factor (religion) had a high test-retest reliability which again supports the previous argument of changes over time. An individual’s reliance on religion to cope with their issues usually may not change drastically over time unless there is a considerable change in one’s faith.

On the hindsight, certain items of the Brief COPE scale (Humour, Denial and Self-distraction sub-scales) seemed not very relevant to the construct of coping with new dentures in a homogenous Indian population. This again reiterates the argument that the conceptualisation of coping strategies in individuals receiving dentures needed to be more culture specific and sensitive. However, this will require series of research perspectives in their own right such as qualitative exploration in specific populations, followed by designing and validating instruments that quantifies coping accurately yet is culturally specific and sensitive. As all of this were out of scope of the present study, a factor analysis of Brief COPE scale was done to consolidate the relevant factors.

### Summary

The main hypothesis of this study was that coping strategies determined denture success to improve OHQoL. However, the results did not support this hypothesis. This section has discussed this result in depth by reflecting on the hypothesis itself and its rationale in the light of the existing literature; that is, whether coping strategies really do matter for wearing dentures. This section has also considered whether the study was adequately powered, its homogenous nature, conceptual difficulties and the cross-cultural difficulties of using the Brief COPE scale in India, its factor structure of Brief COPE and its reliability

Based on this discussion of the primary hypothesis it can be concluded that,

* The lack of apparent association between coping strategies and OHQoL in the present study may be due to a genuine non-association between the variables or the effects of other associations (clinical factors) masking the association.
* Lack of power may not have affected these results. However, the inherent homogenous nature of the sample may have played a role.
* The concept of coping is new to India and may need culture specific conceptualisation. The content validity of the measure used in this study (Brief COPE) had questionable relevance in certain subscales. However, this may have had little effect on the results.
* The Brief COPE scale had questionable test-retest reliability when using the factor structures reduced for this study. The extent to which this may have affected the result of the hypothesis testing is likely to be small.
* In India, where oral health interventions are predominantly downstream, clinicians have more authority and the patient perspectives may be masked.
* To achieve a better understanding of coping strategies in individuals seeking dentures in an Indian population, coping strategies should be explored qualitatively with more cultural and demographic sensitivity.

## Variables hypothesised in the model but showed no associations

The secondary hypothesis of this study (Objective 4) was to determine and identify clinical, individual and environmental factors that influence OHQoL and other patient reported outcomes (denture satisfaction and chewing ability).confirm whether coping strategies of individuals receiving new dentures predicted its successful outcome.

The results found no significant association between any individual factors or environmental factors except certain clinical factors. The lack of these associations will be discussed in this section under the following sub sections

### Ageing expectations

Expectations regarding ageing (ERA) did not predict any outcomes in this study (OHQoL, denture satisfaction, chewing ability). Existing evidence suggested an association between overall QoL and expectations/attitude towards ageing (Low et al., 2013). However, there were no studies done in the past where this variable has been tested on individuals receiving dentures.

This research study used this variable as studies have shown strong association between age and OHQoL in individuals wearing dentures. Ageing has been stereotyped both positively and negatively in different cultures and has shown to influence how older adults see themselves (Dionigi, 2015). Individual’s age is understandably strongly associated with their expectations regarding ageing. As discussed in section 2.4.2.2 of the literature review, this research was interested in observing whether an individual’s ERA was associated with denture success to further understand the prevalence of dentures in aged cohort.

The results of the present study found no association between ERA and denture success. In retrospect, it may be understood that any change in expectations regarding ageing may have been too little to be observed given the narrow 3 month follow-up window of the study. Also given the homogeneity of the study sample with its SES, the changes may have been minimised further and had any effect on the treatment outcome.

### Perceived stress

Perceived stress was not associated with any successful denture outcomes in this study. This study used PSS-4 scale to measure perceived stress. As discussed earlier in Section 4.2.2.2, PSS-4 measure was designed and developed in a western population culturally different from the population examined in this study.

Previous studies found strong negative associations between perceived stress with oral health (Locker et al., 2001, Locker and Allen, 2002, Sanders and Spencer, 2005). Increased perceived stress levels were associated with significantly low levels of subjective oral health even when the other mediating factors were adjusted across various ethno-racial groups (Sanders and Spencer, 2005, Watson et al., 2008). Based on the results from the systematic literature review (section 2.4.4) studies were identified suggesting strong associations between perceived stress and OHQoL (Locker et al., 2001, Locker and Allen, 2002). Thus, perceived stress was chosen as a variable and populated within the model developed for this study. The results however showed no associations between perceived stress and denture success.

Perceived stress has been explored in the past in Indian population but its range has been very limited. Most studies observed perceived stress in students mostly in the field of health (Acharya, 2003, Lane et al., 2007, Kumar et al., 2009, Singh et al., 2011, Harikiran et al., 2012, Reddy et al., 2013, Singh et al., 2013, Swami et al., 2013, Gade et al., 2014, Gupta et al., 2014, Joseph et al., 2015) and also in healthcare professionals (Amin et al., 2015).

Perceived stress as a variable predicting health outcomes or treatment outcomes has been very limited in the Indian population especially, in terms of oral health. Also, the context of perceived stress in individuals receiving dentures has never been explored in a sample similar to that of this study. This raises issues on the content validity of the instrument. Varied individual expectations and cultural differences may have influenced this non-association.

Furthermore, the internal consistency was the lowest (α = 0.50 baseline; α = 0.60 follow-up) of any of the questionnaires used in this study. Although, a more dental-specific perceived stress measure may have helped to explore this association, the instrument used in this study was subject to rigorous translations methods and piloting. Thus the effect of issues arising through content validity may be negligible. Although, significant predictors of denture success may have masked the association with perceived stress, based on the discussion it can be well concluded that perceived stress was not a significant predictor of denture success in a homogenous, low SES south Indian population.

### Concern about oral health

Concern about one’s health was not associated with any outcomes variables in the present study. Health beliefs of individuals are suggested to play a key role in determining their behaviour and help them with their perceptions and placing their confidence thus contributing towards their health status (Bandura, 2006). Studies have shown that individuals exhibiting lack of concern on oral health have negative dental self-care behaviours (such as dental neglect and dental indifference) that were associated with poor oral health outcomes (Nuttall, 1996, Thomson et al., 1996, Sanders et al., 2004a, Marshman et al., 2014).

In the study by Marshman and colleagues (2014), it was observed whether dental indifference was associated with OHQoL amongst 659 prisoners based within three prisons in the UK. An 8-item dental indifference questionnaire designed by Nuttall and colleagues (1996) was used in this study which reported a strong association between dental indifference and OHQoL.

The present study used a custom 6-item questionnaire based on the evidence from the above study and on the Maslow’s hierarchy of needs (1943). This questionnaire has never been used in any specific population before and has not, therefore, been validated thoroughly except at the piloting phase of the present study. Understandably, the lack of testing of this questionnaire may have influenced the association between the variables.

Also presumably, the range of concern among the participants of the present study was limited considering they were all seeking a treatment procedure. This may have masked the association in the present study.

### Objective SES

Objective socioeconomic status (SES) in this study comprised of education, income, occupation, caste and religion. Although SES did not predict OHQoL and denture satisfaction, occupation predicted participant’s chewing ability (Table 5-26).

The lack of association with the other denture outcomes may be due to the nature of the sample as discussed above in section 6.2.2. Almost 60% of the participants were not in active employment and only 35.3% had an education above high school level. With a homogenous sample, the variability in SES would have been too narrow to reveal any effect on OHQoL and denture satisfaction.

## Associations found in the study

### Predictors of successful patient-reported denture outcomes

Apart from assessing if coping strategies determined denture success, this study aimed to identify the clinical, individual and environmental factors that influence patient reported outcomes in individuals (Objective 4 – Section 3.2). OHQoL was the primary outcome variable used in the study. Denture satisfaction and patient-reported chewing ability were the other outcomes.

#### Primary outcome (OHQoL)

The results of the analysis indicated (Table 5-27) that the baseline number of teeth present predicted OHQoL at follow-up. Baseline chewing ability and OHQoL also predicted OHQoL at follow-up

##### Number of teeth present

The number of teeth present (i.e.) presence or absence of a functional dentition directly predicted OHQoL (Table 5-27, β = -0.277, *p*<*0.01*).

In line with the current literature on functional dentition the present findings provide further evidence linking functional dentition to improved OHQoL. Number of teeth present and the associated factor of tooth loss, retention are important clinical indicators. Loss of teeth is considered a major public health problem in various societies (Tan et al., 2016).

It affects quality of life due to issues such as reduced functional capacity as a result of change in patterns of diet etc.(Gerritsen et al., 2010). It has even shown to predict mortality (Österberg et al., 2008) and nutrition status in the elderly (Yoshihara et al., 2005, Thomson, 2014), health and illness conditions including cardiac vascular diseases (Desvarieux et al., 2003, Holmlund et al., 2010), acute respiratory illnesses (Barros et al., 2013), chronic health conditions such as diabetes (Kapp et al., 2007, Marín et al., 2008) cancer (Michaud et al., 2008, Meyer et al., 2008) and rheumatoid arthritis (McAlindon et al., 2008, Wolff et al., 2014).

A reduced dentition is shown to be associated with socioeconomic status, availability/ access to dental services, patient-dentist attitudes/ relationships and even cultural priorities (Fejerskov et al., 2013), In terms of oral health status, numerous studies have shown strong associations with the number of teeth above the functional dentition (21 or more teeth) and OHQoL. In a systematic review assessing the relationship between missing teeth and OHQoL by Gerritsen and colleagues (2010), 10 out of the 35 studies synthesised were eligible for meta-analysis with 13 different samples leading to 6 set of analyses. All studies showed that tooth loss is associated OHQoL significantly independent of study location and OHQoL instrument used.

In recent a critical review by Tan and colleagues (2016), out of the 29 studies shortlisted, several studies found that participants with 20 or lesser teeth had worse OHQoL scores than those who had more. This study further implied that retention of teeth may improve OHQoL.

The present study thus provides a further longitudinal evidence to support the findings of the past studies. These findings imply that replacing missing teeth with prosthesis (dentures, implants) and associated service provisions which need to be improved. These findings further imply that preventive dental interventions must aim to achieve retention of teeth to maintaining functional dentition in adults to ensure improved OHQoL.

##### Baseline Chewing ability and OHQoL

The present study reported findings of a strong associations between baseline OHQoL (β = 0.246, *p<0.*01), chewing ability (β = -0.194, *p<0.05*) and OHQoL at follow-up.

Patient reported chewing ability is a functional outcome as perceived by the patient. In the literature review (Section 2.2) studies have reported strong associations between OHQoL and Chewing ability. Given that OHQoL comprises functional limitation as a sub-domain this association can be described as a part-whole association. The finding from the present study further strengthens this association.

#### Denture satisfaction

The results of the analysis indicated (Table 5-28) that the baseline occluding pairs of teeth predicted OHQoL at follow-up. Baseline chewing ability and denture satisfaction also predicted denture satisfaction at follow-up.

##### Occluding pairs of teeth

The presence of occluding pairs of teeth directly predicted patient’s denture satisfaction (Table 5-28, β = -0.239, *p*<*0.01*).

With vast amount of studies explaining about associations between occluding pairs and better chewing ability and masticatory ability, the present study highlights a strong association between patient’s denture satisfaction and occluding pairs of teeth. Elias and Sheiham (1998) in their narrative review explain how occluding pairs of teeth can improve satisfaction with mouth’s functional status. Many studies have explored the association between

#### Chewing ability

The results of the regression analysis indicated (Table 5-29) that the baseline number of teeth present predicted chewing ability at follow-up. Baseline chewing ability and OHQoL also predicted Chewing ability at follow-up

##### Number of teeth present

The number of teeth present (presence of functional dentition) directly predicted patient’s chewing ability (Table 5-29, β = -0.163, *p*<*0.01*).

In line with the existing literature on number of teeth present and chewing ability, the findings of the present study highlights the consistency with this association. One of the preliminary studies that explored the factors influencing the chewing ability was that of Agerberg and Carlsson’s (1981). In this study of 1215 participants in Sweden, they explored their chewing and masticatory ability observed against various clinical factors. One of the strong finding of this study was that none of the participants who had 20 or more teeth reported poor ability and only 1% of individuals with 8–20 teeth considered their chewing ability to be poor.

More recent studies show stronger associations between the number of teeth present and patient reported chewing ability.as well as an association with an individual’s general health (Brennan et al., 2008, Singh and Brennan, 2012).

Although studies in the past have explored this association, the present study is a longitudinal observation among individual seeking dentures based on a conceptual model. The finding of the study further implicates the importance of retention of natural teeth and improved denture provision. Preventive dental interventions should aim to retain natural teeth in order to improve functional capacity (such as chewing) in individuals.

The present study reported findings of a strong association between denture satisfaction at follow up and baseline patient reported chewing ability in the primary bivariate analysis (Table 5-22) as well as in the secondary regression analysis (Table 5-32). Likewise, patient reported chewing ability at follow-up was strongly associated with baseline denture satisfaction (Table 5-25 and Table 5-33).

Both these outcomes have been used in studies as variables in denture based studies and have reported associations in the past. However, both these variables are not well conceptualised nor have a strong theoretical model backed robustness. Both the outcomes can be incorporated within the domains of the OHQoL which is strongly backed by theory based Wilson and Cleary (1995) model which links clinical status to subjective outcomes.

### Predictors of coping strategies

This study also explored factors that may influence the coping strategies post receiving dentures (Objective 5). Prosthetic treatment need and prosthetic status were strongly associated with inadequate negative coping strategy. The number of occluding pairs of teeth was associated with positive coping strategies. Needing for dentures in the upper arch and denture status of the upper arch associated with negative inadequate coping. Understandably, the respective coping strategies at baseline were associated with their respective strategies at follow-up. Self-blaming coping strategy at baseline was associated with negative, inadequate coping strategy at follow-up.

#### Inadequate negative avoidant strategies

For a successful performance in any activity, individuals must be able to overcome the effects of negative events that threaten their goals and ability to self-regulate effectively. Appraising failure associated with events evoke a complex of negative emotions Receiving dentures as discussed earlier, can be a stressful life event and may evoke negative emotions (Klock and Haugejorden, 2002). An individual’s performance can be adversely affected if negative emotions are triggered unless effective coping strategies are used (Weiss and Cropanzano, 1996).

Prosthetic treatment need is strongly associated with negative strategies in the present study. This suggests that receiving dentures indeed does trigger negative emotions which lead to coping negatively among individuals. This can be due to various reasons ranging from problems with adaptation, priorities of the patient, difficulties with managing them, lack of support, socio-economic status and so on. This evidence strengthens the rationale to further explore denture provisions based on individual’s coping strategies

Prosthetic status was also strongly associated with Negative strategies in the present study. Individuals who already wore a denture tend to cope negatively. Considering the sample used in this study were seeking new dentures, it is understandable that participants who already had prosthesis used negative strategies. This may be due to their past unhelpful experiences with wearing dentures, uncertainty with the new dentures, and lack of support on getting adapted to them and so on. This further strengthens and implies the need to explore denture provisions and interventions that incorporate help and support with adaptation to dentures.

Individuals who were coping negatively before receiving new dentures were coping negatively post receiving the dentures in the present study. Understandably, individuals who have issues with coping with dentures may not the always adapt well to new dentures.

#### Positive adequate strategies

Positive coping enables individuals to resolve problems, relieve emotional distress, and stay on track toward achieving their goals. Identifying effective and ineffective ways of coping is likely to inform efforts to improve individuals’ coping skills.

Presence of occluding pairs of teeth was strongly associated with positive coping strategies (Table 5-31). An occluding pair consists of a tooth in the upper arch and the corresponding tooth in the lower arch that it bites against or occludes. Studies have suggested better retention of dentures and improved chewing ability with more occluding pairs of teeth (Gilbert et al., 2004, Tsakos et al., 2006, Mei Na et al., 2014). With better retention and functional ability, it should be easier for individuals to get adapted to dentures.

#### Self-blaming and Religion

Self-blaming strategy was associated with individuals who used self-blaming strategies at baseline in this present (Table 5-32) and so was religious coping strategy (Table 5-33)

Self-blame is a negative emotional coping strategy where an individual blame themselves for the adversity they face due to a life event.

The participants of this study may have used self-blaming strategies due attitudes, relationships with clinicians and priorities over life. In a healthcare set up like in India where the clinicians’ perspective and normative assessments are still widely used (World Health Organisation, 2012), participants may have used self-blaming strategies assuming that the dentures they receive cannot be wrong.

## Methodological issues and limitations

In the past, only a few studies have investigated the psychosocial factors that are linked to successful outcomes in denture provision. To date, no study has investigated these associations longitudinally. This is the first longitudinal study to investigate the psychosocial determinants of successful denture outcomes and the first investigating the relationship between coping strategies and OHQoL using an explicit theoretical model. Research based on theoretical models help understand the genuine nature of relationships between variables. The present study observed the psychosocial factors influencing successful denture outcomes using the Wilson and Cleary model (1995). This makes the present study one of the very few in the field of dentistry to have explored this association based on a theoretical model that links clinical status and quality of life. Nevertheless, like any study, there were some methodological limitations that warranted attention.

### Methodological limitations

As with any exploratory study, the results of this study should be treated with caution given potential methodological limitations.

Sample size: Usually, in hypothesis testing the power is at about 80-90% for sample size calculation with the given difference between groups (Altman, 1991). The sample size calculated in the present study was based on the effect size found in the Heydecke and colleagues (2004) study as described in section (6.2.2). Although the calculation did detect differences between coping strategies (primary independent variable) and OHQoL (primary outcome variable) it was not possible to power the present study *a priori* because this was the first study to evaluate this effect longitudinally.

Follow-up: Previous literature did not indicate an appropriate follow-up period for the intervention. Also with the time constraints for this study, a minimum 3-month follow-up period was considered. It may be possible that an association between coping strategies and improved OHQoL may be evident over a longer period of time. To evaluate this, further research having a longer follow up period might be needed.

Questionnaires and their validity:

Most questionnaires used in the present study were originally developed in western countries with western populations and were then tested cross culturally by subsequent studies. In the present study, questionnaires were translated from English to the Tamil language. It has been suggested that varied expectations and cultural factors can affect the sensitivity of adapted and translated versions (Touze et al., 2006). For example, in the present study the word ‘laughing about’ in the Brief COPE scale was not congruent in direct translation to the Tamil language. An equivalent Tamil word that meant ‘cracking a joke’ was used instead. Similarly, in the perceived stress scale, the item enquiring on ‘being in control of daily situations’ used a term commonly used in Tamil. An equivalent translation stating ‘bringing things under control’ was used and explained during the questionnaire completion.

In order to avoid and overcome such difficulties, it was ensured that translated versions were of high quality in Tamil. Back translation method was repeated until the measures achieved high quality. Easy, simple language was used for the participants. Questionnaires were pretested to test their validity and reliability. The internal reliability of the measures varied. The Denture satisfaction scale (de Liz Pocztaruk scale) had the highest internal consistency (α = 0.92-0.95) while the Perceived stress (PSS-4 scale) had the lowest (α = 0.50-0.60) among the scales used for the study. The test-retest reliability for the ageing expectation scale (ERA-12) was acceptably higher than 0.8 but the scales such as Brief COPE, OHQoL, SOC and denture satisfaction were lower than 0.6 in terms of their intra-class correlation coefficients (ICC). A low internal consistency in a scale decreases its reliability thereby compromising the discriminative power. Low reliability may eventually reduce an instrument’s responsiveness by masking changes over time. However, noticeably certain key relationships hypothesised by the present study, (clinical factors and OHRQoL) were still detected suggesting a reasonable discriminative power and responsiveness for the OHIP-EDENT scale.

Participants: As noted in section 6.2.2, the demographic character of the participants in this study was unusual. More than half (54.2%) earned less than ₹ 4555 INR (equivalent to £45 approximately) a month and about 65% were educated to less than high school level or were not formally educated at all. About 60% of the participants were not in active employment (i.e.) either unemployed or retired. And nearly 3/4 of the participants belonged to a lower caste. As noted earlier, the generic coping strategies considered in the present study may not have been as relevant in such a low SES sample seeking subsidised dentures. Furthermore, the participants completed eight questionnaires; totally of 86 items. Considering the educational status of the population used in the present study, the sheer number of items may have burdened them and their responses may have been influenced as result to not reflect genuine feelings. Nevertheless, questionnaires were given separately to each participant in order to reduce their concerns and obtain accurate data. Ample time was given to participants before completing each questionnaire.

In retrospect, it was understood that one of the questionnaires that was used (ERA -12) used to measure ageing expectations was unnecessary. Such a change in expectations regarding ageing can hardly be observed in a short observational period of 3 months.

Intervention: Conventional denture treatment was the intervention of the present study. Lack of previous research regarding the subjective impact of this intervention on individuals may have restricted its effect. Furthermore, an understanding of the social position of a patient and the receipt of denture treatment needs to be explored in Indian settings. This should also be considered in terms of treatment styles and dentist’s approach towards the patients. It should also be noted that the quality of dentures made in this study might also have affected the results, although the general improvement in OHQoL and other outcomes suggest that this was not a problem.

Evaluation of an interventional process can be done using various methods. Mixed methods observation is one of those that use qualitative and quantitative approaches (Greene, 2007, Tashakkori and Teddlie, 2010). Data from both sources (qualitative and quantitative) provide identify consistency in results and may offer strong evidence of associations and change in the populations and organisations (Nutbeam, 1998). Patients offer views and unique experiences which do not necessarily share the views of dentists. Allowing them to involve more in the decision-making process pertaining to their care may improve outcomes. In future, research combining questionnaire-based research alongside qualitative approaches (e.g. interviews with dentists, patients, students treating patients) may help researchers clearly understand and explain conventional denture interventions by means of observed effects and how they work(i.e.) mechanisms of action.

Inclusion of relevant variables:

The Wilson and Cleary (1995) model was populated in this study with variables identified in the review (Section 2.3). Inevitably since the research was planned, new studies have been published on dentures and OHQoL that could be included in the review. However, the review was conducted to identify relevant variables and fortunately none of the more recent studies have introduced any new variables

The clinical variables in this study were based on common oral conditions representing problems experienced among adults who seek new dentures. Inclusion of other clinical factors such as individuals with severe disabilities and cases where the challenge in adapting to new dentures can be worse could have provided different findings. Thus, it is recommended to repeat this study among other populations, including more diverse participants.

This study followed the sample over a 3-month period. It is possible that longer follow-up might provide different effects between independent and dependent variables. These findings however, provided preliminary data of individuals seeking new dentures and their characteristics. In other words, the study provides important findings to indicate key clinical variables that may be useful in predicting longitudinal changes in oral health outcomes which could be useful in oral health interventions. Longer periods of follow-up will be useful to provide information about further factors linked to participant’s backgrounds or psychosocial variables. For example, coping strategies are important, but it remains to be seen whether it would be so pertinent in adults receiving dentures. Furthermore, the study only involved adults of the Tamil ethnicity and in Chennai metropolis area. Thus, generalisation to other age and ethnic groups may be limited.

Thus, interpretation of the findings of this study must be undertaken with caution. Separate studies involving adults of other backgrounds, races, ethnicities, socio-economic groups, ages and cultures are therefore suggested. Also the use of multiple regressions only identified predictive relationships but did not test causal relationships or bidirectional or feedback loops. The more sophisticated structural equation technique (Baker et al., 2007) may help elucidate on indirect and direct pathways linking variables in the hypothesised Wilson and Cleary model. Nevertheless, the present study was a robust, longitudinal study, with lagged analyses which controlled for baseline variables to explain follow up variables.

In spite of the above limitations, this study has made contributions to oral health research by providing strong evidence that certain clinical factors were important determinants of successful oral health outcomes among individuals seeking new dentures. The main variable coping strategies did not seem to influence such outcomes. It will be valuable to further assess the ability of individual factors and social adversity to define successful oral health outcomes in individuals seeking dentures. Studies carried out in the future should consider whether these same findings could be identified across age-groups, with different patterns of diseases and longer periods of follow-up.

## Strengths of the study

Over the last decade and a half, a few studies have explored the association between individuals’ coping strategies and oral health (Genco et al., 1999, Heydecke et al., 2004, Porritt et al., 2014). With the exception of the Heydecke and colleagues’ (2004) study, which was a cross-sectional observation, the effect coping strategies on denture wearer’s OHQoL has not been explored. The present study is the first longitudinal examination of this relationship and also the first to investigate the relationship using a robust theoretical model and has provided evidence that coping strategies are not associated with successful outcomes. The lack of apparent relationship may be may be due a homogenous low SES population receiving subsidised dentures. Research driven by theoretical concepts is imperative to comprehensively understand the relationship between variables influencing patient reported outcomes. The present study is one of the very few within dentistry to have tested the relationships between factors influencing patient reported successful denture outcomes based on the Wilson and Cleary model (1995) which associates clinical status, individual and environmental factors.

# CHAPTER 7 CONCLUSION AND RECOMMENDATIONS

This prospective longitudinal and questionnaire study intended to understand and conceptualise conventional denture success using OHQoL, identify its determinants and further observe its association with coping strategies used by individuals receiving new dentures,. The primary aim of this research was to observe whether coping strategies of individuals determine denture success to improve their OHQoL. A robust theory based model by Wilson and Cleary (1995) was employed and populated with the variables identified through a systematic literature review (Section 2.3). Lagged regression modelling approach was used for the analysis. Measures included clinical, demographic, coping strategies other individual factors (subjective SES, ageing expectations, concern about oral health, perceived stress), environmental factors (SES) and outcomes (OHQoL, denture satisfaction and chewing index). Data were collected for all the populated variables at baseline and after a 3 month follow-up (except clinical data and subjective SES).

This research has contributed to current evidence by longitudinally exploring the association between coping strategies in individuals receiving new dentures and OHQoL. It is the first study to identify predictors of denture success based on reported treatment outcomes using a clearly conceptualised theoretical model, with strong analytical methods. This chapter lists the balanced conclusions of this study and the recommendations for policy and future research.

## Conclusions

* Coping strategies did not determine denture success to improve OHQoL and other secondary outcomes of denture satisfaction and chewing ability.
* Instead, clinical factors such as the number of teeth present and the number of occluding pairs had a strong association denture success.
* The lack of apparent association between coping strategies and OHQoL, secondary outcomes may be due to a combination of factors.

The content validity of the coping measure used in this study, the conceptual validity of carrying out a coping based research in an Indian population and the homogeneity the sample may all have played a role.

* Education on coping strategies does not appear to be a promising method in achieving denture success in such populations.
* Other individual factors populated within the model; subjective SES, ageing expectations, concern about oral health, and perceived stress did not predict any of the subjective oral health outcomes.
* Environmental factors, specifically SES, as indicated by income, education, caste and occupation were unrelated to OHQoL, denture satisfaction and chewing ability.

## Recommendations

Based on the outcomes of this research study, the following are recommended:

### **Recommendations for research**

* Given that most research on coping has been conducted in the west, the concept of coping in general, needs further exploration in non-western populations, perhaps with qualitative research
* A qualitative exploration of coping strategies in denture wearers would allow deeper understanding of its possible role.
* Whilst the environmental factors did not appear to play a role in the outcome of the study due to the homogeneity in the sample, similar research could be repeated in a more diverse sample.

### Recommendations for service

* The effect of missing teeth is profound on OHQoL hence preventive dentistry should develop further support of tooth retention and denture provision
* Interventions to improve coping strategies in patients receiving new dentures do not appear to be warranted.

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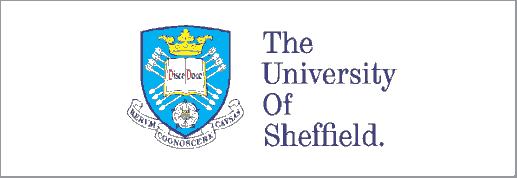
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# APPENDICES

## List of Appendices

|  |  |
| --- | --- |
| Appendix A | Recruitment Flyer |
| Appendix B | Patient Information Sheet |
| Appendix C | Consent Form |
| Appendix D | Clinical Examination |
| Appendix E | Questionnaire booklet |
| Appendix F | Back translated versions in Tamil |
| Appendix G | Recoded Data |
| Appendix H | Distributions before and after recoding |

## Appendix A-Recruitment Flyer



**DO YOU HAVE MISSING TEETH?**

We are a group of dentists from the School of Clinical Dentistry, University of Sheffield, UK and Ramachandra Dental College & Hospital conducting research to understand whether the way you cope can improve the success of your dentures.

**What would you get?**

An opportunity to share your experience of wearing dentures

A chance to win a microwave oven or a refrigerator\*

|  |  |
| --- | --- |
| Department of Oral medicine & Radiology  Ramachandra Dental College and Hospital,  Porur, Chennai | Department of Prosthodontics  Ramachandra Dental College and Hospital,  Porur, Chennai |

**Or contact**

Mr Karthik Periyakaruppiah,

Ph: +91 9791180582(direct) e-mail: k.periyakaruppiah@sheffield.ac.uk.

\* by lucky draw. There will be two draws and one winner in each. Microwave oven for the first and refrigerator in the next.

## Appendix B-Patient Information Sheet

**Title of Study:** DO COPING STRATEGIES OF PATIENTS DETERMINE DENTURE SUCCESS AND IMPROVE ORAL HEALTH RELATED QUALITY OF LIFE?

You are being invited to take part in a research study. Before you decide it is important that you understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information.

**What is the purpose of the study?**

With the help of this study we would like to identify what things might influence the success of dentures to improve patient’s quality of life. We hope our findings will help us gain a better understanding of adults’ experiences of their edentulousness. Before you decide to take part it is important for you to know what the study will involve.

**Why have I been asked to take part?**

We are asking adults over 18 years of age with 2 or more missing teeth to take part. This is because we are interested in understanding the factors that influence the denture success.

**Do I have to take part?**

It is completely up to you to decide whether or not to take part. You are free to withdraw from the research at any time and do not have to give a reason.

**What will happen to me if I take part? What do I have to do?**

If you decide to take part you will have to-

1. Undergo a whole mouth check-up
2. Complete a series of questionnaires which will ask about what you think about yourself and the world around you and about your oral health.
3. Answer the same questionnaires again 3 months later after you have been fitted with dentures
4. We will contact you to do this

**What are the possible disadvantages and risks of taking part?**

There are no known risks. We will just ask you to fill in some questionnaires and let us examine your mouth. We can assure you, we will not administer any treatment apart from the dentures you will receive. If there are any questions you find upsetting or personal, please feel free not to answer them

**What are the possible benefits of taking part?**

There might be no immediate or direct benefits to you. However, this research will help us gain a better understanding of achieving success in dentures. This help from you will enable us to find better ways of providing dentures care to people like you.

If you do decide to take part in this study the time you will need to commit to completing the questionnaires will be recognised and you will receive an incentive for completing the questionnaire at each stage. These incentives will be given to you at the end of each session. For both the stages of the study you will be entered into a free prize draw to win X and Y respectively.

**Will my taking part in this study be kept confidential?**

All information that you provide us for this study will be kept **strictly confidential**. To protect your privacy, your **name** will **not** appear on any questionnaire. You will be allocated an identification number which will be used as an identifier. Only you and the research team will know your name and identification number.

**Did anyone else check the study is ok to do?**

The study’s protocol has been reviewed and approved by the University of Sheffield Research Ethics Committee, UK. They make sure the research is ok to do. The ethics committee of the Sri Ramachandra University has also given permission to do this research in their University

****What if I wish to complain about the way in which the study has been conducted?****

**If you have any cause to complain about any aspect of the way in which you have been approached or treated during the course of this study please contact-**

**Mr Karthik Periyakaruppiah**

**Phone number**

**Email:** [k.periyakaruppiah@sheffield.ac.uk](mailto:k.periyakaruppiah@sheffield.ac.uk)

|  |  |
| --- | --- |
| **Professor Peter G Robinson**  **Head of Unit, Academic Unit of Dental Public Health**  **School of Clinical Dentistry**  **Claremont Crescent**  **Sheffield, UK**  **S10 2TA**  **Telephone: + (00)44 114 2717885**  **Email:** peter.g.robinson@sheffield.ac.uk | **Professor TV Padmanaban**  **Head of Department**  **Department of Prosthodontics,**  **Sri Ramachandra Dental College and Hospital**  **Sri Ramachandra University**  **Porur, Chennai – 6000 116**  **Tamilnadu, India**  **Telephone: +** + 91 9381052122  Email: tvpadu@gmail.com |

Participant Code: …………………………………..

## Appendix C-Consent Form

**Title of Research Project:** **DO COPING STRATEGIES OF PATIENTS DETERMINE DENTURE SUCCESS AND IMPROVE ORAL HEALTH RELATED QUALITY OF LIFE?**

**Name of Researchers:** Mr Karthik Periyakaruppiah, Professor. Peter. G. Robinson, Dr Sarah Baker

1. I confirm that I have read and understand the information sheet dated………………… explaining the above research project and I have had the opportunity to ask questions about the project.
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences on my employment. In addition, should I not wish to answer any particular question or questions, I am free to decline.
3. I understand that my responses will be kept strictly confidential. I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the report or reports that result from the research.
4. I agree for the data collected from me to be used in future research.
5. I agree to take part in the above study.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Name of Participant Signature Date**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Karthik Periyakaruppiah Signature Date**

**(Researcher)**

**Copies:**

Please sign both copies of this consent form.

You will need to keep **one copy** of this consent form for your own records and **hand in one** to the research team.

**Fair Processing Notice**

Your personal data will be used only in accordance with Thesis Research (PhD) at the University of Sheffield United Kingdom under the Data Protection Act 1998 and in compliance with the Freedom of information act 2000. The researcher will not disclose any personal information to any other third parties without your express concern.

## Appendix D-Clinical Examination

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. **PERSONAL DETAILS**   **Name………………………………………….** Date: \_\_/\_\_/2014/15  Identification Number   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  |      |  | | --- | | Date of Birth: …………………… Age (years): …………………..Sex (M=1, F=2): ………….. |   (dd/mm/yy) (last birthday) |
|  |
| 1. **NUMBER OF TEETH PRESENT AND OCCLUDING PAIRS**   **No. of teeth present =**  **No of Occluding pairs =**   |  |  | | --- | --- | | **7 6 5 4 3 2 1 0** | **0 1 2 3 4 5 6 7 8** | | **8 7 6 5 4 3 2 1 0** | **0 1 2 3 4 5 6 7 8** | |
| 1. **ORAL MUCOSA**   **Mucosal Disease - 1**-Yes (please specify type)……………………………………….  2-No |
| 1. **PROSTHETIC STATUS**     0=No prosthesis Upper Lower  1=Bridge  2=More than one bridge  3=Partial denture  4=Both denture and partial denture  5=Full removable denture  9=not recorded |
| 1. **PROSTHETIC NEED**   0=No prosthesis needed Upper Lower  1=Need for one-unit prosthesis  2=Need for multi-unit prosthesis  3=Need for a combination of 1& 3  4=Need for full prosthesis  9=not recorded |
| 1. **TEETH EXTRACTION HISTORY**   0 = <1 year  1= <5 years  2= <10 years  3= >10 years  4= Tooth loss due to other reasons |
| 1. **DENTURE LEVEL OF EXPERTISE**   **Who makes your denture?**  **Student**  **Staff** |

## 

|  |
| --- |
| DO COPING STRATEGIES OF PATIENTS DETERMINE DENTURE SUCCESS TO IMPROVE ORAL HEALTH RELATED QUALITY OF LIFE?  APPENDIX E QUESTIONNAIRE BOOKLET    Karthik Periyakaruppiah  Email: k.periyakaruppiah@sheffield.ac.uk; kart777@gmail.com  Tel: +44(0)114 2717885  **Supervisors:** Professor Peter.G.Robinson & Dr Sarah Baker  Unit of Dental Public Health  School of Clinical Dentistry  Claremont Crescent  Sheffield, United Kingdom (S10 2TA)  **Research co-ordinator:** Professor T.V Padmanaban  Department of Prosthodontics  Sri Ramachandra Dental College and Hospital  Porur, Chennai, Tamilnadu, India – 600116  Thank you for agreeing to help us with this study.  This study aims to identify the factors that influence denture success in adults.  This study is being done so that there will be more understanding about the problems adults encounter because of their missing teeth, dentures.  By answering the questions you will help us learn more about individual’s experience of their missing teeth.  **Please remember:**   * **Please don’t write your name** on the questionnaire. * This is not a test and there are no right and wrong answers. * **Please don’t talk to anyone** about the questions when you are answering them. * Read each question carefully and think about the experiences you have had in the past few weeks. * When answering the questions **think about your daily life** and answer as honestly as you can. * Please put a 🗹 in the box next to your answers.   **Please answer the following questions:**  **Date** \_\_\_/\_\_\_/\_2014  **Date** \_\_\_/\_\_\_/\_2014\_  **Date** \_\_\_/\_\_\_/\_2014  **Date** \_\_\_/\_\_\_/\_2014\_  **Date** \_\_\_/\_\_\_/\_2014  **Date** \_\_\_/\_\_\_/\_2014\_  **Date** \_\_\_/\_\_\_/\_2014  **Date** \_\_\_/\_\_\_/\_2014\_     1. Your age \_\_\_\_\_\_\_\_\_\_\_ 2. Your marital status:  * Married * Single * Divorced * Widowed   3) What is your Occupation or Profession?   * Professional * Semi-professional * Clerical, shop-owner, farmer * Skilled worker * Semi-skilled worker * Unskilled worker * Unemployed   4) What is your approximate monthly salary in Rupees (₹)?   * =1520 or less * 1521-4555 * 4556-7593 * 7594-11361 * 11362-15187 * 15188-30374 * = 30375 or more   5) What is the level of education attained by you?   * Profession or Honours * Graduate or post graduate * Intermediate or post high school diploma (polytechnic etc.) * High School certificate * Middle School certificate * Primary School certificate * Illiterate   6) What is your religion?   * Hindu * Muslim * Sikh * Christian * Other (please specify) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   7) Caste   * Forward * Backward * Most Backward * Scheduled Caste/ Tribe * Other (please specify) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**8.) Imagine this ladder pictures how Indian society is set up**

* **At the top of the ladder are the people who are best off** –they have the most money, the highest amount of schooling, and the jobs that bring the most respect
* **At the bottom are the people who are worst off**-they have the least money, little or no education, no jobs or jobs that no one wants or respects

Now think where you would place yourself on the ladder in relation to other people around you.

**Place “X” on the rung which best represents your position.**

**BEST OFF PEOPLE**

**BEST OFF PEOPLE**

**BEST OFF PEOPLE**

**BEST OFF PEOPLE**

**BEST OFF PEOPLE**

**BEST OFF PEOPLE**

**BEST OFF PEOPLE**

**BEST OFF PEOPLE**

**WORST OFF PEOPLE**

**WORST OFF PEOPLE**

**WORST OFF PEOPLE**

**WORST OFF PEOPLE**

**WORST OFF PEOPLE**

**WORST OFF PEOPLE**

**WORST OFF PEOPLE**

**WORST OFF PEOPLE**

**Concern about your mouth and teeth**

The following questions in the scale ask about the level of concern and needs you have upon your mouth and teeth in daily life. There are no correct answers to any of these questions, rather a range of acceptable views. For example, some people think mouth and teeth are very important, whereas some people think they are not important. Please tick an appropriate choice that you best agree with.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Strongly agree | Agree | Neither agree or disagree | Disagree | Strongly disagree |
| 9. My teeth are only important to me if they stop me from eating |  |  |  |  |  |
| 10. I would not worry about having trouble with my mouth and teeth |  |  |  |  |  |
| 11. I am not bothered if people are put off by the appearance of my mouth and teeth |  |  |  |  |  |
| 12. Having nice teeth can make you feel good about yourself |  |  |  |  |  |
| 13. A nice smile can help you get on in life |  |  |  |  |  |
| 14. My mouth and teeth really matter to me |  |  |  |  |  |
|  | Strongly agree | Agree | Neither agree or disagree | Disagree | Strongly disagree |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Definitely true | Somewhat true | Somewhat false | Definitely false |
| 15. Having more aches and pains is an accepted part of aging |  |  |  |  |
| 16. The human body is like a car: When it gets old, it gets worn out. |  |  |  |  |
| 17. Every year that people age, their energy levels go down a little more |  |  |  |  |
| 18. I expect that as I get older I will spend less time with friends and family |  |  |  |  |
| 19. Being lonely is just something that happens when people get old. |  |  |  |  |
| 20. As people get older they worry more |  |  |  |  |
| 21. Its normal to be depressed when you are old |  |  |  |  |
| 22. I expect that as I get older I will become more forgetful. |  |  |  |  |
| 23. It is an accepted part of aging to have trouble remembering name. |  |  |  |  |
| 24. Forgetfulness is a natural occurrence just from growing old |  |  |  |  |
| 25. It is impossible to escape the mental slowness that happens with ageing. |  |  |  |  |
|  | Definitely true | Somewhat true | Somewhat false | Definitely false |

**Ageing and your expectations (ERA - 12)**

The following questions in the scale ask about your views on the process of ageing and your expectations as you get older. Please tick one choice for each of the following questions to the level you agree with each statements.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **QUESTIONS ABOUT YOUR FEELINGS AND THOUGHTS**  The questions in this scale ask you about your feelings and thoughts **during the last month**. In each case, you will be asked to indicate *how often* you felt or thought a certain way. Although some questions are similar, there are differences between them and you should treat each one as a separate question. For each question tick🗹the number which you feel is appropriate.  **PLEASE TICK ONLY ONE ANSWER** | | | | | |
|  |  | 0- Never | 1- Almost Never | 2- Some times | 3- Fairly Often | 4 - Very Often |
| 26 | In the last month, how often have you felt that you were unable to control the important things in your life? |  |  |  |  |  |
| 27 | In the last month, how often have you felt confident about your ability to handle your personal problems? |  |  |  |  |  |
| 28 | In the last month, how often have you felt that things were going your way? |  |  |  |  |  |
| 29 | In the last month, how often have you felt difficulties were piling up so high that you could not overcome them? |  |  |  |  |  |
|  |  | 0- Never | 1- Almost Never | 2- Some times | 3- Fairly Often | 4 - Very Often |

COPING Strategies- CAN YOU TELL US HOW YOU MANAGE THE STRESS IN YOUR LIFE DUE TO MISSING TEETH/DENTURES? PLEASE INDICATE BY INSERTING ‘X’ IN THE APPROPRIATE BOX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Not at all | A little bit | A medium amount | A lot |
| 30. I have been concentrating my efforts on doing something about the situation l am in. |  |  |  |  |
| 31. I have been taking action to try make the situation better |  |  |  |  |
| 32. I have been trying to come up with a strategy about what to do. |  |  |  |  |
| 33. I've been thinking hard about what steps to take. |  |  |  |  |
| 34. I've been trying to see it in a different light, to make it seem more positive. |  |  |  |  |
| 35. I've been looking for something good in what is happening |  |  |  |  |
| 36. I've been accepting the reality of the fact that it has happened. |  |  |  |  |
| 37. I've been learning to live with it. |  |  |  |  |
| 38. I've been making jokes about it. |  |  |  |  |
| 39. I've been making fun of the situation. |  |  |  |  |
| 40. I've been trying to find comfort in my religion or spiritual beliefs. |  |  |  |  |
| 41. I've been praying or meditating. |  |  |  |  |
| 42. I've been getting emotional support from others. |  |  |  |  |
| 43. I've been getting comfort and understanding from someone. |  |  |  |  |
| 44. I've been trying to get advice or help from other people about what to do. |  |  |  |  |
| 45. I've been getting help and advice from other people. |  |  |  |  |
| 46. I've been turning to work or other activities to take my mind off things |  |  |  |  |
| 47. I've been doing something to think about it less, such as going Io movies, watching TV, reading, daydreaming, sleeping, or shopping. |  |  |  |  |
| 48. I've been saying to myself "this isn't real” |  |  |  |  |
| 49. I've been refusing to believe that it has happened. |  |  |  |  |
| 50. I've been saying things to let my unpleasant feelings escape. |  |  |  |  |
| 51. I’ve been expressing my negative feelings. |  |  |  |  |
| 52. I've been using alcohol or other drugs to make myself feel better. |  |  |  |  |
| 53. I've been using alcohol or other drugs to help me get through it. |  |  |  |  |
| 54. I’ve been giving up trying to deal with it |  |  |  |  |
| 55. I’ve been giving up the attempt to cope. |  |  |  |  |
| 56. I’ve been criticizing myself. |  |  |  |  |
| 57. I’ve been blaming myself for things that happened. |  |  |  |  |
|  | Not at all | A little bit | A medium amount | A lot |

**ORAL HEALTH RELATED QUALITY OF LIFE – EDENT**

We are interested in knowing how much the Quality of your life has been influenced by the condition you experience. Please read the following questions and tick 🗹 the response that most closely describes your current situation

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | never | hardly  ever | occasionally | fairly often | very often |
| 58. Have you had difficulty chewing any foods because of problems with your teeth, mouth or dentures? |  |  |  |  |  |
| 59. Have you had food catching in your teeth or dentures? |  |  |  |  |  |
| 60. Have you felt that your dentures have not been fitting properly? |  |  |  |  |  |
| 61. Have you had painful aching in your mouth? |  |  |  |  |  |
| 62. Have you found it uncomfortable to eat any foods because of problems with your teeth? |  |  |  |  |  |
| 63. Have you had sore spots in your mouth? |  |  |  |  |  |
| 64. Have you had uncomfortable dentures? |  |  |  |  |  |
| 65. Have you been worried by dental problems? |  |  |  |  |  |
| 66. Have you been self-conscious because of your teeth, mouth or dentures? |  |  |  |  |  |
| 67. Have you had to avoid eating some foods because of problems with your teeth, mouth or dentures? |  |  |  |  |  |
| 68. Have you been unable to eat with your dentures because of problems with them? |  |  |  |  |  |
| 69. Have you had to interrupt meals because of problems with your teeth, mouth or dentures? |  |  |  |  |  |
| 70. Have you been upset because of problems with your teeth, mouth or dentures? |  |  |  |  |  |
| 71. Have you been a bit embarrassed because of problems with your teeth, mouth or dentures? |  |  |  |  |  |
| 72. Have you avoided going out because of problems with your teeth, mouth or dentures? |  |  |  |  |  |
| 73. Have you been less tolerant of your spouse or family because of problems with your mouth, teeth or dentures? |  |  |  |  |  |
| 74. Have you been a bit irritable with other people because of problems with your teeth, mouth or dentures? |  |  |  |  |  |
| 75. Have you been unable to enjoy other people’s company as much because of problems with your teeth, mouth or dentures? |  |  |  |  |  |
| 76. Have you felt that life in general was less satisfying because of problems with your teeth, mouth or dentures? |  |  |  |  |  |
|  | never | hardly  ever | occasionally | fairly often | very often |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Totally satisfied** |  |  |  | **Totally dissatisfied** |
|  | **0** | **1** | **2** | **3** | **4** |
| 77. How do you feel about the pleasure you get from food, compared with the time when you had natural teeth? |  |  |  |  |  |
| 78.With respect to chewing, how satisfied are you with your dentures |  |  |  |  |  |
| 79.With respect to appearance, how satisfied are you with your dentures |  |  |  |  |  |
| 80. With respect to how comfortable your dentures are, how satisfied are you? |  |  |  |  |  |
| 81. With respect to being self-assured and self-conscious, how satisfied are you with your dentures? |  |  |  |  |  |
| 82. With respect to your social and affective relationships, how satisfied are you with your oral conditions? |  |  |  |  |  |
| 83. With respect to your professional performance, how satisfied are you with your oral conditions? |  |  |  |  |  |
| 84. With respect to eating, how satisfied are you with your dentures |  |  |  |  |  |
| 85. Are you satisfied with your smile (aesthetic)? |  |  |  |  |  |
|  | **0** | **1** | **2** | **3** | **4** |
|  | **Totally satisfied** |  |  |  | **Totally dissatisfied** |

**DENTURE SATISFACTION (de Liz Pocztaruk et al., 2006)**

We are interested in knowing how much you are satisfied with your dentures Please read the following questions and tick 🗹 to rate that most closely describes your current situation

**86.** **LEAKE’S CHEWING INDEX**

In the following list of foods please tick the hardest food that you will be able to chew comfortably without any discomfort. **PLEASE TICK ONE OPTION ONLY**

|  |  |  |
| --- | --- | --- |
| FOOD TYPE |  |  |
| None | 0 |  |
| Boiled vegetables,(cooked rice, idly) | 1 |  |
| Salad (Cabbage, Spinach) | 2 |  |
| Raw carrots or celery (radish) | 3 |  |
| Steaks or chops (Roasted firm meat) | 4 |  |
| Whole Apple | 5 |  |

## Appendix F-Back translated versions in Tamil

### Recruitment flyer



பற்கள் **இல்லாதவரா நீங்கள்?**

இங்கிலாந்தின் செஃப்பீல்டு பல்கலைக்கழக, பல் மருத்துவப் பள்ளி மற்றும் ஸ்ரீ இராமச்சந்திரா பல் மருத்துவ கல்லூரி & மருத்துவமனையைச் சேர்ந்த பல் மருத்துவர்களாகிய நாங்கள், தங்களுடைய சமாளிப்பு வியூகங்கள் செயற்கை பல் கட்டமைப்பின் (பல்-செட்) வெற்றியினைத் தீர்மானிக்கிறதா என்பதனை ஆராய்ச்சி செய்து வருகிறோம்.

தங்களுக்கு **இதனால்** என்ன பலன்**?**

* **செயற்கைப் பல் கட்டமைப்பு (பல்-செட்) அணியும் அனுபவத்தைப் பகிர்ந்து கொள்ள ஒரு வாய்ப்பு.**
* **மைக்ரோவேவ் ஓவன் (microwave oven) அல்லது ஓர் குளிர்சாதனப் பெட்டி (fridge) பரிசாக வெல்ல வாய்ப்பு\***

பங்கு பெற விருப்பம் இருந்தால் கீழுள்ள இடங்களில் தொடர்பு கொள்ளவும்**வாய் மருத்துவம் மற்றும் கதிர்வீச்சியல் பிரிவு**

இராமச்சந்திரா பல் மருத்துவ கல்லூரி & மருத்துவமனை,

போரூர், சென்னை

**செயற்கை பல் கட்டமைப்புப் பிரிவு**

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**அல்லது தொடர்பு கொள்ளவும்:**

திரு. கார்த்திக் பெரியகருப்பையா

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**\* குலுக்கல் முறை மூலம். இரண்டு குலுக்கல்கள் நடத்தப்படும்.முதல் குலுக்கலில் மைக்ரோவேவ் ஓவன் இரண்டாவதில் குளிர்சாதனப் பெட்டி வழங்கப்படும்**.

### Patient information sheet

**நோயாயாளிகள் தகவல் தாள்**

**ஆய்வின் தலைப்பு: செயற்கைப் பல் கட்டமைப்பின் வெற்றியால் மேம்படும் வாய்நலம் சார்த்த வாழ்க்கைத் தரத்தினை, நோயாளியின் நேர்த்தியான சமாளிப்பு வியுகங்கள் தீர்மானக்கின்றனவா?**

தாங்கள் இங்ஙனம் ஓர் ஆய்வாராய்ச்சிப் படிப்பில் பங்கு பெறுவதற்காக அழைக்கப்படுகிறீர்கள். இவ்வழைப்பினை தாங்கள் ஏற்கும் முன், இந்த ஆய்வு எதற்காக மேற்கொள்ளபடுகிறது மற்றும் இதில் எத்தகைய முறைகள் ஈடுபடுத்தப்படும் என்பதனை புரிதல், இன்றியமையாதது ஆகும். எனவே, பின்வரும் தகவல்களை, சற்று கால அவகாசம் எடுத்துக்கூட கவனமாகப் படிக்கவும். தேவையெனில், மற்றவர்களுடன் இதனைப்பற்றி நீங்கள் ஆலோசித்துக் கொள்ளலாம். பின்வரும் தகவல்களில் ஏதேனும் தெளிவின்றி இருந்தாலோ அல்லது மேலும் விபரங்கள் தேவையென்றாலோ, எங்களிடம் கேட்டு அறிந்து கொள்ளுமாறு அறிவுறுத்துகின்றோம்.

**இந்த ஆய்வின் நோக்கம் என்ன ?**

இந்த ஆய்வின் மூலமாக, வாய் நலம் தொடர்புடைய வாழ்க்கைத் தரத்தை மேம்படுத்தும் செயற்கை பல் கட்டமைப்பின் (பல் செட்) வெற்றியினை எவை தீர்மானிக்கக்கூடும் என்பதனை அறிந்து கொள்ள விருப்பப்படுகிறோம். இப்படிப்பின் மூலமாக செயற்கை பல் கட்டமைப்பு அணியும் நபர்களின் அனுபவங்களை புரிதல் மேலும் சிறக்கும் என எண்ணுகின்றோம் . இந்த ஆய்வினில் பங்கேற்க முற்படும் முன் இந்த ஆராய்ச்சி ஈடுபடுத்தக்கூடியவை என்ன என்பதை அறிதல் மிக இன்றியமையாதது ஆகும்.

**இதில் பங்கேற்குமாறு நான் ஏன் அழைக்கப்படுகிறேன் ?**

2 அல்லது அதற்கு மேல் பற்கள் தவறிய, 18 வயதிற்கு மேற்பட்டோரை பங்கேற்குமாறு அழைப்பு விடுகிறோம். ஏனெனில் நாங்கள் செயற்கை பல் கட்டமைப்பின் (பல்-செட்) வெற்றியினை பாதிக்கும் காரணிகள் பற்றி அறிய விரும்புகிறோம் .

**நான் அவசியம் பங்கேற்க வேண்டுமா?**

இதில் பங்கேற்பது குறித்த முடிவு முற்றிலும் தங்களுடையதே. எப்பொழுது வேண்டுமானாலும் நீங்கள் இந்த ஆராய்ச்சியில் இருந்து தாரளமாக வெளியேறலாம். அவ்வாறு வெளியேறுவதற்கு தாங்கள் எத்தகைய காரணமோ விளக்கமோ அளிக்கத் தேவையில்லை.

**இதில் பங்கேற்றால் எனக்கு என்ன நடக்கும் ? நான் என்ன செய்ய வேண்டும்?**

தாங்கள் பங்கேற்க முடிவு செய்தால்,

* முழு வாய் பரிசோதனை செய்யப்படும்.
* தங்களைப் பற்றியும், தங்களைச் சுற்றி உள்ள உலகச்சுழல் மற்றும் தங்களுடைய வாய் நலம் சார்த்த வினாத்தொடர் சரத்தினை பூர்த்தி செய்தல் வேண்டும்.
* செயற்கை பல் கட்டமைப்பு (பல்-செட்) அணிவித்து 3 மாதங்கள் கழித்து அதே வினாத்தொடர் சரத்தினை, மீண்டும் ஒரு முறை பூர்த்தி செய்தல் வேண்டும். தங்களை இதன் போது நாங்கள் தொடர்பு கொள்வோம்.

**பங்கேற்பதால் ஏற்படக்கூடிய சாதகமற்ற மற்றும் அபாயகரமான விளைவுகள் என்ன?**

இந்த ஆய்வினால், தெரிந்தமட்டில் எந்த ஒரு ஆபத்தும் இல்லை. வினாத்தொடரைப் பூர்த்தி செய்யவும், தங்களின் வாய் பரிசோதனை செய்ய மட்டுமே நாங்கள் கோருவோம். இந்த ஆராய்ச்சியைப் பொறுத்த மட்டில், செயற்கை பல் கட்டமைபினைத் தவிர எந்த ஒரு சிகிச்சையும் தங்களுக்கு நிர்வகிக்கப்பட மாட்டாது. வினாதொடரில் ஏதேனும் கேள்விகள் தனிப்பட்ட முறையில் தங்களுக்கு சலனம் ஏற்படுத்தினால், அவற்றை தாரளமாக பதில் அளிக்காமல் விட்டுவிடலாம்.

இந்த ஆய்வில் பங்கேற்பதால் ஏற்படக்கூடிய பலன்கள் என்ன?

இந்த ஆய்வினால் உடனடி அல்லது நேரடிப் பலன்கள் இல்லை. இருப்பினும், செயற்கைப் பற்கட்டமைப்பின் வெற்றியினைப் பற்றி நன்கு புரிந்து கொள்ள இந்த ஆய்வு மிகப் பயனுள்ளதாக அமையும். தங்களைப் போன்றவர்களுக்கு மேலும் சிறந்த வகையில் செயற்கை பற்கட்டமைப்பு மற்றும் பராமரிப்பினை வழங்க எங்களுக்கு உதவும்.

நீங்கள் இந்த ஆய்வில் பங்கு பெற முடிவு செய்தால், வினாத்தொடரினைப் பூர்த்தி செய்ய தாங்கள் அற்பணிக்கும் நேரத்தினை அங்கீகரிக்கும் மற்றும் ஊக்குவிக்கும் விதமாக, ஒவ்வொரு கட்டத்தின் முடிவில் குலுக்கல் முறையில் தேர்வு செய்து தங்களுக்கு பரிசு வழங்கப்படும். ஒவ்வொரு கட்டத்தின் முடிவிலும் தாங்கள் குலுக்கல் தேர்வில் சேர்க்கப்படுவீர்கள். சிற்றலை அடுமனை (மைக்ரோவேவ் அவன் – microwave oven) மற்றும் உணவு குளிர்சாதனப் பெட்டி (Fridge) ஆகிய பரிசுகள் இவ்விரு கட்டங்களிலும் முறையே வழங்கப்படும்.

**நான் இந்த ஆய்வில் பங்கேற்பது ரகசியமாக வைத்துக்கொள்ளப்படுமா ?**

தாங்கள் வழங்கும் அனைத்துத் தகவல்களும் மிகக் கவனமான முறையில், இரகசியமாகப் பாதுகாக்கப்படும். தங்களுடைய தனி நபர் வாழ்க்கையினை பாதுகாக்க, தங்களுடைய பெயர் எந்த ஓரு வினாத்தொடரிலோ ஆய்வின் எப்பகுதியிலும் குறிப்பிடப் பட மாட்டாது. அதற்குப் பதில் தங்களுக்கென்று ஓர் அடையாள எண் வழங்கப்படும். அதுவே தங்களை அடையாளம் கண்டு கொள்ளப் பயன்படுத்தப்படும். தங்கள் பெயர் மற்றும் தங்கள் அடையாள எண், தாங்கள் மற்றும் தங்களுடைய ஆய்வாளருக்கு மட்டுமே தெரியும்.

**வேறு யாரேனும் இந்த ஆய்வினை சரிபார்த்து மேற்கொள்ள அனுமதித்துள்ளனரா?**

இந்த ஆய்வின் உடன்படு நெறிமுறை, ஷேப்பீல்டு பல்கலைக்கழகத்தின் ஆராய்ச்சி நன்னெறி செயற்குழுவினால் (University of Sheffield Research Ethics Committee) பரிசீலனை செய்யப்பெற்று அங்கீகரிக்கப்பட்டுள்ளது. ஸ்ரீ ராமச்சந்திரா பல்கலைக்கழகத்தின் ஆராய்ச்சி நன்னெறி செயற்குழுவும் இந்த ஆராய்ச்சியினை அவர்களுடைய பல்கலைக்கழகத்தில் மேற்கொள்ள அனுமதி வழங்கியுள்ளனர்.

**இந்த ஆய்வு மேற்கொள்ளப்படும் விதம் குறித்துப் புகார் கொடுக்க எண்ணினால் நான் என்ன செய்ய வேண்டும்?**

தாங்கள் அணுகப்படும் விதம் குறித்தோ அல்லது இந்த ஆராய்ச்சியின் பொழுது நடத்தப்படும் விதம் குறித்தோ ஏதேனும் புகார் தெரிவிக்க வேண்டுமெனில் பின்வரும் தொடர்புகளை தயவு செய்து அணுகவும்.

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பங்கேற்பாளர் குறியீடு: …………………………………..

### Consent form

**இணக்கப் படிவம்**

**ஆய்வு செயற்திட்டத்தின் தலைப்பு: செயற்கைப் பல் கட்டமைப்பின் வெற்றியால் மேம்படும் வாய்நலம் சார்த்த வாழ்க்கைத் தரத்தினை, நோயாளியின் நேர்த்தியான சமாளிப்பு வியுகங்கள் தீர்மானிக்கின்றனவா?**

**ஆராய்சியாளர் பெயர்கள்:** திரு. கார்த்திக் பெரியகருப்பையா, பேராசிரியர். பீட்டர். ஜி. ராபின்சன், முனைவர்.திருமதி.சாரா பேக்கர், பேராசிரியர். திரு. தல்லம் வீரவல்லி பத்மநாபன்

1. நான், ............................ தேதியிட்ட இந்த ஆய்வராய்ச்சி பற்றி விளக்கும் தகவல் தாளினை முழுமையாகப் படித்தும், புரிந்தும் கொண்டேன். இந்த ஆய்வினைப்பற்றிய கேள்விகள் மற்றும் ஐயப்பாடுகளை எழுப்ப எனக்கு முழு வாய்ப்பு அளிக்கப்பட்டது என உறுதி அளிக்கின்றேன்.
2. இந்த ஆய்வில் என்னுடைய பங்களிப்பு முற்றிலும் தன்னிச்சையானது. மேலும், எந்நேரம் வேண்டுமானாலும் இந்த ஆய்விலிருந்து காரணம் இன்றி விலகிக் கொள்ளலாம் என்பதையும், எனது வேலைக்கு எதிர்மறை விளைவுகள் ஏற்படாத வண்ணம் இதனைச் செய்து கொள்ள முடியும் என்பதையும் நான் அறிவேன். இது தவிர, ஏதேனும் ஓர் வினாவிற்கு அல்லது வினாக்களுக்கு பதிலளிக்க விருப்பம் இல்லையெனில், அவற்றை நான் தாரளமாக தவிர்க்கலாம்.
3. எனது பதில் மறைகள், மிகக் கண்டிப்பான முறையில் இரகசியக் காத்தல் செய்யப்படும் என்பதனை நான் அறிவேன். ஆராய்ச்சிக் குழு உறுப்பினர்களுக்கு எனது அநாமதேயப்படுத்தப்பட்ட பதில் மறைகளை அணுக அனுமதி அளிக்கின்றேன். எனது பெயர் ஆராய்ச்சி சாதனங்களுடன் தொடர்பு படுத்தப்பட மாட்டாது என்பதும், மற்றும் இந்த ஆராய்ச்சியின் முலமாக வெளிப்படும் அறிக்கை அல்லது அறிக்கைகளில் என்னை அடையாளம் காணவோ அல்லது காணக்கூடிய நிலையோ இருக்காது என்பதை நான் நன்கு அறிவேன்.
4. என்னிடம் இருந்து பெறப்படும் தரவுகள் பிற்காலத்தில் நடத்தப்படும் ஆய்வு ஆராய்ச்சிகளில் பயன்படுத்திக்கொள்ள நான் அனுமதிக்கிறேன்.
5. இந்த ஆய்வுப் படிப்பில் பங்கு பெற நான் முழுச் சம்மதம் தெரிவிக்கின்றேன்..

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பங்கேற்பாளர் பெயர் கையொப்பம் தேதி

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கார்த்திக் பெரியகருப்பையா கையொப்பம் தேதி

**(ஆராய்ச்சியாளர்)**

**பிரதிகள்:**

இரு பிரதிகளிலும் கையொப்பம் இடவும்.

இந்த இணக்கப்படிவத்தின் **ஒரு பிரதியினை** தாங்கள் தங்கள் பதிவுகளில் வைத்துக்கொள்ளவும் மற்றொன்றை ஆராய்ச்சிக் குழுவினரிடம் **ஒப்படைக்கவும்**

**நன்நெறி நடைமுறை அறிவிப்பு**

**தங்களுடைய தனிப்பட்டத் தரவுகள், செஃப்பீல்டு பல்கலைகழக ஆராய்ச்சிக் கட்டுரையின் (PhD) விதிமுறைகள் கீழ் மட்டுமே பயன்படுத்தப்படும். இவ்விதிமுறைகள் தரவு காப்புச் சட்டம்** (Data Protection Act 2000) **கீழ் உட்பட்டவை ஆகும். மேலும், தகவல் சுகந்திரச் சட்டம் (Freedom of Information act 2000) உடன் இணக்கமான**  ஒன்றாகும். அராய்ச்சியாளர் தங்களுடைய தனிப்பட்ட தகவல்களை எவ்வித மூன்றாம் தரப்பினரிடமும் தங்களுடைய அனுமதியின்றி வெளிப்படுத்த மாட்டார

### Questionnaire booklet

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| --- |
| செயற்கைப் பல் கட்டமைப்பு அணிவோரின் நேர்த்தியான சமாளிப்பு வியுகங்கள், அதன் வெற்றியினைத் தீர்மானிப்பதன் மூலம் வாய்நலம் சார்த்த வாழ்க்கைத் தரத்தினை மேம்படுத்துகிறதா?  வினாத்தொடர் புத்தகம்    **ஆராய்ச்சியாளர்**: **கார்த்திக் பெரியகருப்பையா**  மின்னஞ்சல்: k.periyakaruppiah@sheffield.ac.uk; kart777@gmail.com  தொலைபேசி: +91 9791180582  **மேற்பார்வையாளர்கள்:** பேராசிரியர். திரு. பீட்டர்.ஜி.ராபின்சன் மற்றும் முனைவர். சாரா பேக்கர்  பல் பொது நலப்பிரிவு  பல் மருத்துவப் பள்ளி, கிளேர்மோன்ட் கிரெசன்ட்  செஃபீல்டு, இங்கிலாந்து (S10 2TA)  **ஆராய்ச்சி மேற்பார்வை மற்றும் ஒருங்கிணைப்பாளர்:** பேராசிரியர்.திரு.த.வீ.பத்மநாபன்  செயற்கைப்பல் கட்டமைப்புப் பிரிவு  ஸ்ரீ இராமச்சந்திரா பல் மருத்துவக் கல்லூரி & மருத்தவமனை  போரூர், சென்னை, தமிழ்நாடு, இந்தியா – 600116  இந்த ஆய்வில் பங்குபெறச் சம்மதித்ததற்கு நன்றி  இந்த ஆய்வின் குறிக்கோள், செயற்கை பல் கட்டமைப்பு (பல்- செட்) வெற்றிபெற தாக்கம் ஏற்படுத்தும் காரணிகளை அடையாளம் காண்பது ஆகும்.  இந்த ஆய்வின் மூலம், பற்கள் அற்றவர்கள் மற்றும் செயற்கைப் பல் கட்டமைப்பு அணிவோர் எதிர்கொள்ளும் பிரச்சனைகளைப் பற்றிய புரிதலை உயர்த்திக்கொள்ள முற்படுகிறோம்.  பின்வரும் கேள்விகளுக்கு தாங்கள் பதிலளிப்பது மூலம் பற்கள் இல்லாதோறுடைய அனுபவங்களைப் பற்றி மேலும் அறிந்து கொள்ள எங்களுக்கு உதவும்.  **தயவு செய்து நினைவு கூர்க:**   * வினாத்தொடரில் எங்கும் **தங்கள் பெயரை தயவு செய்து குறிப்பிட வேண்டாம்.** * இது **ஓர் தேர்வு அல்ல**. எனவே இதில் சரியான அல்லது தவறான பதில்கள் இல்லை. * பதில் அளிக்கும்பொழுது, கேள்விகள் பற்றி **யாரிடமும் தயவுசெய்து பேசாதீர்.** * ஒவ்வொரு கேள்வியையும் கவனமாக படித்தபின், உங்களுடைய கடந்த சில வார அனுபவங்களை சிந்தித்துப் பார்த்து அதன் துணை கொண்டு பதிலளிக்கவும். * பதிலளிக்கையில், **தங்களின் தினசரி வாழ்க்கையைச் சிந்தித்து** நேர்மையாக பதிலளிக்கவும். * தங்களுடைய பதில்களுக்கு அருகில் உள்ள கட்டங்களில் தயவுசெய்து 🗹 செய்யவும்.   பின்வரும் கேள்விகளுக்கு பதில் அளிக்கவும்**:**  தேதி\_\_\_/\_\_\_/\_2014\_  தேதி\_\_\_/\_\_\_/\_2014\_  தேதி\_\_\_/\_\_\_/\_2014\_  தேதி\_\_\_/\_\_\_/\_2014\_  தேதி\_\_\_/\_\_\_/\_2014\_  தேதி\_\_\_/\_\_\_/\_2014\_  தேதி\_\_\_/\_\_\_/\_2014\_  தேதி\_\_\_/\_\_\_/\_2014\_     * + - 1. **தங்கள் வயது \_\_\_\_\_\_\_\_\_\_\_**       2. **தங்கள் மணவாழ்வு நிலை :** * **திருமணமானவர்** * **திருமணம் ஆகாதவர்** * **விவாகரத்து ஆனவர்** * **வாழ்க்கை துணை இழந்தவர்**   3) **தங்களுடைய வேலை அல்லது தொழில்?**   * **தொழில் வல்லுநர்** * **பகுதித் தொழில் வல்லுநர்** * **எழுத்தர், கடை உரிமையாளர், விவசாயி** * **திறமை தேர்ந்த தொழிலாளி** * **பகுதி- திறமை தேர்ந்த தொழிலாளி** * **திறமை தேர்ச்சியற்ற தொழிலாளி** * **வேலையில்லாதவர்**   4) **தங்களுடைய தோராயமான மாத வருமானம் ரூபாயில் (₹)?**   * =1520 **அல்லது கீழ்** * 1521-4555 * 4556-7593 * 7594-11361 * 11362-15187 * 15188-30374 * = 30375 **அல்லது மேல்**   **5) தங்களுடைய கல்வித் தகுதி எவ்வளவு?**   * **தொழில் சார்ந்த அல்லது கௌரவ மதிப்பு** * **இளநிலை அல்லது முதுநிலை பட்டம்** * **இடைநிலை அல்லது உயர்நிலைப் பள்ளி முதுநிலை பட்டயம் (பாலிடெக்னிக் போன்றவை)** * **உயர்நிலைப்பள்ளிச் சான்றிதழ்** * **இடைநிலைப்பள்ளிச் சான்றிதழ்** * **ஆரம்பநிலைப்பள்ளிச் சான்றிதழ்** * **படிப்பறிவற்றோர்**   6) **தங்களுடைய மத நம்பிக்கை?**   * **இந்து** * **இசுலாமியர்** * **சீக்கியர்** * **கிறித்துவர்** * **மற்றவை (குறிப்பிடவும்) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**   7) **சாதி வழிபாடு**   * **முற்படுத்தப்பட்ட வகுப்பினர்** * **பிற்படுத்தப்பட்ட வகுப்பினர்** * **மிகவும் பிற்படுத்தப்பட்ட வகுப்பினர்** * **அட்டவணை வகுப்பினர் மற்றும் பழங்குடியினர்** * **மற்றவை (தயவுசெய்து குறிப்பிடவும்)** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**8.) இந்த ஏணி இந்திய சமூக அமைப்பினை படம் பிடித்துக்காட்டுவதாக கற்பனை செய்து கொள்ளுங்கள்**

* ஏணியின் மேல் உள்ளோர் செழிப்பானோர் –பண வசதி, உயர் ரக கல்வி, மரியாதைக்குரிய வேலை போன்றவற்றைக் கொண்டவர்கள்.
* ஏணியின் கீழுள்ளோர் செழிப்பற்ற சிரம நிலையில் உள்ளவர்- மிகக் குறைந்த பண வசதி, படிப்பறிவு குறைந்த அல்லது அற்றவர், வேலையற்ற அல்லது மரியாதை குறைந்த பலரும் விரும்பாத வேலை செய்வோர்.

இப்பொழுது இந்த ஏணியில் தங்களை தாங்கள் மற்றவர்களுடன் ஒப்பிட்டு எங்கு அமர்த்திக் கொள்வீர்?

அங்கு **“X”** குறியிட்டு தங்கள் நிலைப்பாட்டைத் தெரிவிக்கவும்

செழிப்பான மக்கள்

செழிப்பான மக்கள்

செழிப்பான மக்கள்

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செழிப்பற்ற மக்கள்

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செழிப்பற்ற மக்கள்

வாய் மற்றும் பற்கள் பற்றிய அக்கறை

**பின்வரும் அளவுகோள்க் கேள்விகள், தினசரி வாழ்கையில் வாய் மற்றும் பற்கள் மீதுள்ள தங்களுடைய அக்கறை மற்றும் தேவைகளின் அளவினை பற்றிக் கேட்பவை ஆகும். இதில் சரியான பதில் என்று எதுவும் இல்லை, ஆனால் ஏற்றுக்கொள்ளக் கூடிய வரையறையில் உள்ள அபிப்ராயங்கள் உள்ளன. சிலர் வாய் மற்றும் பற்கள் மிகவும் முக்கியமானதாகக் கருதக்கூடும், சிலர் அவ்வாறு கருதாமல் இருக்கலாம். எனவே கீழுள்ள பதில்களில் தங்களுக்கு உகந்தவற்றை குறியிடுமாறு கேட்டுக்கொள்கிறோம்**.

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|  | **பலமாக உடன்படுகிறேன்** | **உடன்படுகிறேன்** | **இரண்டும் இல்லை** | **உடன்படவில்லை** | **பலமாக உடன்படவில்லை** |
| 9. **எனது பற்களால் உண்பது தடைபடும் போது மட்டுமே, அவற்றை நான் முக்கியமானதாகக் கருதுவேன்.** |  |  |  |  |  |
| **10. எனது வாய் மற்றும் பற்களில் தொந்தரவு இருப்பின் அதை பற்றி கவலை கொள்ள மாட்டேன்.** |  |  |  |  |  |
| 11. **என்னுடைய வாய் மற்றும் பற்களின் தோற்றத்தினால் மற்றவர்கள் விலகி ஒதுங்கினால் எனக்குக் கவலை இல்லை** |  |  |  |  |  |
| 12. **பற்கள் நன்றாக இருந்தால்ஒருவர் அவரை பற்றி நல்ல முறையில் உணர்ந்துகொள்வர்** |  |  |  |  |  |
| **13. அழகிய புன்னகை வாழ்கை மேம்பட உதவுகிறது** |  |  |  |  |  |
| 14. **எனது வாயும் பற்களும் எனக்கு மிக மதிபிற்குரியவை; முக்கியமானவை** |  |  |  |  |  |
|  | **பலமாக உடன்படுகிறேன்** | **உடன்படுகிறேன்** | **இரண்டும் இல்லை** | **உடன்படவில்லை** | **பலமாக உடன்படவில்லை** |

**முதுமை அடைவது சார்ந்த எதிர்பார்ப்புகள் (ERA - 12)**

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|  | **நிதர்சனமான உண்மை** | **ஓரளவு உண்மை** | **ஓரளவு தவறு** | **நிதர்சனமான தவறு** |
| 15. நிறைய வலிகள் மற்றும் நோவுதல்கள் மூப்படைவதின் ஒரு ஏற்றுக்கொள்ளகூடிய ஒரு அங்கமாகும். |  |  |  |  |
| 16. மனித உடல் ஓர் சிற்றூர்தி (கார்) போன்றது. வயதானால் கந்தையாகி விடும்.. |  |  |  |  |
| 17. ஒவ்வொரு வருடமும் மக்கள் வயது கூடும் பொழுது அவர்களுடைய சக்தியின் அளவு சற்று மேலும் குறைந்து விடுகிறது |  |  |  |  |
| 18. நான் மூப்படையும் போது, எனது குடும்பம் மற்றும் நண்பர்களுடன் குறைந்த நேரமே செலவிட முடியும் என எதிர்பார்க்கின்றேன். |  |  |  |  |
| 19. தனிமை வாழ்க்கை என்பது முதுமை அடையும் போது ஏற்படும் ஒன்றாகும். |  |  |  |  |
| 20. முதுமை அடையும் போது மக்கள் மிகவும் கவலை அடைகின்றனர் |  |  |  |  |
| 21. முதுமை அடையும் போது மனச்சோர்வு ஏற்படுவது இயற்கையானது |  |  |  |  |
| 22. முதுமையடையும் போது நான் மிகுந்த மறதியுடைய ஓர் நபராக ஆகிவிடுவேன் |  |  |  |  |
| 23. ஒருவருடைய பெயரை ஞாபகப்படுத்திக்கொள்ள சிரமப்படுவது முதுமையடைவதின் ஏற்றுக்கொள்ளகூடிய ஓர் அங்கமாகும். |  |  |  |  |
| 24. மறதி என்பது முதுமை அடைவதால் ஏற்படும் ஓர் இயற்கையான நிகழ்வு |  |  |  |  |
| 25. முதுமையால்ஏற்படும் மனம் சார்ந்த தொய்விலிருந்து விடுபடுவது முடியாத ஒன்றாகும் |  |  |  |  |
|  | **நிதர்சனமான உண்மை** | **ஓரளவு உண்மை** | **ஓரளவு தவறு** | **நிதர்சனமான தவறு** |

பின்வரும் வினாக்கள், முதுமை அடைவதின் செயல்முறை மற்றும் முதுமையடைவதின் மீது தங்களது எதிர்பார்ப்பு மற்றும் அபிப்ராயத்தினைப் பற்றியவை ஆகும். **கீழுள்ள அறிக்கைகளில் தங்களுக்கு உகந்த அளவிற்கு உள்ள பதிலை குறியிடுமாறு கேட்டுக்கொள்கிறோம்**..

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|  | தங்களுடைய உணர்வுகள் மற்றும் சிந்தனைகள் பற்றிய கேள்விகள்  பின்வரும் அளவுகோளில் உள்ள வினாக்கள் **கடந்த ஒரு மாதமாக** தங்களுக்கு ஏற்பட்ட உணர்வுகள் மற்றும் எண்ணங்கள் பற்றிக் கேட்பவை. ஒவ்வொரு கேள்வியிலும், *எவ்வளவு முறை* குறிப்பிட்ட வகையில் தங்கள் உணர்ச்சிகள் மற்றும் சிந்தனைகள் இருந்தன எனக் குறிப்பிடும்படி கேட்கப்படுவீர். சில கேள்விகள் ஒரே மாதிரி இருப்பினும், அவற்றுள் வேறுபாடுகள் உள்ளன. எனவே ஒவ்வொரு கேள்வியையும் தனியே பிரித்து படித்துப்பார்க்கவும் . ஒவ்வொரு கேள்விக்கும் சரியென உணரும் எண்ணுக்கு 🗹 குறியிடவும்.ஒரே ஒரு பதிலை மட்டும் குறியிடவும் | | | | | |
|  |  | **0- எப்போழுதும் இல்லை** | **1- கிட்டத்தட்ட எப்போழுதும் இல்லை** | **2- சில நேரங்களில்** | **3- சற்று அடிக்கடி** | **4 –அடிக்கடி** |
| 26 | **கடந்த ஒரு மாதமாக, எப்பொழுதெல்லாம் வாழ்கையில் முக்கியமானவற்றை கட்டுக்குள் கொண்டுவர இயலவில்லை என உணர்ந்தீர்கள்?** |  |  |  |  |  |
| 27 | **கடந்த ஒரு மாதமாக, எப்பொழுதெல்லாம் உங்கள் தனிப்பட்ட பிரச்சனைகளை தன்னம்பிக்கையுடன் கையாளும் வல்லமை உள்ளதாக உணர்ந்தீர்கள்?** |  |  |  |  |  |
| 28 | **கடந்த ஒரு மாதமாக, எப்பொழுதெல்லாம் வாழ்வில் நடப்பவை தங்கள் வழியில் நடப்பதாக உணர்ந்தீர்கள்**? |  |  |  |  |  |
| 29 | **கடந்த ஒரு மாதமாக, எப்பொழுதெல்லாம் கஷ்டங்கள் ஒன்றன் மேல் ஒன்றாக அடுக்ககிக் கொண்டு சென்றதால் அதிலிருந்து மீடேற முடியாது என உணர்ந்தீர்கள்?** |  |  |  |  |  |
|  |  | **0- எப்போழுதும் இல்லை** | **1- கிட்டத்தட்ட எப்போழுதும் இல்லை** | **2- சில நேரங்களில்** | **3- சற்று அடிக்கடி** | **4 –அடிக்கடி** |

தங்களது தினசரி வாழ்வில் தவறிய பற்கள் / செயற்கை பல் கட்டமைப்பு (பல்- செட்) இவற்றால் ஏற்படும் மனவுளைச்சலை எவ்வாறு சமாளிப்பீர்? பின்வரும் கேள்விகளில் தங்களின் நிலைமைக்கு உகந்த பதிலுக்குரிய கட்டத்தில்‘X’ இடவும்

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| --- | --- | --- | --- | --- |
|  | இல்லவே இல்லை | சிறிதளவு | நடுத்தர அளவு | அதிக அளவு |
| 30. என்னுடைய தற்போதைய நிலையைப் பொறுத்து எதாவது செய்ய எனது முயற்சிகளை ஒரு நிலைப்படுத்தி வருகிறேன். |  |  |  |  |
| 31. தற்போதைய நிலையை முன்னேற்ற நடவடிக்கை எடுத்து வருகிறேன். |  |  |  |  |
| 32. என்ன செய்யலாம் என வியுகங்கள் வகுக்க முயற்சி எடுத்து வருகிறேன். |  |  |  |  |
| 33. என்னவாறு அடியெடுத்து வைக்கலாம் என மிகக் கடுமையாக யோசித்து வருகிறேன். |  |  |  |  |
| 34. இப்பிரச்சனயை வேறொரு விதமான பார்வையில் பார்த்து, அதன் மூலம் நேர்மறையாகத் தென்படவைக்க முயற்சித்து வருகிறேன். |  |  |  |  |
| 35. நடந்தவற்றில் உள்ள சில நன்மைகளைத் தேடி முயற்சித்து வருகிறேன். |  |  |  |  |
| 36. நடந்த விடயத்தின் யதார்த்தத்தில் உள்ள உண்மையை ஏற்றுக்கொண்டுள்ளேன் |  |  |  |  |
| 37. இந்நிலைமையுடன் வாழக் கற்றுக்கொண்டுள்ளேன். |  |  |  |  |
| 38. இந்நிலைமையைப்பற்றி (ஜோக்) பரிகாசம் செய்து வருகிறேன் |  |  |  |  |
| 39. இந்நிலைமையைப்பற்றி கேலி செய்து வருகிறேன். |  |  |  |  |
| 40. மத மற்றும் ஆன்மிக நம்பிக்கைகள் மூலம் ஆறுதல் பெற முயற்சித்து வருகிறேன். |  |  |  |  |
| 41 பிரார்த்தித்து அல்லது தியானித்து வருகிறேன் |  |  |  |  |
| 42. மற்றவர்களிடம் இருந்து உணர்ச்சிவச நிலை சார்ந்த ஆறுதல் பெற்று வருகிறேன். |  |  |  |  |
| 43. யாரோ ஒருவரிடம் இருந்து ஆறுதலும் புரிதலும் பெற்று வருகிறேன் |  |  |  |  |
| 44. மற்றவர்களிடம் இருந்து என்ன செய்யலாம் என ஆலோசனை அல்லது உதவி பெற முயற்சித்து வருகிறேன். |  |  |  |  |
| 45. மற்றவர்களிடம் இருந்து ஆலோசனை மற்றும் உதவி பெற்று வருகிறேன். |  |  |  |  |
| 46. வேலை மற்றும் பிற செயல்பாடுகளில் ஈடுபட்டு எனது எண்ணத்தை இவற்றில் இருந்து திசை திருப்பி வருகிறேன். |  |  |  |  |
| 47. இதைப்பற்றிக் குறைவாகச் சிந்திக்க, திரைப்படம் காணச் செல்வது, தொலைகாட்சி பார்ப்பது, படிப்பது, பகற்கனவு காண்பது, தூங்குவது அல்லது பொருட்கள் வாங்குவது போன்று ஏதாவது செய்து வருகிறேன். |  |  |  |  |
| 48. ‘இது உண்மையல்ல’ என எனக்கே நான் சொல்லிக்கொள்கிறேன். |  |  |  |  |
| 49.இவ்வாறு நடந்துவிட்டதாக நம்ப மறுத்து வருகிறேன். |  |  |  |  |
| 50. மனக்கசப்பான எண்ணங்கள் விலக எதாவது சொல்லி வருகிறேன். |  |  |  |  |
| 51. எனது எதிர்மறை உணர்ச்சிகளை வெளிப்படுத்தி வருகிறேன். |  |  |  |  |
| 52. என் நிலைமை பற்றி நான் நன்முறையில் எண்ணிக்கொள்ள மது அல்லது போதை மருந்து பயன்படுத்தி வருகிறேன். |  |  |  |  |
| 53. மது அல்லது போதை மருந்து உதவி கொண்டு இந்நிலைமையை தாண்டிச்செல்ல முற்படுகிறேன். |  |  |  |  |
| 54. இந்நிலைமையை எதிர்கொள்ள முடியாமல்கைவிட்டு வருகிறேன். |  |  |  |  |
| 55. சமாளிப்பு முயற்சி செய்வதை கைவிட்டு வருகிறேன். |  |  |  |  |
| 56. என்னை நானே கடிந்து கொண்டு வருகிறேன். |  |  |  |  |
| 57. நடந்தவற்றிற்கெல்லாம் என் மீது நானே பழி போட்டு வருகிறேன். |  |  |  |  |
|  | இல்லவே இல்லை | சிறிதளவு | நடுத்தர அளவு | அதிக அளவு |

**வாய் நலம் சார்ந்த வாழ்க்கைத் தரம் –**

தங்களது தற்போதைய வாய்நல நிலைமை தங்களுடைய வாழ்க்கைத் தரத்தின் மீது எவ்வளவு தாக்கம் ஏற்படுத்தியுள்ளது என்பதை அறிய விரும்புகிறோம். பின்வரும் கேள்விகளை கவனமாகப் படித்து தங்களுடைய தற்போதைய நிலைமைக்கு உகந்த பதிலை 🗹 செய்யவும்

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | எப்போழுதும் இல்லை | கிட்டத்தட்ட எப்போழுதும் இல்லை | சில நேரங்களில் | சற்று அடிக்கடி | அடிக்கடி |
| 58. தங்களுடைய பற்கள், வாய் அல்லது பல் கட்டமைப்பு (பல்-செட்) இவற்றில் உள்ள பிரச்சனைகளால் உணவை மெல்லுவதில் சிரமங்கள் உள்ளனவா? |  |  |  |  |  |
| 59. தங்களுடைய பற்கள் அல்லது பல் கட்டமைப்பு (பல்-செட்) இவற்றில் உணவுப்பொருள் சிக்குகின்றனவா? |  |  |  |  |  |
| 60. தங்களுடைய பல் கட்டமைப்பு (பல்-செட்) வாயில் ஒழுங்காக பொருந்தாது இருப்பதாக எப்பொழுதாவது உணர்ந்தீர்களா? |  |  |  |  |  |
| 61. தங்களுடைய வாயில் ஏதேனும் வலி உள்ளதாக எப்பொழுதாவது உணர்ந்தீர்களா? |  |  |  |  |  |
| 62. தங்களுடைய பற்களில் உள்ள தொந்தரவுகளால், உணவு உட்கொள்ள எப்பொழுதாவது சிரமப்பட்டுள்ளீர்களா? |  |  |  |  |  |
| 63. தங்களுடைய வாயில், எரிச்சல்ப்புண் எப்பொழுதாவது ஏற்பட்டுள்ளதா? |  |  |  |  |  |
| 64. அசௌகரியமான பல் கட்டமைப்பு (பல்-செட்) எப்பொழுதாவது அணிந்துள்ளீர்களா? |  |  |  |  |  |
| 65. பற்கள் சார்ந்த தொந்தரவுகளால் எப்பொழுதாவது கவலைப்பட்டுளீர்களா? |  |  |  |  |  |
| 66. தங்களுடைய பற்கள், வாய் அல்லது பல் கட்டமைப்பு (பல்-செட்) இவற்றால் அதீத தன்னுணர்வுடன் இருந்துள்ளீர்களா? |  |  |  |  |  |
| 67. தங்களுடைய பற்கள், வாய் அல்லது பல் கட்டமைப்பு (பல்-செட்) இவற்றால் சில உணவு வகைகளை தவிர்க்க வேண்டிய நிர்பந்தம் எப்பொழுதாவது ஏற்பட்டுள்ளதா? |  |  |  |  |  |
| 68. தங்களுடைய பல் கட்டமைப்பால் (பல்-செட்) எப்பொழுதாவது உணவு உட்கொள்ள முடியாமல் போனதுண்டா? |  |  |  |  |  |
| 69. தங்களுடைய பற்கள், வாய் அல்லது பல் கட்டமைப்பு (பல்-செட்) இவற்றால் உணவு உட்கொள்ளும் போது தடங்கல் ஏற்பட்டுள்ளதா? |  |  |  |  |  |
| 70. தங்களுடைய பற்கள், வாய் அல்லது பல் கட்டமைப்பு (பல்-செட்) இவற்றால் எப்பொழுதாவது சலனம் அடைந்துள்ளீர்களா? |  |  |  |  |  |
| 71. தங்களுடைய பற்கள், வாய் அல்லது பல் கட்டமைப்பு (பல்-செட்) இவற்றால் எப்பொழுதாவது சங்கடம் அடைந்துள்ளீர்களா? |  |  |  |  |  |
| 72. தங்களுடைய பற்கள், வாய் அல்லது பல் கட்டமைப்பு (பல்-செட்) இவற்றால் எப்பொழுதாவது வெளியில் செல்வதை தவிர்த்துள்ளீர்களா? |  |  |  |  |  |
| 73. தங்களுடைய பற்கள், வாய் அல்லது பல் கட்டமைப்பு (பல்-செட்) இவற்றில் உள்ள தொந்தரவுகளால் தங்களுடைய வாழ்க்கைத் துணையுடன் அல்லது குடும்பத்தாருடன் குறைவான சகிப்புதன்மையுடன் நடந்துள்ளீர்களா? |  |  |  |  |  |
| 74. தங்களுடைய பற்கள், வாய் அல்லது பல் கட்டமைப்பு (பல்-செட்) இவற்றால் மற்றவர்ககளுக்கு எப்பொழுதாவது ஓர் உறுத்தலாக இருந்துள்ளீர்களா? |  |  |  |  |  |
| 75. தங்களுடைய பற்கள், வாய் அல்லது பல் கட்டமைப்பு (பல்-செட்) இவற்றால் மற்றவர்களின் சகவாசத்தை தங்களால் அவ்வளவாக அனுபவிக்க முடியாமல் போனதுண்டா? |  |  |  |  |  |
| 76. தங்களுடைய பற்கள், வாய் அல்லது பல் கட்டமைப்பு (பல்-செட்) இவற்றில் உள்ள தொந்தரவுகளால், வாழ்க்கை பொதுவாகவே சற்று குறைந்து திருப்தியளிப்பதாக எப்பொழுதாவது உணர்ந்துள்ளீர்களா? |  |  |  |  |  |
|  | **எப்போழுதும் இல்லை** | **கிட்டத்தட்ட எப்போழுதும் இல்லை** | **சில நேரங்களில்** | **சற்று அடிக்கடி** | **அடிக்கடி** |

**செயற்கைப் பற்கட்டமைப்பின் முலம் ஏற்படும் மனநிறைவு**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0 | 1 | 2 | 3 | 4 |
|  | முழு மனநிறைவு |  |  |  | முழு அதிருப்தி |
| 77. உணவு உண்பதன் மூலம் கிடைக்கும் மனமகிழ்ச்சி தற்பொழுதைய நிலைக்கும் இயற்கைப் பற்கள் இருந்தபோது உள்ள நிலையையும் ஒப்பிட்டுப் பார்க்கையில்எவ்வாறு உணருகிறீர்கள்? |  |  |  |  |  |
| 78 .மெல்லும் திறனைப் பொறுத்தவரை தங்கள் பல் கட்டமைப்பின் மீது எவ்வளவு மனநிறைவு அடைந்துள்ளீர்கள்? |  |  |  |  |  |
| 79. தோற்றத்தினைப் பொறுத்தவரை பல் கட்டமைப்பின் மீது எவ்வளவு மனநிறைவு அடைந்துள்ளீர்கள்? |  |  |  |  |  |
| 80. செளகரியத்தைப் பொறுத்தவரை பல் கட்டமைப்பின் மீது எவ்வளவு மனநிறைவு அடைந்துள்ளீர்கள்? |  |  |  |  |  |
| 81. சுய-உறுதி மற்றும் சுய-உணர்வுடன் இருப்பதைப் பொறுத்தவரை பல் கட்டமைப்பின் மீது எவ்வளவு மனநிறைவு அடைந்துள்ளீர்கள்? |  |  |  |  |  |
| 82. தங்களுடைய சமூக மற்றும் பாச உறவுகளைப் பொறுத்தவரை, வாய்நல நிலைமையால் எவ்வளவு மனநிறைவு அடைந்துள்ளீர்கள்? |  |  |  |  |  |
| 83. தங்களுடைய தொழில் செயல்திறனைப் பொறுத்தவரை, வாய்நல நிலைமையால் எவ்வளவு மனநிறைவு அடைந்துள்ளீர்கள்? |  |  |  |  |  |
| 84. உணவு உண்பதைப் பொறுத்தவரை பல் கட்டமைப்பின் மீது எவ்வளவு மனநிறைவு அடைந்துள்ளீர்கள்? |  |  |  |  |  |
| 85. தங்களுடைய புன்னகையைப் பொறுத்தவரை மனநிறைவு அடைந்துள்ளீர்களளா (அழகு)? |  |  |  |  |  |

தங்களுடைய செயற்கைப் பல் கட்டமைப்பால் (பல்-செட்) எவ்வளவு மனநிறைவு அடைந்துள்ளீர்கள் என அறிய விரும்புகிறோம். பின்வரும் கேள்விகளை கவனமாகப் படித்து தங்களுடைய தற்போதைய நிலைக்கேற்ப விளக்கிடும், மதிப்பிடும் பதிலினை 🗹 செய்யவும்

**85.** **லீக்-இன் மெல்லும் திறன் பற்றிய அகவரிசை**

பின்வரும் உணவுப் பட்டியலில் உங்களால் எளிதாக மென்று உண்ணக்கூடிய கடினமான உணவினை குறிப்பிடவும். **ஒரே ஒரு பதிலை மட்டும் குறியிடவும்.**

|  |  |  |
| --- | --- | --- |
| உணவு வகை |  |  |
| எதுவும் இல்லை | 0 |  |
| அவித்த காய்கறிகள் (சமைத்த சாதம், இட்லி) | 1 |  |
| பச்சைக்காய்கறிக் கலவை (முட்டைக்கோசு, கீரைகள்) | 2 |  |
| பச்சைக் காரட் அல்லது சிவரிக்கீரை (முள்ளங்கி) | 3 |  |
| வருத்த இறைச்சித் துண்டு | 4 |  |
| முழு ஆப்பிள் | 5 |  |

## Appendix G-Recoded Data

### Demographic data

|  |  |  |
| --- | --- | --- |
| **Participants** | **n** | **%** |
|  |  |  |
| **Age (Median split)** |  |  |
| 18-58 | 104 | 51.7 |
| 59 & above | 97 | 48.3 |
|  |  |  |
| **Marital status** |  |  |
| Married with living partner | 148 | 73.6 |
| Single/ separated or divorced /widowed | 53 | 26.4 |
|  |  |  |
| **Monthly income in (₹) rupees (1 rupee = £0.01)** |  |  |
| Upto 4555 | 109 | 54.2 |
| 4556 and above | 92 | 45.8 |
|  |  |  |
| **Education** |  |  |
| High school and above | 71 | 35.3 |
| School drop outs/ Illiterate | 130 | 64.7 |
|  |  |  |
| **Occupation** |  |  |
| Employed | 79 | 39.3 |
| Unemployed/retired | 122 | 60.7 |
|  |  |  |
| **Caste** |  |  |
| Forward / open category | 52 | 25.9 |
| Historically oppressed castes | 149 | 74.1 |
|  |  |  |

### 

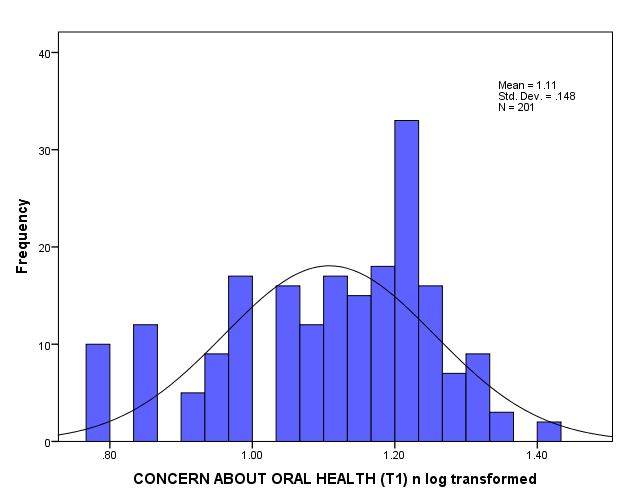
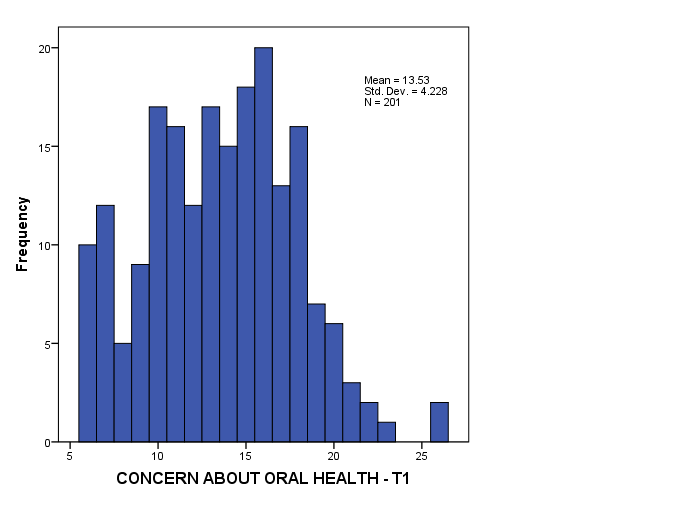
### Clinical data

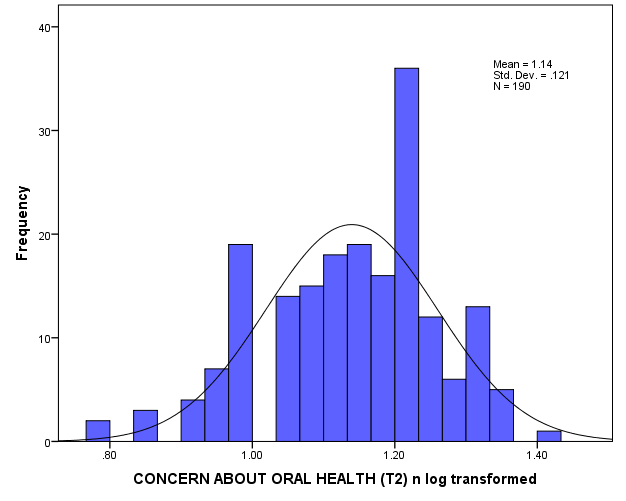
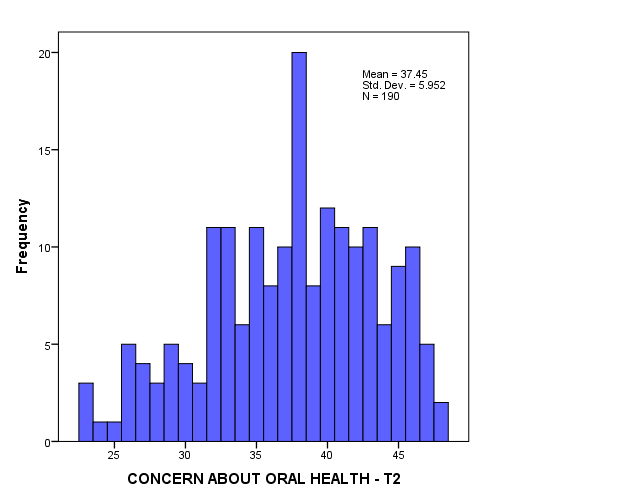
|  |  |  |
| --- | --- | --- |
| **Clinical data** | **n** | **%** |
|  |  |  |
| **Missing teeth** |  |  |
| 21 or more teeth (functional dentition) | 38 | 18.9 |
| Less than 21 teeth | 54 | 26.9 |
| No teeth present | 109 | 54.2 |
|  |  |  |
| **Occluding pairs** |  |  |
| Present | 63 | 31.3 |
| No occluding pairs | 138 | 68.7 |
|  |  |  |
|  |  |  |
| **Time since last tooth loss episode** |  |  |
| Less than 1 year | 114 | 56.7 |
| More than a year | 87 | 43.3 |
|  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Clinical data** | **Upper** | | **Lower** | |
| **n** | **%** | **n** | **%** |
|  |  |  |  |  |
| **Prosthetic status** |  |  |  |  |
| No prosthesis | 97 | 48.3 | 107 | 53.2 |
| Wearing dentures | 104 | 51.7 | 94 | 46.8 |
|  |  |  |  |  |
| **Prosthetic need** |  |  |  |  |
| Partial dentures/ none needed | 73 | 36.3 | 84 | 41.8 |
| Need for a full prosthesis | 128 | 63.7 | 117 | 58.2 |
|  |  |  |  |  |

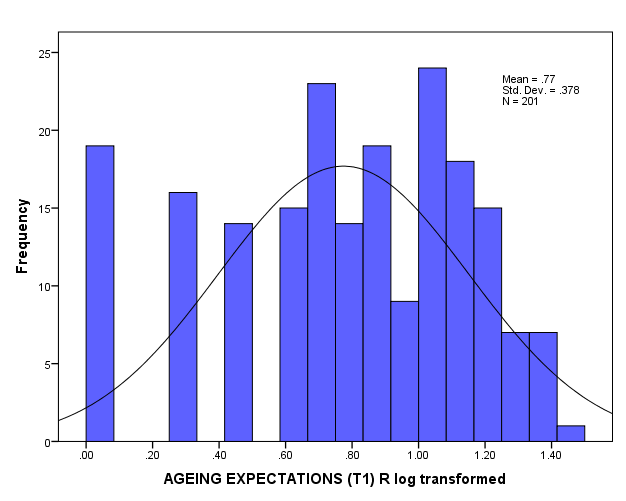
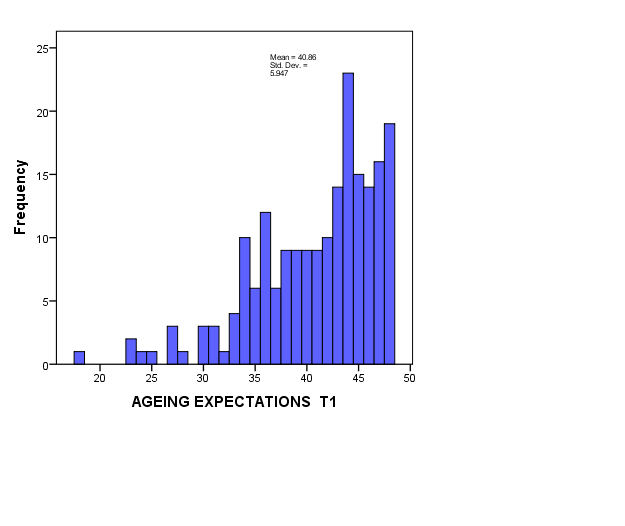
## Appendix H-Distributions before and after recoding

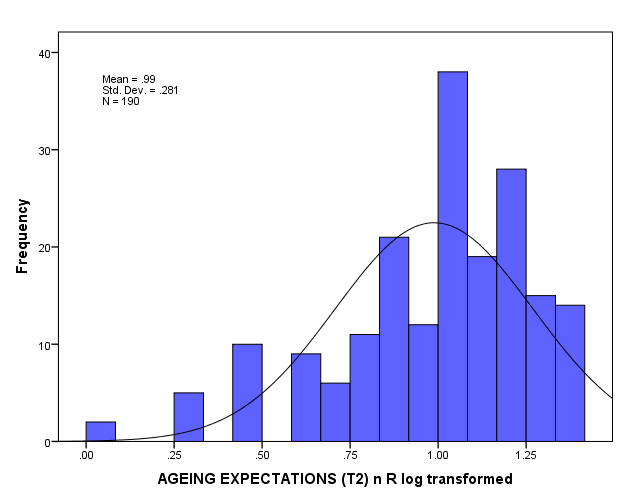
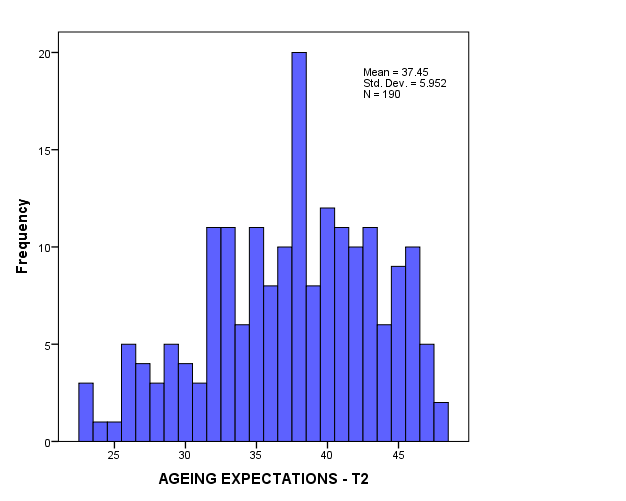
### Concern about oral health



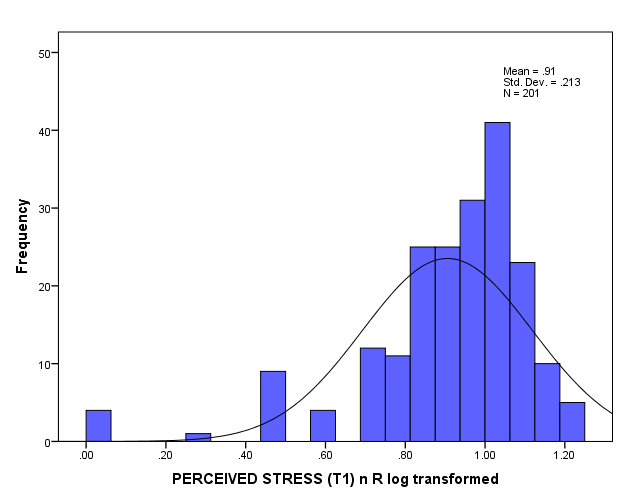
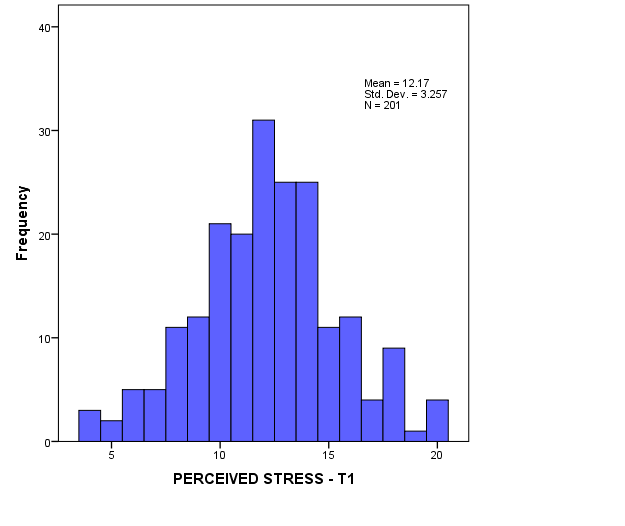


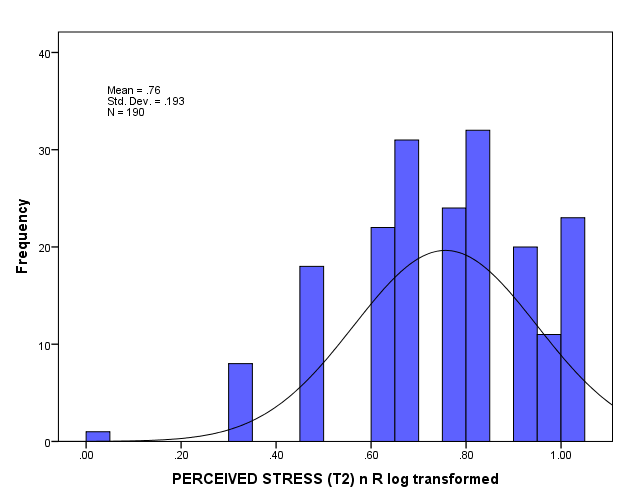
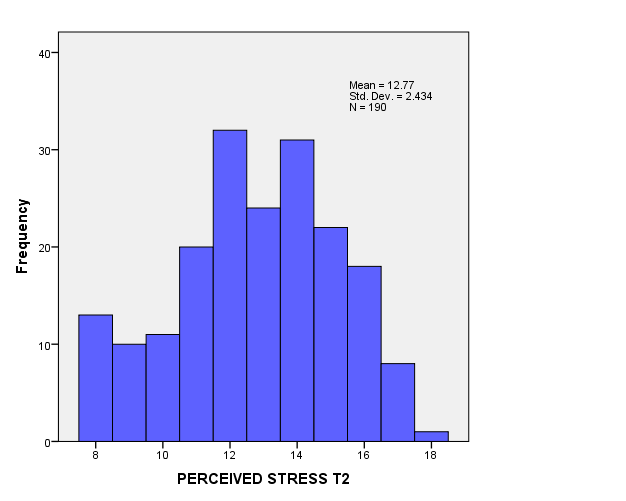
### Ageing expectations



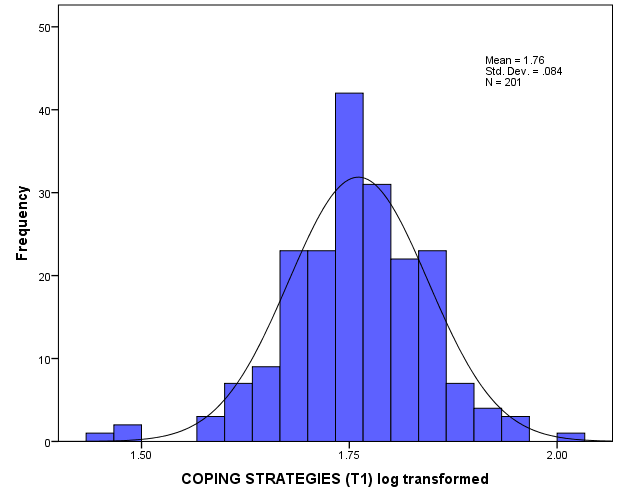
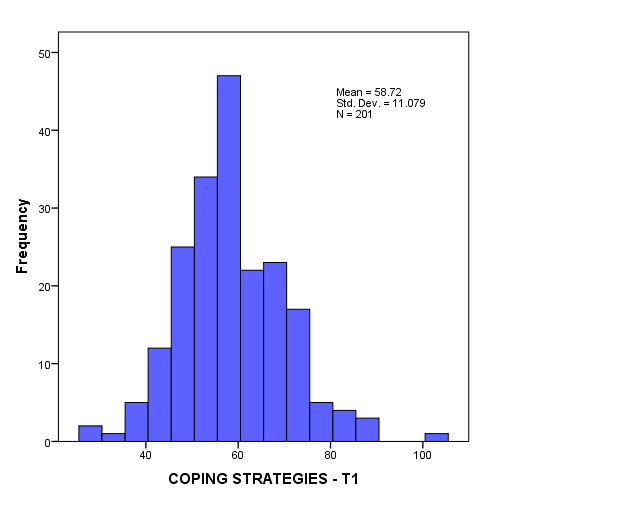


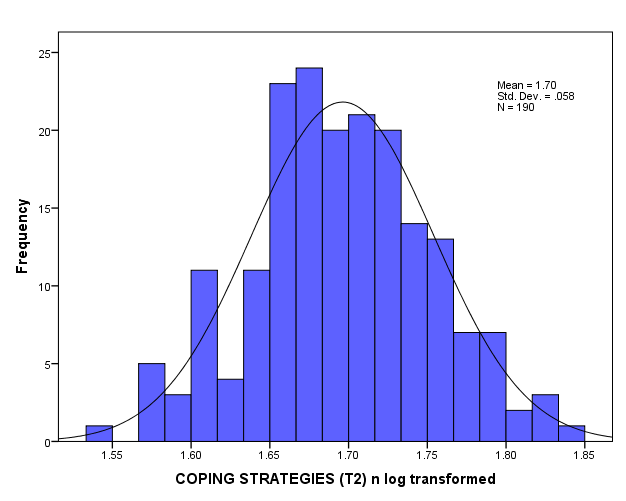
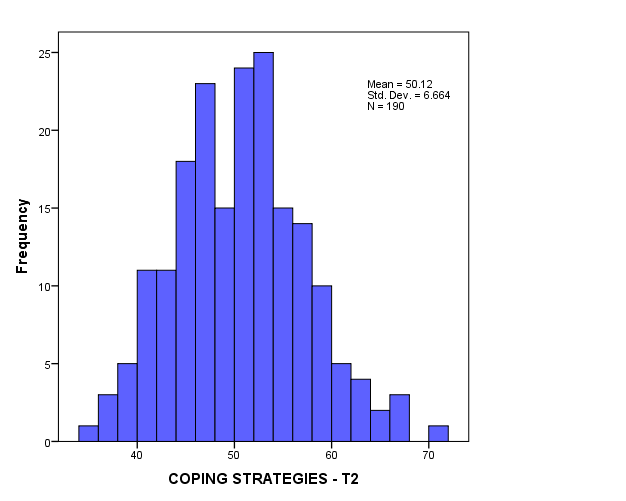
### Perceived stress



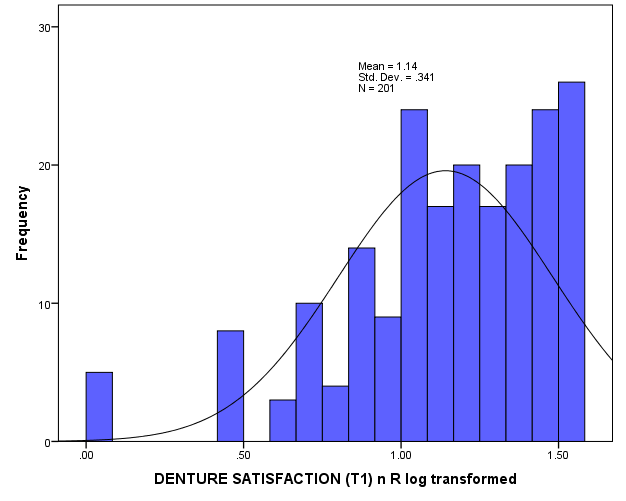
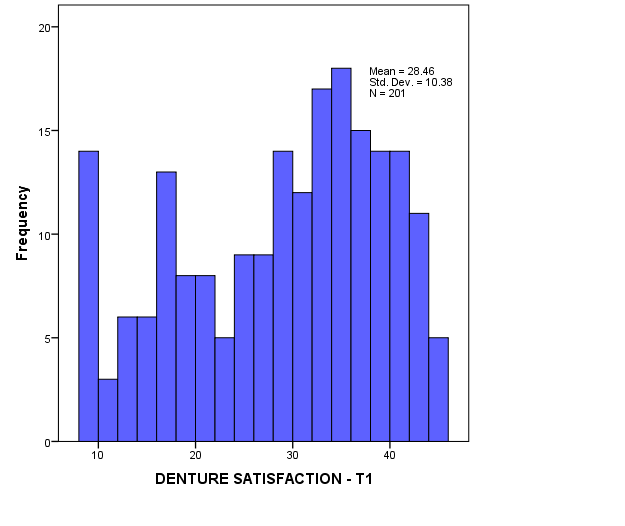


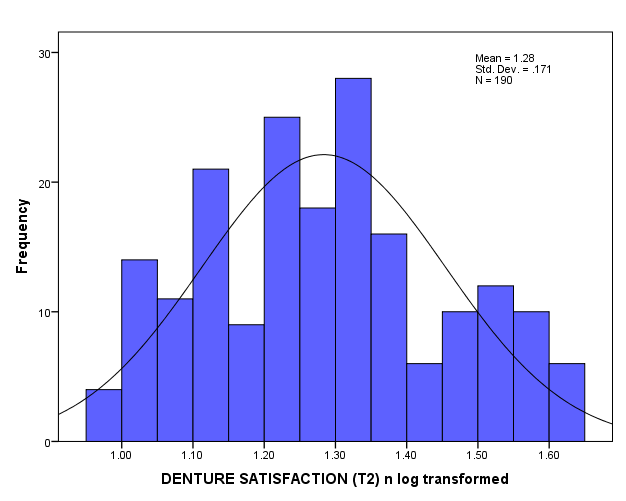
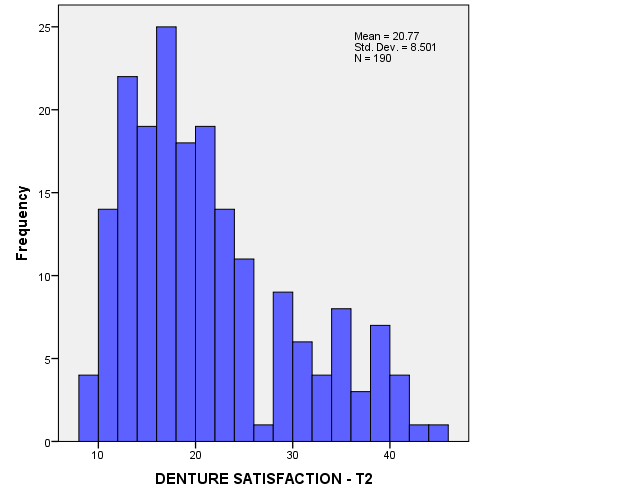
### Coping strategies



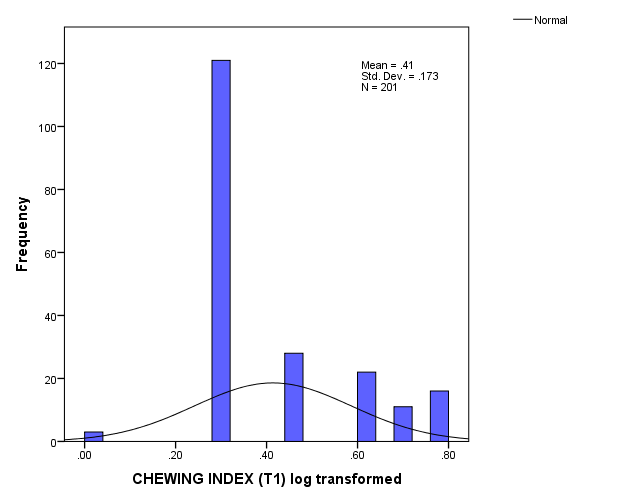
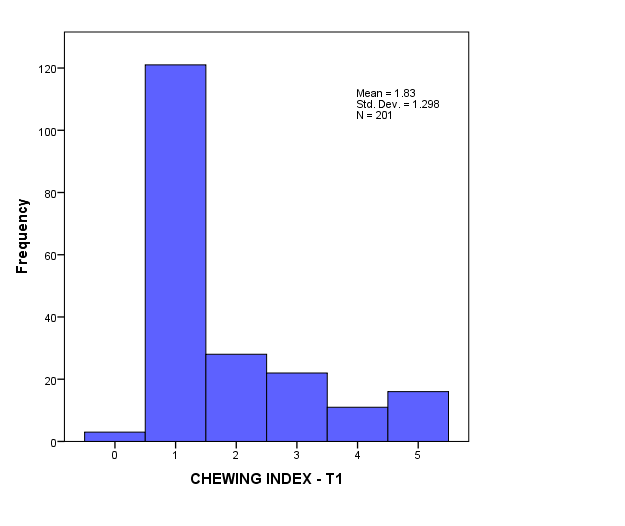


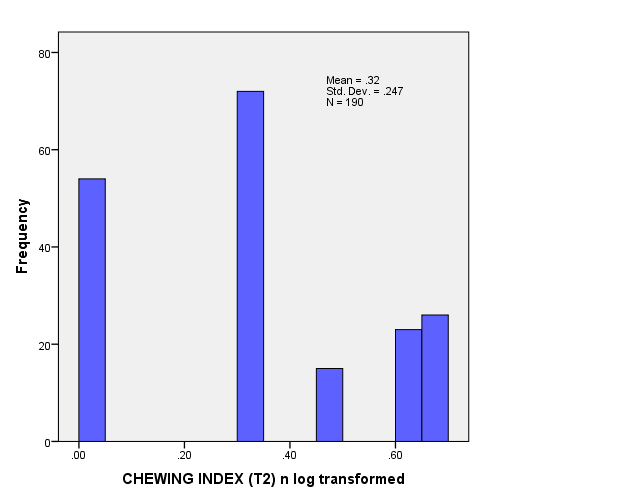
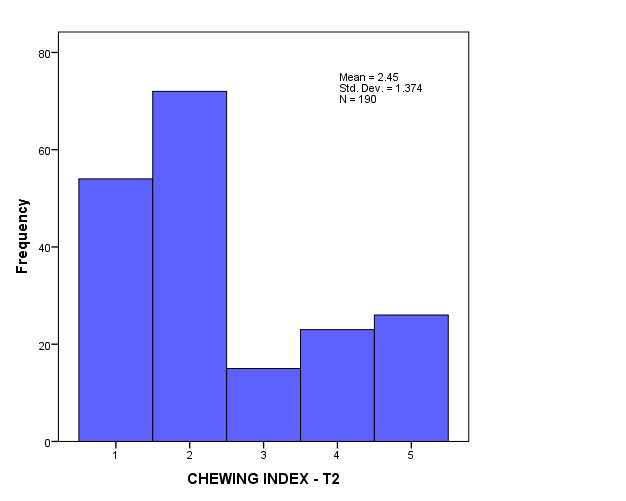
### Denture satisfaction





### Chewing index





### Oral Health related Quality of Life

