Dimensions of oral conditions and health-related quality of life among adults: a population based study

Thesis prepared for the degree of Doctor of Philosophy in Dentistry and Public Health by

Dandara Gabriela Haag

Supervisors

Prof. David Brennan

Professor
Australian Research Centre for
Population Oral Health (ARCPOH)
Adelaide Dental School
The University of Adelaide

A/Prof. Karen Peres

Associate Professor
Australian Research Centre for
Population Oral Health (ARCPOH)
Adelaide Dental School
The University of Adelaide

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Dedication

to my parents

Marli and Adalberto *(in memoriam)*

I will be forever grateful for all the times you made my dreams yours, and for your unconditional love

aos meus pais

Marli e Adalberto *(in memoriam)*

por todas as renúncias em nome dos meus sonhos, e sobretudo, pelo seu amor incondicional

Preface

This thesis reports on research related to the investigation of the relationship between oral health dimensions and health-related quality of life (HRQoL) that was carried out during my PhD candidature at the Australian Research Centre for Population Oral Health (ARCPOH), Adelaide Dental School, Adelaide, South Australia from October 2014 until May 2017.

This thesis is structured in a publication format and consists of eight chapters. Chapter 1 presents the background and literature review which develops the foundation for the study aims, which are presented in Chapter 2. Chapter 3 refers to a systematic review which covers the first specific objective of the thesis. Chapter 4 provides a description of the methodology of the population-based study on which the empirical articles were based. Chapters 5, 6 and 7 address the second, third and fourth specific objectives of the current thesis, respectively. Each chapter contains an original article, which is preceded by a short statement that links the article to the body of work. Finally, Chapter 8 presents an overall discussion of the findings in the light of the general aim of the current thesis, summarises the major conclusions and highlights the future directions in this field of research.

Abstract

Oral health is an integral part of general health and oral diseases are considered an important public health problem due to their prevalence, expense associated with treatment and their impact on individuals and societies. Over the last few decades, a paradigm shift from a Biomedical to a Bio-Psychosocial model of health stimulated the development of subjective measures of health and well-being. This idea is central to the concept of HRQoL, which encompasses individuals' evaluations of physical, psychological, and social well-being associated with their health state. Although the relationship between oral and general health has been well established by clinical and epidemiological studies, a longstanding question remains on the impacts of oral conditions on general HRQoL. This evidence can have key implications for integrating oral and general health prevention strategies to the existing knowledge on common risk factors and co-occurrence of oral and general diseases.

The general aim of the current thesis was to investigate the association between oral health dimensions and HRQoL among adults. Specific objectives were: 1) to verify if chronic oral health conditions are associated with HRQoL; 2) to estimate the association between dentition status and HRQoL; 3) to assess clustering of oral and general chronic conditions and to explore the association between the patterns of multimorbidity and HRQoL; and 4) to test a health-related quality of life conceptual model for oral health conditions.

The objectives were addressed in four papers. Paper 1 was a systematic review, and was conducted in order to address specific objective 1. Specific objectives 2, 3 and 4 were addressed through the empirical component of the thesis. Secondary analyses were performed on the data of the *EpiFloripa* study, a population based prospective study

conducted with adults (20-59 years) from Southern Brazil, in 2009 (n=1,720) and 2012 (n=1,223).

Findings presented in this thesis indicate that a negative association between oral conditions and HRQoL exists. Individuals with more teeth had better HRQoL, and a functional dention was important for individuals' HRQoL. However, there was a lack of evidence that a shortened dental arch (SDA) is negatively associated with HRQoL. Furthermore, individuals with general health conditions are more likely to also present oral health problems, and multimorbidity is negatively associated with HRQoL. Finally, our findings support Wilson and Cleary's model for HRQoL as applied to untreated dental caries. The evidence provided by the current thesis reinforces the integration of oral and general health policies, aiming at reducing the burden of oral disease and improving quality of life.

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Thesis Declaration

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name, in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name, for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree.

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Dandara Gabriela Haag
Date: 17/01/2018

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Research Outcomes

Publications arising from work contained within this thesis

The current thesis included four research articles, out of which one is published and another has been accepted for publication:

Manuscript 1 was accepted for publication in the Journal of Dental Research on the 19th of April 2017.

> HAAG, D.G., PERES, K.G., BALASUBRAMANIAN. M. & BRENNAN, D.S. 2017. Oral conditions and health-related quality of life: a systematic review.

Manuscript 2 was published in the journal Quality of Life Research on the 8th of May 2017.

> HAAG, D.G., PERES, K.G. & BRENNAN, D.S. 2017. Tooth loss and general quality of life in dentate adults: a population based study. *Qual Life Res.*

Conference presentations from work arising in this thesis

HAAG, D.G., PERES, K.G., BALASUBRAMANIAN. M. & BRENNAN, D.S. 2017. Oral conditions and health-related quality of life: a systematic review. 94th General Exhibition of the International Association for Dental Research. Seoul, Korea.

Haag DG, Peres KG, Balasubramanian M, Brennan DS. Assessing clustering of health conditions. EpiForum meeting from the 94th General Exhibition of the International Association for Dental Research. Seoul, Korea.

HAAG, D.G., PERES, K.G. & BRENNAN, D.S. Tooth loss and general quality of life in dentate adults: a population based study. 55th Annual Scientific Meeting of the IADR Australian and New Zealand Division. Dunedin, New Zealand.

Conference poster presentations

HAAG, D.G., PERES, K.G. & BRENNAN, D.S. Tooth loss and general quality of life in dentate adults: a population based study. 2015 Florey International Postgraduate Research Conference. The University of Adelaide.

HAAG, D.G., PERES, K.G., BALASUBRAMANIAN. M. & BRENNAN, D.S. Oral conditions and health-related quality of life: a systematic review. 2016 Florey International Postgraduate Research Conference. The University of Adelaide.

HAAG, D.G., PERES, K.G., GONZÉLEZ-CHICA, D.A., SILVA, D.A. & BRENNAN D.S. Clustering of chronic health conditions and health-related quality of life in adults. 2017 Florey International Postgraduate Research Conference. The University of Adelaide.

Grant proposals

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Award

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Chapter 1 Introduction

Background

It has been increasingly recognized by health policy makers that biological parameters and clinical measures of disease are insufficient indicators of health status (Engel, 1977; Greenfield and Nelson, 1992; Ware and Sherbourne, 1992; Starfield, 2001). Furthermore, increasing evidence has documented the importance of subjective experiences and interpretation of health and illness on individuals' quality of life (Feeny et al., 2013). Over the last few decades, there was broad paradigm shift from a Biomedical to a Bio-Psychosocial model of health. This paradigm shift has stimulated the development of subjective measures of health and well-being, which are known as Patient Reported Outcomes (PRO). Health-related quality of life is an important PRO that encompasses individuals' perceptions of physical, psychological, and social well-being associated with their health state (Bergner et al., 1976; Lohr, 1988; Ware and Sherbourne, 1992). In parallel to this paradigm shift, contemporary definitions of oral health, which more closely reflect the new Bio-Psychosocial framework of health have evolved. According to these new conceptualizations, oral health is seen as an inseparable part of general health, which, in turn, cannot be dissociated from the individual.

In studying oral conditions and their outcomes, two levels of analysis are possible: the 'body' level and the 'person' level, with the later reflecting a broader definition of oral health according to the Bio-Psychosocial perspective (Slade, 1997). Concerning the body level, several epidemiological and clinical studies have consistently demonstrated the biological and clinical relationships between oral and general health conditions (Petersen, 2003; Petersen, 2009). These studies support the view that oral diseases may be a risk factor for general health conditions and vice-versa. They also highlight the existence of common risk factors (Silva et al., 2013), and co-occurrence of oral and general health conditions within the same individuals (Azarpazhooh and Leake, 2006;

Nascimento et al., 2015; Kisely et al., 2015; Da Silva et al., 2017). On the other hand, subjective oral health indicators have been developed to assess the extent to which oral disorders compromise individuals perceptions of their oral health-related quality of life (OHRQoL), reflecting a subjective evaluation of oral health at the 'person' level (Slade, 1997). Nevertheless, less attention has been given to assessing the general HRQoL impacts associated with oral health status. Oral health conditions have impacts on individuals' appearance, food choice and social interactions (Sheiham, 2005). These impacts may affect different dimensions of life, which are not restricted to oral health perceptions, such as general physical and psychological health, as well as feelings of social well-being. For this reason, evaluating the association between oral health conditions and general HRQoL may require investigation of different domains of knowledge for a broader understanding of the impact of oral health dimensions on HRQoL.

Literature Review

The concept of health

Different conceptual models have been proposed to define health over time, and although it appears to be an intuitive process, defining health may be an abstract and complex task. In recent years, there was a paradigm shift in health-related thinking from a Biomedical to a Bio-Psychosocial perspective. The old paradigm defined health as the absence of disease or disability. On the other hand, the new perspective adopts a more holistic definition of health, taking into account the social determinants and individual's subjective experiences in relation to health (Engel, 1977; Engel, 1980; Engel, 1981). Consequently, measures of health and disease have changed over time to reflect this new subjective paradigm. This idea is key to the concept of HRQoL, which reflects an individual's subjective perception of the impacts associated to the health state (Bowling, 2001; Greenfield and Nelson, 1992).

The objective of this chapter is to describe the different conceptualizations of health according to the Biomedical and Bio-Psychosocial theoretical frameworks. A historical perspective of these frameworks will enable an understanding of how the conceptualisation of health has evolved to improve health status assessments over time, enhancing the importance of HRQoL from a research, policy and clinical perspective. In addition, this chapter presents a discussion of HRQoL measurements in the context of oral health, together with the rationale for the current thesis.

The Biomedical model of health

The Biomedical model is the oldest and most widely adopted conceptualization of health in the Western world. According to this model, health is defined as the absence of disease or disability, being entirely dependent on the biological processes that occur

within the body (Hewa and Hetherington, 1995). As a consequence, the body is disconnected from the person, and individuals' subjective experiences in relation to health are disregarded. The historical and philosophical roots of the Biomedical model of health started to be drawn with the embrace of scientific reason in antiquity, but it was only with the development of the scientific method in the Renaissance period (14th to 17th centuries) that this model gained a more solid conceptualization (Larson, 1999).

There were important periods in history when philosophical paradigm shifts influenced the way health and disease were conceptualized. The embrace of reason *(logos)* by Greek philosophers in antiquity is one of these moments, with the first systematic evidence about the concepts of health and disease dating from the 3rd and 5th century B.C. Before this period, health and disease were associated with gifts/ punishments by the gods due to deviations in religious morality. An increase in population size and formation of the *polis* or Greek city-state in the 6th, 7th and 8th century B.C. created a new demand for resources, stimulating ancient Greek philosophers the develop a more rational perspective to solve problems. This approach was intensively stimulated by the Aristotelian Natural Philosophy, also called as 'Scientific Thinking', which began to challenge the traditional and religious-driven understanding about the world's dynamics. Hippocrates (460-377 B.C.) was the one who merged the evolving scientific driven conception about nature's phenomena with the traditional definitions of health and disease, encouraging it to become more reason oriented (Clarke, 2004).

Hippocrates's writings proposed a systematic description of diseases, symptoms and patient's clinical histories by adopting an observational and experimental perspective. According to him, health status was determined by four humours (blood, phlegm, black bile, and yellow bile) from four organs in the body (heart, brain, liver, and spleen), and sickness was a result of an imbalance in any of the four humours (Serafino,

2005). Although Hippocrates's thoughts were clearly driven by reason, medical practices in line with this perspective began to be adopted only during the Renaissance period. Very few scientific advances were made in the meanwhile, when science was still considered by the church an instrument of evil for challenging religious explanations for nature's phenomena. The subsequent development of the scientific method by key philosophers and other personalities in the Renaissance period was responsible for a health paradigm shift at that time (Larson, 1999).

Francis Bacon (1571-1626) was one of the first to encourage the dissociation between science and evil. He proposed that science was not an instrument of evil, but instead, an instrument of god that could be used to solve problems (Smith, 2002). He stated that the observation and experimentation of new possibilities could be useful for human beings, enhancing the cause of science and dissociating it from evil (Gemelli, 2012). Significant advances in medical sciences were motivated by Bacon's ideas, with several physiological mechanisms of the human body being established during this period. Even though the benefits of science started to be acknowledged, the scientific method was still exposed to religious morality, and the influence of god was seen as the main explanation for nature's phenomena. In medical sciences, for example, the pump function of the heart was discovered through scientific experiments, but the soul were believed to cause the pulsing.

In the same period, René Descartes (1596-1657) challenged the idea that the body functions were promoted by god and argued, instead, that they had mathematical explanations, and were independent of the soul/mind. This distinction was known as the Cartesian Dualistic philosophy, which is considered the basis of the Biomedical model of health (Descartes, 1969). According to Descartes' perspective, the human body was disconnected from the soul, and while the body functioned by one set of mechanisms, the

soul functioned by completely different principles. Therefore, the body's integrity was no longer a religious matter, allowing for great advances in the fields of anatomy and physiology. Additionally, the Cartesian Dualistic philosophy proposed that the human body was structured similarly to a machine, and the study of the small parts could provide an entire understanding of the body. In other words, Descartes created a mechanical framework where the whole is understood as the sum of many small parts (Descartes, 1969).

The reductionist focus of the Cartesian Dualistic philosophy allowed for the accurate technical description of different systems in the body. In this sense, the Biomedical model of health has promoted unquestionable advances in medical sciences, stimulating the development of techniques that increased the knowledge about cells, tissues, organs and biological causes of diseases (Havelka et al., 2009). Understanding the physiopathology of certain somatic disorders allowed for the development of treatments that could be used to prevent and treat them. The Cartesian Dualistic philosophy prevailed over the following centuries, and advances such as the development of the germ theory by Louis Pasteur (1822–1895) and Robert Koch (1843–1910) contributed to the idea that biological processes were key for the maintenance of health. Consistent with this, the World Health Organization (WHO) defined health in 1958 as the "absence of disease".

The need for a more comprehensive model of health

Although the Biomedical model of health has contributed to significative advances in medical sciences, fundamental issues have arisen from this model over time (Havelka et al., 2009). First, while the Biomedical model of health was demonstrated to a certain extent to be efficient in the control of infectious diseases- a major concern in the 19th and early 20th centuries, its dualistic approach failed to handle the increasing

prevalence of non-communicable chronic diseases (NCDs) in the following years. Second, the need for a broader model of health has also emerged from the fact that individuals with identical exams and laboratory tests can present completely different courses of diseases, challenging the idea that biological factors are able to provide a comprehensive diagnosis. Not only biological factors, but also whether the individual perceives him/herself sick or considers the need for medical assistance to function in daily life may also influence the course of diseases and treatments. Therefore, apart from biological factors, a new health paradigm should be developed in order to incorporate individual's subjective experiences and interpretations of health and illness.

Increasing scientific evidence from epidemiological studies in the final decades of the 20th century substantiated the need for a new health paradigm. Observational studies started to show that the determinants for diseases have multidimensional natures, including social, behavioural, psychological and environmental roots (Gerhardt, 1989), which are completely neglected by the Biomedical model's reductionist/Cartesian approach. One of the key principles of the Biomedical model of health is that each disease has a specific biological aetiology, which does not satisfy the aetiological characteristics of multiple conditions. While potentially identifiable agents are key for causing infectious diseases, multiple risk factors and their simultaneous occurrence contribute to the development of NCDs. Consequently, the subsequent prevention and treatment strategies involved in the management of these conditions are essentially different. In this regard, extensive vaccination programs could not control multidimensional determinants of diseases, nor could exclusively organ-oriented therapeutic methods be used to treat chronic conditions. Therefore, the Biomedical model became extremely inefficient and narrow in handling a scenario where diseases with more complex aetiological factors evolved as the major concern.

The Bio-Psychosocial model of health

Emerging evidence on the multidimensional determinants of health and on the predictive value of patients' perception of their own health status influenced the way health was conceptualized in the end of the 20th century and a holistic model of health began to be defined on a more solid basis.

The psychiatrist George Engel, together with other researchers and clinicians from the University of Rochester, started to point out some of the limitations of the Biomedical model of health, addressing the need for a broader perspective beyond the biological determinants of health. Engel published a classic series of papers where he provided clinical evidence substantiating the need for a more holistic model of health (Engel, 1977; Engel, 1980; Engel, 1981). The central point of Engel's framework was the fundamental distinction between health and disease. He explored the idea that one can be ill without necessarily having a disease, and one can have a disease without being ill. In addition, one can perceive symptoms without necessarily having a disease. According to Engel's perspective, disease does not necessarily result in poor health, and biological processes may not be the only cause of diseases. At the same time that he recognized the advances promoted by the Biomedical model of health, Engel pointed out some key limitations of such perspective:

> "The merit of such an approach (Biomedical) needs no argument. What do require scrutiny are the distortions introduced by the reductionist tendency to regard the specific disease as adequately, if not best, characterized in terms of the smallest isolable component having causal implications, for example, the biochemical; or even more critical, is the contention that the

> designation “disease” does not apply in the absence of perturbations at the biochemical level” (Engel, 1977).

The new model of health proposed by Engel was named the Bio-Psychosocial model of health. According to the Oxford English Dictionary, ‘psychosocial’ is defined as ‘pertaining to the influence of social factors on an individual’s mind or behaviour, and to the interrelation of behavioural and social factors’. The model’s novelty can be summarized in two central ideas in line with an individual-centred perspective. First, from a philosophical point of view, this model offers an alternative way of understanding how multiple factors, including social, psychological and biological levels of organization, and their interaction may impact on individuals’ health status. Second, and from a clinical perspective, patient’s subjective experience in relation to health are understood as an essential contributor to an accurate diagnosis and establishment of a treatment plan (Engel, 1977).

Since its introduction in the 1970’s, the Bio-Psychosocial model of health began to be adopted within health sciences research and as a guide for public health strategies, although there are limited examples of it’s application in clinical practice (Havelka et al., 2009). This culminated with the development of subjective and patient-centred health status and well-being measures to be used alongside clinical indicators of diseases. Over the last thirty years, continuing evidence has supported the importance of more holistic health status assessments that are not restricted to the body, but focused, instead, on the person.

The concept of oral health

Traditionally, oral health has been conceptualized separately from general health, which, in turn, has been disconnected from the individual (Slade, 1997; Sheiham, 2005).

This is in accordance with the Descartes's Cartesian Dualistic approach, where the body is compared to a machine and its structures can be studied separately (Descartes, 1969). But the changes in the philosophical paradigms of health also influenced the way oral health has been defined over time, and most importantly- the way oral health has been assessed to accommodate these paradigms shifts (Slade, 1997).

In early 90's, oral health conceptualizations that were not restricted to the biological processes that occur within the oral cavity started to evolve. In 1993 Yewe-Dwyer defined oral health as:

> "A state of the mouth and associated structures where disease is contained, future disease is inhibited, the occlusion is sufficient to masticate food and the teeth are of a socially acceptable appearance" (Yewe-Dwyer, 1993).

Although this definition is more related to the Bio-Psychosocial model of health, it is still focused on biological parameters of oral health. In the same year, another conceptualization, and more connected to the Bio-Psychosocial model of health, was proposed by Dolan: "Oral health is a comfortable and functional dentition which allows individuals to continue in their desired social role" (Dolan, 1993). This definition not only connects oral health with general health in stating the functional consequences of oral conditions on activities of daily living, but also to the individual itself through the social role importance attributed to oral health (Slade, 1997).

The most updated definition of oral health was proposed in 2016 by the World Dental Federation- FDI's Vision 2020 Think Tank, which is composed by experts in oral health, public health and health economics (Glick et al., 2016; Lee et al., 2017). As defined by FDI:

> “ Oral health is multi-faceted and includes the ability to speak, smile, smell, taste, touch, chew, swallow and convey a range of emotions through facial expressions with confidence and without pain, discomfort and disease of the craniofacial complex; Is a fundamental component of health and physical and mental wellbeing; It exists along a continuum influenced by the values and attitudes of individuals and communities; Reflects the physiological, social and psychological attributes that are essential to the quality of life; Is influenced by the individual’s changing experiences, perceptions, expectations and ability to adapt to circumstances.”

It is possible to notice that this conceptualization is multidimensional and emphasizes that oral health does not occur in isolation, but is part of the wider framework of overall health. Furthermore, by enhancing the individual’s experiences, perceptions, psychological attributes and values, it corroborates with the Bio-Psychosocial model of health in shifting the focus from the disease to the individual as a whole (Glick et al., 2016). According to the FDI, this definition was created as an attempt of providing a theoretical framework to the conceptualization of oral health in order to guide its assessment and evaluation. In this sense, the implications of the Bio-Psychosocial model of health were not restricted to the conceptualization of oral health, but also influenced its assessment. Furthermore, increasing evidence has shown that preventive strategies and treatment outcomes are dependent upon individuals’ health self-perception of the consequences enhancing the need for a more holistic paradigm in assessing oral health (Menec et al., 1999; Lee et al., 2017).

Clinical oral health measures, such as the number of Decayed, Missing and Filled teeth (DMFT index) and the Community Periodontal Index of Treatment Needs (CPITN) have been largely adopted to assess oral health status. These indicators reflect the biological processes that occur within the oral cavity. While they may be useful tools to assess oral health status from a Biomedical perspective, they are unable to establish the functional and social impairments associated with oral conditions from an individual perspective. The Bio-Psychosocial model of health has provided a theoretical rationale for the development of measures that are able to capture the subjective dimensions of oral health. Over the last three decades, subjective oral health indicators have been developed to assess individuals' perception of their oral health above and beyond a clinician's opinion of successful treatment and impact of disease, and there is now a substantial body of research documenting the self-perceived oral health impacts on quality of life (Leao and Sheiham, 1995; Slade and Spencer, 1994; Tsakos et al., 2012).

The concept of quality of life

The term quality of life began to be adopted in the 20th century after the Second World War (Meeberg, 1993). Since then, several definitions of quality of life have been proposed according to the wide range of contexts in which this concept is applied. In a health sciences context, the Centre for Health Promotion at the University of Toronto defined: "quality of life is concerned with the degree to which a person enjoys the important possibilities of life". According to the WHO, quality of life is defined as "individual's perceptions 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" (WHO, 1995).

The concept of quality of life is subjective and multidimensional. Quality of life is subjective because it is highly influenced by personality traits, suggesting that this concept is only meaningful at a personal level. In this sense, cultural aspects, values, and spiritual dimension may also influence individuals' quality of life. Additionally, although health status is one of the important facets of quality of life, there are other dimensions, such as psychological state, social relationships, environment, housing and education, which may play a role in determining general well-being. The multidimensional nature associated with quality of life makes it complex to define and measure this concept (Testa and Simonson, 1996).

Besides the multidimensional characteristics of quality of life, the subjective nature of this concept makes it even harder to assess quality of life. Subjectiveness is related to the importance that people place on different aspects of their lives, which must always come from the individuals' perspective. In this regard, a semantic distinction can be noticed among three related concepts: information on health status, elements of health status that people usually value, and people's evaluation of their subjective experience of living. Quality of life refers to the third concept (WHO, 1995). For example, it is possible to formulate different questions when asking someone about their sleep: How many hours did you sleep last night? (information about health status/functioning); How well do you sleep? (global evaluation of health status/functioning) and: How satisfied are you with your sleep? (highly personalized evaluations of health status/functioning). Although information about health status and functioning (represented by the number of hours slept a day) is important, it does not capture the individual evaluation associated with this event. Nor do global evaluations of functioning, since they do not establish the meaning of these events on individuals' lives according to their own perspectives. Therefore, the measurement of quality of life involves subjective evaluations of

individual and multidimensional phenomena, respecting individuals' interpretations of their lives (WHO, 1995).

Quality of life became a meaningful outcome of health conditions in the context of the Bio-Psychosocial model, according to which, health is also seen as a multidimensional and subjective phenomenon (Engel, 1977). In this sense, the concept of quality of life, rather than being a description of individuals' health status, relates to the way individuals perceive their health status and other aspects of their lives. Since overall quality of life refers not only to health-related factors, such as physical and psychological well being, but also to non-health-related factors, such as jobs and social support, the development of a narrower definition of quality of life in relation to health was stimulated, and is known as HRQoL (Feeny et al., 2013).

Relationship between health and quality of life

The concept of HRQoL encompasses individuals' perceptions of their physical, psychological, and social well-being associated with their health state. In this sense, HRQoL is clearly a multidimensional construct, representing an evaluation of quality of life and its relationship with health (Lohr, 1988; Bergner et al., 1976; Ware and Sherbourne, 1992). This concept was embraced as an attempt of distinguishing the new multidimensional conceptualisation of health from the Biomedical definition. Some authors use the terms HRQoL, health status and functional status interchangeably, while others provide distinct conceptualizations (Feeny et al., 2013). In this regard, health status is defined as a person's current state of health, including physical status, morbidity, physiologic outcomes, and some notion of well-being. Functional status is defined as the physical, psychological and social impairments associated with health conditions (Starfield, 2001), whereas HRQoL translates the importance of these on individuals' well-being according to their own perspective (Feeny et al., 2013).

Health-related quality of life is also referred to as a Patient Reported Outcome (PRO). The Food and Drug Administration (FDA) introduced the concept of PRO as referring to any information reported by the individual that has not been interpreted by an independent observer. In this sense, PROs cover outcomes ranging from simple one-dimensional symptom scales to complex multidimensional constructs, such as the concept of HRQoL. The development of PROs was based on the fact that changes in physical assessments may not always be related to benefits as perceived by the individual. Since PROs are based on the individuals' perspective, they are able to add another dimension to the understanding of impacts of health conditions and response to treatments, which may not be captured by physiologic or clinical assessments alone. Therefore, PROs, including HRQoL assessments, are able to capture the individuals' perceptions of their health state, which cannot be assessed by other physical measures.

The applicability of HRQoL is acknowledged in different scenarios, and a variety of HRQoL instruments, generic and disease-specific, with distinct purposes have been applied in the fields of research, clinical practice and policy making. Additionally, several theoretical models have been proposed to explain the relationship between clinical conditions and HRQoL.

Applicability of HRQoL assessments

Health-related quality of life assessments are useful in the fields of research, clinical practice and policy making. From a research perspective, these instruments can be adopted to assess HRQoL in clinical and epidemiological studies in order to assess the impacts associated with health conditions on individual's well-being, as well as the outcomes of healthcare interventions (Robinson et al., 2003; Tsakos et al., 2012). Additionally, the use of measurements in the light of conceptual models make it possible to explore the pathways through which health conditions may affect individuals' well-

being, contributing to a better targeting of specific points for effective intervention strategies (Baker et al., 2007). In terms of policy implications, HRQoL assessments are useful for surveillance, as they support the development of evidence-based public health strategies, guiding the allocation of resources. Finally, when adopted in healthcare settings, HRQoL measurements are a useful communication tool for identifying and prioritizing patient problems and preferences (Robinson et al., 2003). While much has been achieved in terms of development and validation of HRQoL measures, a more difficult issue is whether these measures actually influenced policy makers in their decisions, and examples of policies which have been explicitly shaped by measures of this type are difficult to find (Tsakos et al., 2013). Nevertheless, according to the Centre of Disease Control and Prevention, the demonstrated value of these measures and the continuous accumulation of public domain data have resulted in support to various health policies.

Health-Related Quality of Life Measures

There is a large variety of HRQoL measures, and, in general, they can be divided into generic and disease-specific tool. Generic instruments can be further classified into health profile and preference-based measures, also called as health utility indexes (Garrat et al., 2002). Specific measures are designed to capture the impacts of particular disease on quality of life, such as cardiovascular diseases, breast cancer and oral health conditions. When applied in the context of oral health, disease-specific instruments are called OHRQoL measures.

There are three main intellectual paradigms behind the different types of HRQoL measures; the psychometric, clinimetric, and the economics/decision science paradigms (Feeny et al., 2013). The psychometric paradigm guides the development of health profile

measures, since it is based on an underlying construct indirectly measured by pre-selected items (Fayers and Hand, 1997). Therefore, this paradigm can guide the development of both generic (profile) and disease-specific HRQoL instruments. The clinimetric paradigm is based on the selection of items that are relevant to a condition in particular; therefore; this approach is usually adopted for the development of disease-specific measures. The economics paradigm establishes a predictive health state value, which is usually represented by a 0-1 scale, with 0 being death and 1 indicating perfect health. Therefore, this approach can be adopted in the development of preference-based measures or health utility indexes, which are usually generic measures of HRQoL (Feeny et al., 2013).

In terms of overall performance, HRQoL measurements can be evaluated in the light of three different psychometric properties: reliability, validity, and responsiveness, which are summarized in table 1 (Feeny et al., 2013). Reliability reflects the overall consistency of a measure, and can be assessed through inter-rater reliability, intra-rater reliability, test-retest reliability and internal consistency. Validity refers to which extent a measure actually captures what it was developed to measure. Evidence of validity can be provided by several types of validity indicators, with the ones most applied in the context of HRQoL measures being: construct validity (convergent and discriminant validity), content validity (face validity), and criterion validity (concurrent and predictive validity). Responsiveness, also called as sensitivity to change, corresponds to the overall sensitivity of a measurement in capturing within-person change over time. In other words, it reflects the extent to which change in a measure is associated with the corresponding change in a reference clinical measure of health status (Feeny et al., 2013) (Table 1).

Psychometric property	Definition	Assessment
Reliability	Refers to the consistency of scores obtained by the same persons when they are re-examined with the same test on different occasions.	
Internal Consistency	The extent to which items within a measurement are measuring the same concept.	The consistency among all items in a scale is tested (commonly indicated by a Cronbach's alpha coefficient > 0.70).
Intra-Observer Reliability	The extent of agreement among repeated applications of a measure by a single rater.	Assessed through measurement comparisons within examiners (intra-rater), between examiners (inter-rater) and within individuals in two points in time (test-retest). Intra-class correlation coefficient-ICC (continuous variables) or kappa statistic (categorical variables) can be used.
Inter-Observer Reliability	The extent of agreement between two or more raters in their appraisals	
Test-Retest Reliability	The extent of agreement of a measure from one time to another in the same individual.	
Validity	The measure accurately reflects the concept it is intended to measure.	
Content Validity	The extent to which the items are sensible and reflect the intended domain of interest.	
Face validity	The degree to which the items indeed look as though they are an adequate reflection of the concept to be measured.	Reflected by the validity of a test from the observers' point of view (who do not have any expertise in the area).
Criterion Validity	The extent of agreement between the measure and a gold standard measure.	
Concurrent validity	The ability of a measure to distinguish between groups that it should theoretically be able to distinguish between.	Assessed through comparisons between a measure and a theoretically related outcome previously measured.
Predictive validity	The ability of a measure to predict something it should theoretically be able to predict.	Assessed through comparisons between a measure and a theoretically related outcome measured *a posteriori*

Table1 Psychometric properties applied in the context of Health-Related Quality of Life Measures.

Psychometric property	Definition	Assessment
Construct Validity	Evidence that the relationships among items and domains conform to a priori hypotheses and that logical relationships exist between the measure and characteristics of groups of individuals.	
Convergent Validity	Evidence of association between measures of the same concept or construct.	Assessed through correlations with other measures of similar constructs, which should be high (constructs that theoretically should be related to each other are empirically observed to be related to each other). When assessing the construct validity of a generic HRQoL instrument, usually correlations with a disease-specific instrument are assessed.
Discriminant Validity	Evidence of lack of relationship between measures of a different concept or construct.	Assessed through correlations between items referring to different constructs, (should be low). Another strategy: *known-groups comparisons*- scores for a measure of perceived health status are expected to be related to known groups based on their clinical diagnose.
Responsiveness	The ability of a measure to capture meaningful changes when they occur. Also known as sensitivity to change.	Assessed through comparisons between responses at baseline and after treatment follow-up.

Table 1 (cont) Psychometric properties applied in the context of Health-Related Quality of Life Measures.

Disease-specific and Generic measures of HRQoL

An important consideration when studying the impact of health conditions on quality of life are the differences between disease-specific and generic measures of HRQoL (Feeny et al., 2013). Generic HRQoL instruments are developed to be applicable across a variety of health conditions, treatments, health interventions and across different demographic and cultural groups. Additionally, they can also reflect a single index or a profile of interrelated scores (Feeny et al., 2013). Examples of generic instruments include: the Short-Form 36 (SF-36) (Ware and Sherbourne, 1992), the EuroQol (Brooks, 1996), the Health Utility Index (HUI) (Horsman et al., 2003), the Quality of Well-Being Scale (QWB) (Kaplan et al., 1989), and the World Health Organization Instrument for Quality of Life Assessment (WHOQOL) (WHO, 1995) and its abbreviated version, the WHOQOL-BREF (WHO, 1998). On the other hand, disease specific measures are those designed to capture the impacts associated with specific health conditions. While some authors argue that these instruments are 'organ specific' the term 'disease specific' is the most common term in the literature. The Oral Health Impact Profile (OHIP-14) (Slade and Spencer, 1994) and the Oral Impact on Daily Performance (OIDP) (Adulyanon et al., 1996) are two most commonly OHRQoL measures within oral epidemiology.

There is an overlap between the constructs captured by generic and disease-specific instruments. Nevertheless, studies show that disease-specific tools are superior in certain psychometric properties, such as discriminant validity and responsiveness, in comparison to generic measures (Allen, 2003). In this regard, disease-specific measures are especially useful when greater sensitivity to the oral health condition of interest is needed. On the other hand, generic instruments are able to establish the impact of specific health conditions in relation to general health perceptions, allowing for comparisons between diseases of different natures (Feeny et al., 2013). Additionally, generic

instruments may generate more standardized health profiles and utility indices, which are useful in economic evaluations of health and may simplify the understanding of results of health burden and HRQoL for health policy makers. (Brennan, 2013) Therefore, health planners and policy makers can use this information to help allocate resources for specific health conditions among particular groups. Finally, generic measures may capture different elements of quality of life, since they include domains that might be in different contexts that are not specific to the disease condition. (Jenkinson et al., 1997)

Considerations to HRQoL and OHRQoL assessments

Although HRQoL has been increasingly adopted as an important outcome in health sciences research, some theoretical criticisms to the use of HRQoL measures have been raised. One of the most important relates to the strong emphasis on functional and role limitations placed by HRQoL measures, which may fail to assess the actual importance of these events on individuals' lives. Furthermore, authors have questioned to which extent the meaning of the impacts of diseases are assessed according to individuals' beliefs. While HRQoL instruments claim to capture the subjective perception related to health, many HRQoL tools are actually generic health status measures. These aspects were first discussed in a debate between Gill and Feinstein (1994) and Guyatt and Cook (1994) published in the Journal of the American Medical Association in the 90's, and were elaborated in the context of general and oral health later on. (Locker and Allen, 2007).

As a starting point, Guyatt and Cook performed a critical appraisal of 75 studies according to a set of criteria developed by the authors for how well HRQoL was being measured. Less than 50% of the articles they reviewed were judged satisfactory for each criterion, and most of the measurements failed to incorporate individuals' values and preferences and were more likely to be evaluating various aspects of health status and

functional impacts of diseases than HRQoL. This is related to the fact that, even when health-related, quality of life refers to different aspects and significance that are unique to the individual (subjectiveness characteristic of quality of life). In this sense, the main challenge to measuring quality of life consists in its uniqueness to the individual.

Gill and Feinstein further elaborated the set of criteria by Guyatt and Cook, proposing a more limited set by means of which measures may be evaluated. They suggested that open ended questions and global evaluations of health and quality of life should be part of these measurements as a confirmation that quality of life has been explicitly investigated. In case these requirements are not fulfilled, instruments are more likely to be measuring health or functional status rather than HRQoL. Nevertheless, this makes it difficult to assess quality of life at the group level.

Although some differences between the set of criteria by Gill and Feinstein, and Guyatt and Cook can be noticed, both of them are structured in two central ideas: 1) Is the measure patient- or person-centred? 2) Do the items comprising the instrument correspond to aspects of daily life that are important to the population of interest? Based on the debate between the authors around these ideas, Locker and Allen performed a review of five OHRQoL instruments (Geriatric Oral Health Assessment Index- GOHAI, Oral Health Impact Profile- OHIP, Oral Impacts of Daily Performances- OIDP, Child Oral Health Quality of Alife Questionnaire- Child Perceptions Questionnaire 11-14- CPQ11-14 and The Oral Health Quality of Life Inventory- OH-QoL) (Locker and Allen, 2007). The authors found that "while all document the frequency of the functional and psychosocial impacts that emanate from oral disorders they do not unequivocally establish the meaning and significance of those impacts" (Locker and Allen, 2007). In addition, not all OHRQoL instruments do acknowledge the patient's perspective as being as important as the clinician opinion. These findings lead to a similar conclusion to that

previously found for generic HRQoL instruments, and while current measures assess the frequency of impacts associated with oral conditions, they fail to establish the meaning and significance of those impacts on perceptions of quality of life. Therefore, the claim that they are measuring oral health-related quality of life is tenuous (Locker and Allen, 2007).

Considering the intrinsic issues related to the assessment of quality of life, authors have suggested that the concept of quality of life, even when health-related, may be replaced by a more objective and rigorous definition of health status. On the other hand, alternative options in relation to HRQoL measures have been proposed, such as the use of individualised measures and the use of global ratings of quality of life alongside HRQoL. The advantage of these ratings is that they integrate individuals' beliefs and the relative importance of different life domains. Therefore, they 'allow adequate expression of the way in which individual patients determine their own quality of life' (Prutkin and Feinstein, 2002). Additionally, considering that the interpretation of the impacts associated with health conditions will be a highly individual matter, the use of instruments based on a cross-culturally sensitive concept is important. Finally, assessing the impacts of oral conditions on quality of life in the light of a theoretical framework may enhance the understanding by depicting interrelationships among concepts, particularly for the definitions of health status, functioning, quality of life and HRQoL (Baker et al., 2007).

Theoretical models for HRQoL

A variety of HRQoL models have been proposed over time, including the World Health Organization International Classification of Functioning Disability and Health (WHO, 2001), the Wilson and Cleary model and its revision proposed by Ferrans and

colleagues. The most widely adopted model is the one proposed by Wilson and Cleary, and increasing evidence has recommended the adoption of its revised version by Ferrans and colleagues. The updated version is recommended considering the inclusion of individual and environmental characteristics affecting the different levels of the model (Wilson and Cleary, 1995; Ferrans et al., 1999; Bakas et al., 2012). The model consists of five main consecutive levels; 1) physiological/clinical variables, 2) symptom status, 3) functional health, 4) general health perceptions, and 5) overall quality of life, implicating a one-way main causal relationship (Path A to D) (Figure 1). Additionally, individual and environmental characteristics are also likely to be related to all levels included in the model (Ferrans et al., 1999). By including health-related factors that are particular to the individual, Wilson and Cleary combine in their framework the Biomedical and the Bio-Psychosocial paradigms of health.

Although the Wilson and Cleary model is adopted as a HRQoL theoretical framework, it is not possible to visualize this the term in the model. Instead, the model reflects a continuum of factors related to the disease itself, and generic health measures. In this regard, the concept of HRQoL is identified as the intrinsic relationships between the symptoms and impacts associated with the disease itself and subjective evaluations of health and well being (as indicated by the path B, C and D in Figure 1).

This model has been tested in different contexts and for different conditions. This provides a theoretical basis for the selection of variables according to the series of health concepts on the causal pathway, and facilitates the understanding of associations among objective clinical outcomes and patient reported outcomes. In general, studies support Wilson and Cleary's model and its revised version as applied to different health conditions, including lung diseases (Linder and Singer, 2003), HIV (Sousa and Kwok, 2006), Parkinson's disease (Chrischilles et al., 2002), cardiovascular diseases (Bennet et

al., 2001) and oral conditions, such as edentulism (Baker et al., 2007; Santos et al., 2015) and dry mouth (Baker et al., 2008).

Oral health studies which adopted the Wilson and Cleary framework have reported both direct and indirect (mediated) pathways between objective and subjective oral health variables, suggesting that a broader understanding of the HRQoL impacts associated with oral health conditions may be better captured by the simultaneous assessment of clinical and non-clinical factors (Baker et al., 2007; Baker et al., 2008; Baker et al., 2010; Santos et al., 2015, Gupta et al., 2015). While these studies have reported important results, they were limited to few oral conditions (i.e. edentulism and dry mouth) and populations (Rebelo et al., 2016). Testing the applicability of this model in a variety of scenarios may enhance the development of new theories about the relationship between oral health and individuals' wellbeing, translating the clinical relevance of HRQoL on targeting specific points of interventions for improving quality of life.

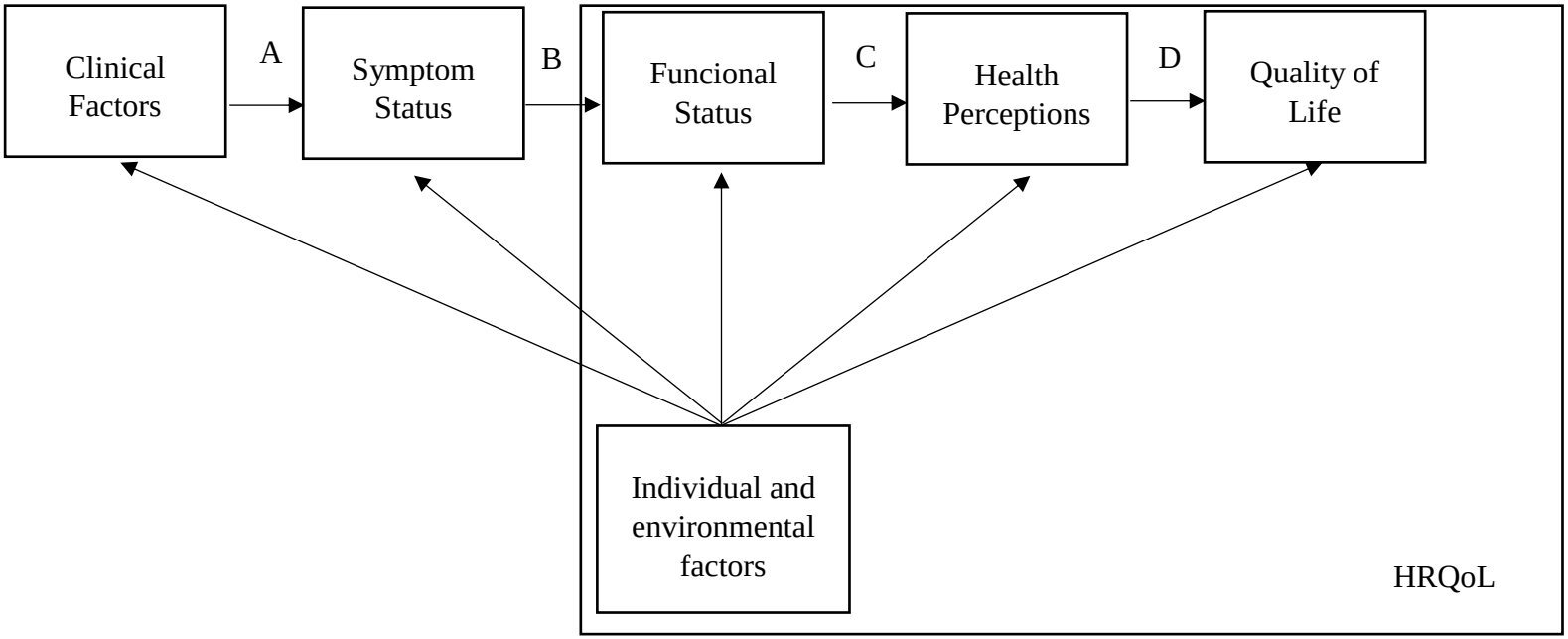

Figure 1 Conceptual Model from Wilson and Cleary for health-related quality of life adapted by Ferrans et al. 1999.

Rationale

Oral conditions are considered an important public health problem due to their prevalence, expense associated with treatment and their impact on individuals and society as a whole (Marcenes et al., 2013; Kassebaum et al., 2017; Sheiham, 2005). Although the relationship between oral conditions and general health has been well established by clinical and epidemiological studies, a longstanding question remains on the impacts of oral conditions on general HRQoL. This would make it possible to establish the meaning of oral conditions in relation to overall health and quality of life, allowing for comparisons between diseases of different natures. In addition, generic HRQoL instruments provide standardized health measures, which may simplify the understanding of oral health burden for health policy makers (Brennan, 2013). This evidence can have key implications for integrating oral and general health prevention strategies to the existing knowledge on common risk factors and co-occurrence of oral and general diseases. In addition, this evaluation makes it possible to understand the impacts or oral conditions for the community in a more broadly way, and their implications in the reduction in a person's capacity for economic and social participation. Furthermore, generic HRQoL measures provide a common yardstick to compare individuals with health conditions with the population, making it possible to estimate the burden of oral diseases (Ware, 1995). Additionally, assessing the impact of oral conditions on general HRQoL may enhance the importance of oral conditions from a policy perspective, since HRQoL measurements show excellent predictive validity in relation to future health, work productivity and mortality (Kaplan et al., 2007). Finally, generic HRQoL assessments may capture different elements of quality of life, since they include domains that might be in different contexts that are not specific to oral health. In this sense, generic

instruments may represent different domains of knowledge for a broader understanding of the impact of oral health conditions on quality of life.

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Chapter 2 General aim and specific objectives

General Aim

To investigate the association between oral health dimensions and health-related quality of life among adults.

Specific Objectives

1. To verify if chronic oral health conditions are associated with HRQoL;
2. To estimate the association between dentition status and HRQoL;
3. To assess clustering of oral and general chronic conditions and to explore the association between the patterns of multimorbidity and HRQoL;
4. To test a health-related quality of life conceptual model for oral health conditions.

Chapter 3 Oral health conditions and health-related quality of life: a systematic review

Statement of Authorship

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Principal Author

Name of Principal Author (Candidate)	Dandara Gabriela Haag
1. Contribution to the Paper	Conceptualized the idea, performed the search, wrote manuscript and acted as corresponding author.
Overall percentage (%)	80%
Certification:	This paper reports on original research I conducted during the period of my Higher Degree by Research candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this thesis. I am the primary author of this paper.
Signature	Date 11/05/2017

Co-Author Contributions

By signing the Statement of Authorship, each author certifies that:

i. the candidate's stated contribution to the publication is accurate (as detailed above);

ii. permission is granted for the candidate in include the publication in the thesis; and

iii. the sum of all co-author contributions is equal to 100% less the candidate's stated contribution.

Name of Co-Author	Karen Peres
Contribution to the Paper	Conceptualized the idea supervised development of work, provided intellectual contribution and revised guidelines
Signature	Date 11/05/2017

Name of Co-Author	Madhan Balasubramanian
Contribution to the Paper	Conceptualized the idea supervised development of work, provided intellectual contribution and revised guidelines
Signature	Date 11/05/2017

Name of Co-Author	David Brennan
Contribution to the Paper	Conceptualized the idea, supervised development of work, provided intellectual contribution and revised guidelines
Signature	Date 11/05/2017

Linkage to the body of work

Tooth loss, dental caries and periodontal diseases are the three most important conditions for the burden of oral diseases (Marcenes et al., 2013). The 2015 GBD update showed that 3.5 billion people are affected by these conditions (Kassebaum et al., 2017). Besides being highly prevalent, these conditions may impact on HRQoL, since they influence how individuals look, speak, choose food, as well as their social relationships (Sheiham, 2005). This manuscript summarizes the evidence on the association between the most important oral conditions and general HRQoL. The collective evidence on this association have key implications for integrating oral and general health prevention strategies to the existing knowledge on common risk factors and simultaneous occurrence of oral and general diseases. Furthermore, the findings from the review had key implications on the development of the rationale and methodological aspects of the manuscripts comprising the empirical component of the current thesis.

Highlights

- Despite the different definitions of the exposures and several instruments used to assess HRQoL, a negative association between tooth loss with HRQoL was confirmed by the majority of the available evidence.
- The association between tooth loss and HRQoL seemed to be independent of HRQoL instrument, diagnostic criteria and country of investigation. However, it was more evident among young and middle aged adults than among older individuals.
- The condition of the remaining teeth was also found to be important, as dental caries were demonstrated to have a negative impact on HRQoL in all studies included for this exposure.

- Mixed findings were observed regarding the direction of association between periodontal disease and HRQoL.

Research and Policy Implications

- Longitudinal studies are needed to investigate the impact of oral health status over time and improve the existing evidence on the importance of tooth loss, periodontal diseases and dental caries on HRQoL.
- Accepted forms of dentition for a healthy occlusion, such as shortened dental arch and functional dentition, should be more broadly studied in respect of their impact on HRQoL.
- A health promotion and preventive approach is suggested for dental caries aiming to prevent tooth loss and improve individuals' HRQoL.
- The findings reinforce the integration of oral and general health policies based upon on a common risk factor approach
- Future research should investigate the impact of multimorbidity on HRQoL.

Authors

Dandara Gabriela Haag[1]

Karen Glazer Peres[1]

Madhan Balasubramanian[1]

David Simon Brennan[1]

[1]Australian Research Centre for Population Oral Health, Adelaide Dental School, The University of Adelaide, South Australia, Australia

Corresponding author:

Dandara Gabriela Haag

Adelaide Health and Medical Sciences Building, Adelaide, SA 5005 Tel: +61 8 83132557

Fax: +61 8 8313 3070

Email: dandara.haag@adelaide.edu.au

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Abstract

Objective: To verify whether oral conditions (tooth loss, periodontal disease, dental caries) are negatively associated with health-related quality of life (HRQoL) in adults.

Methods: A search was carried out on PubMed, Embase, Web of Science, Scopus, SciELO, and LILACS databases until the end of July 2016 with no date restrictions. Quantitative observational studies written in English were included and data extraction was performed independently by two reviewers. HRQoL was investigated as the outcome and tooth loss, periodontal diseases and dental caries were exposures. The Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines was used and the quality of the selected studies assessed by using the Joanna Briggs Institute Meta-analysis of Statistics assessment and review instrument (JBI-MAStARI).

Results: Twenty one studies were included. The sample sizes ranged from 88 to 15,501 subjects; 20 studies were cross-sectional designs while 1 was a case-control study. Case definitions of the exposures were different across the studies, mainly for tooth loss which was defined according to 11 different criteria. Fifteen studies were of 'high' and 6 of 'medium' quality. Eight HRQoL instruments were identified and the most frequent was the EuroQol (n = 7). Ten out of 16 studies reported a negative impact of tooth loss on HRQoL. Four out of seven studies reported that periodontal disease impairs HRQoL and one study showed that periodontal disease is positively associated with HRQoL. All studies that assessed dental caries reported a negative association between this condition and HRQoL.

Conclusion: Despite the different definitions and measures of tooth loss and dental caries, the majority of the available evidence reported a negative impact of these conditions on HRQoL. Mixed and inconclusive findings were observed for the association between

periodontal disease and HRQoL. Longitudinal prospective studies are suggested in order to improve the strength of the findings.

Key words: oral health, health-related quality of life, tooth loss, dental caries, periodontal disease

Background

Over the last three decades, subjective oral health indicators have been developed to assess individuals' perception of their oral health above and beyond a clinician's opinion of successful treatment and impact of disease (Leao and Sheiham 1995, Slade and Spencer 1994). The development of these measures represents a paradigm shift to an individual-centred approach to oral healthcare (Sischo and Broder 2011). This shift is further substantiated by two important changes. First, there is an increased participation of patients in clinical decisions, which can be attributed to increased knowledge levels due to greater educational attainment and information availability (Vahdat et al. 2014). Second, the importance and contribution of indicators of subjective oral health status in needs assessment and planning of health care services is well acknowledged (Sischo and Broder 2011). Furthermore, a clinical definition of successful treatment or cure may be different from the individuals' expectations (Slade and Spencer 1994). The Oral Health Impact Profile (OHIP-14) (Slade and Spencer 1994) and the Oral Impact on Daily Performance (OIDP) (Adulyanon et al. 1996) are the two most commonly used indicators of subjective oral health status within oral epidemiology. Although these measures were developed to evaluate the subjective oral health status, they are commonly used as measures of oral health-related quality of life (OHRQoL) (Locker and Allen 2007).

The World Health Organization defines quality of life as "individuals' 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" (WHO, 1995). Measures of HRQoL were developed to assess the physical, psychological and social impacts of health conditions on individuals' well being. An important consideration when studying the impact of oral health conditions on quality of life are the differences between disease-specific and generic measures of HRQoL. While there is an overlap between the

constructs measured by these tools, in comparison to generic measures, disease-specific instruments tend to have greater discriminant validity and responsiveness properties (Allen 2003). In this sense, disease-specific measures are particularly useful when greater sensitivity to the oral health condition of interest is required. On the other hand, generic instruments are able to establish the impact of oral health conditions in relation to general health perceptions, allowing for comparisons between diseases of different natures (Feeny et al. 2013). They may generate standardized health measures and health utility indices, which are useful in economic evaluations of health and may simplify the understanding of results of health burden and HRQoL for health policy makers (Brennan 2013). Additionally, generic measures may capture different elements of quality of life, since they include domains that might be in different contexts that are not specific to the disease condition (Jenkinson et al. 1997). In this sense, generic instruments may represent different domains of knowledge for a broader understanding of the impact of oral health conditions on quality of life.

Important gaps are observed in the collective evidence on the association between oral health conditions and HRQoL. Two systematic reviews are available that examine the evidence on oral conditions and HRQoL (Buset et al. 2016, Naito et al. 2006). Buset and colleagues systematically reviewed the literature on the association between periodontal disease and quality of life. However, the authors did not report the findings separately for HRQoL and OHRQoL measurements. Additionally, the objective of this review was to evaluate the evidence only on periodontal disease and quality of life. Therefore, two key oral conditions, dental caries and tooth loss that are important for the burden of oral diseases (Marcenes et al. 2013) were not evaluated in this review. This limits comparison between periodontal disease and other oral conditions for their impact on quality of life. The other systematic review performed by Naito et al. included multiple

oral conditions to assess their impact on HRQoL. However, they included other oral conditions such as craniomandibular pain and dry mouth that are likely different in their population burden and impact in comparison to periodontal disease, tooth loss, and dental caries. Additionally, two of the seven studies they included in their review were experimental studies that investigated the differences in HRQoL before and after receiving dental prosthesis (Allen and McMillan 2003, Heydecke et al. 2003). This makes it difficult to attribute the differences in HRQoL to the presence of oral conditions without a detailed investigation of the underlying condition for which the treatment was received, as well as the quality of treatment itself. Last, the search for the review by Naito et al. was conducted over a decade ago in 2004, and so an update is necessary.

Given that oral health is an inseparable part of general health, it is imperative to study the impact of most important oral conditions on HRQoL. Furthermore, this evidence can have key implications for integrating oral and general health prevention strategies to the existing knowledge on common risk factors of oral and general diseases. The aim of this systematic review was to verify whether dental caries, periodontal disease and tooth loss are negatively associated with HRQoL in adults.

Methods

The Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines was followed for this systematic review (Liberati et al. 2009).

Review question

Are the oral-health conditions dental caries, periodontal diseases and tooth loss negatively associated with HRQoL in adults?

Inclusion criteria

Quantitative observational studies that addressed associations between dental caries or periodontal diseases or tooth loss and HRQoL were potential papers to be included. The study designs included were cohort studies, cross sectional studies and case-control studies. Papers regarding individuals aged 18 years of age or more and written in English were included regardless of publication date.

Exclusion Criteria

Case reports, reviews, opinions, non-human studies, conference abstracts, letters to editors, dissertations and thesis, studies regarding medically compromised patient groups, papers regarding only individuals aged below 18 years, not written in English and those without a comparison group were excluded.

Exposures

a) Dental caries- Clinical diagnosis of dental caries (prevalence and severity) as well as self-reported measures according to any criteria.

b) Periodontal diseases- Clinical diagnosis of periodontal disease, including conditions such as: gingival bleeding, clinical attachment loss, periodontal pocket depth and alveolar bone loss, irrespective of periodontal disease case definitions. Any self-reported measures of periodontal disease were also considered.

c) Tooth loss- Studies that clinically diagnosed tooth loss, including edentulism, partial tooth loss and different dentitions criteria such as functional dentition and shortened dental arch were included. Self-reported tooth loss was also considered according to any criteria.

Outcome

The outcome was the HRQoL assessed by instruments such as the EuroQol (Brooks 1996), the SF-36 (Ware and Sherbourne 1992) and the WHOQOL-BREF (WHOQOL Group, 1995).

Search strategy

Electronic searches were carried out in 6 different databases: PubMed, EMBASE, Web of Science, Scopus, LILACS, SciELO. Firstly, a limited search was undertaken across the databases, followed by analysis of the text words contained in the titles and abstracts. A second search using all identified keywords and index terms was then carried out (Appendix I).

Study selection

Firstly, references in duplicate were removed using the software Mendeley v1.10. Two authors (D.G.H. & M.B.) read independently the titles and abstracts and irrelevant reports were eliminated. In order to verify that the reviewers had the same understanding of the inclusion and exclusion criteria, title and abstract screening began with a preliminary review of the first 100 papers (ordered by first author's name) followed by a discussion between reviewers, before they moved on to the full review. If the information relevant to the inclusion criteria was not available in the abstract or if the title was relevant but the abstract was not available, the full text of the paper was obtained. In case of disagreement regarding eligibility, a third reviewer's opinion (D.B.) was sought for further discussion and a decision was made by consensus.

Data extraction and synthesis

Data were assessed by using a pre-defined data collection form (Appendix II) and was performed by both reviewers independently. Initially, information such as authors, country where the study was undertaken, data collection place, year of publication, sample size and sampling process, were recorded. We collected the criteria adopted in the evaluation of tooth loss, dental caries and periodontal diseases. Information regarding the instrument and criteria adopted to assess the outcome was also extracted. Finally, we collected the measures used to estimate the associations between the exposure and the outcome and the main limitations as reported by the authors. We summarized the results in tables, and when there was no association, the information was also recorded.

Assessment of methodological quality

The quality assessment of the papers was performed by two independent reviewers (D.G.H. & M.B.) using standardized critical appraisal instruments according to the study design from the Joanna Briggs Institute Meta-Analysis of Statistics Assessment and Review Instrument (JBI-MAStARI-Appendix III). Both the reviewers were properly trained by attending a course to apply the above-mentioned instrument. The critical appraisal was compared and in case of disagreement a third reviewer's opinion was sought for further discussion. In order to classify studies by quality, an overall score for each study was calculated based on the number of "Yes" answers which could range from 0 to 10. Finally, studies were categorized according to the score obtained, as follows: (0-3): low quality; (4-6): medium quality; (7-10): high quality (Peres et al. 2015). The studies were included in the current review independently of the quality assessment.

Results

Study selection and characteristics

Figure 1 shows a flow chart of the study selection. From the electronic searches, 3,880 potential articles were revealed, of which 2,575 were removed for being duplications. In the first screening, reviewer 1 selected 61 papers, while reviewer 2 selected 59 articles. The main reasons for exclusion were: different populations/exposures of interest, use of specific-disease OHRQoL and studies with experimental design. Both reviewers agreed on the inclusion of 56 papers, and a third reviewer (D.B.) opinion was asked on other 4 articles for the deciding vote. After the evaluation, 58 articles remained for full text reading. Reviewer 1 selected 20 papers, whereas reviewer 2 included 21. Both reviewers agreed on the inclusion of 18 papers, and a third reviewer (D.B.) opinion was sought on another 5 papers. After discussion, twenty one studies were finally included in the systematic review. Fifteen studies were of high quality and six of medium quality. Twenty articles were cross-sectional investigations, while only one was a case-control study (Armellini et al. 2008). Sixteen papers evaluated the association between tooth loss and HRQoL, while seven investigated periodontal disease and three articles investigated dental caries. Four papers evaluated more than one exposure of interest (Brennan and Spencer 2005, Fontanive et al. 2013, Marino et al. 2008, Sim 2014). Eight HRQoL instruments were identified and the most frequent was the EuroQol (n = 7). The most affected HRQoL domain was physical health, but the mental component and the social relationships domain were also affected. The associations were expressed in a variety of ways, including means with standard errors or standard deviations, odds ratios, prevalence ratios and β coefficient. The investigations were carried out in several settings, including high-income countries such as Australia, Germany, United States of America, and Japan as well as in middle and low-income nations like Brazil, Colombia, and Ghana.

Eighteen papers performed adjusted analysis and the main confounding factors identified were age, gender, income and educational level.

Association between tooth loss and HRQoL

Ten out of 16 studies found that tooth loss was negatively associated with HRQoL (Table 2). Among the 10 studies that reported a negative association between tooth loss and HRQoL, 8 performed an adjusted analysis for key confounding factors. Out of the six studies that did not find associations between tooth loss and HRQoL, one reported crude estimates only (Allen et al. 1999) Three studies on the tooth loss exposure did not perform an adjusted analysis, out of which, two reported a negative associations between tooth loss and HRQoL. One study, which reported a negative association between tooth loss and HRQoL on the general health item of the SF-36, also reported a positive association between tooth loss and physical functioning. There were eleven different categorizations for number of teeth, with self-reported and oral examination assessments. The most frequent classification was the edentulous/dentulous division, observed in six studies. Among them, only two studies did not report a negative association between edentulism and HRQoL (Allen et al. 1999; Lee et al). Out of the 11 studies on other categorizations, 7 articles reported a negative association between tooth loss and HRQoL (1 study simultaneously evaluated edentulism and another tooth loss measure).Two papers investigated only younger and middle aged individuals (<60 years) (Brennan et al. 2008, Brennan, 2013), six studies assessed only older individuals (≥60 years) and the other seven studies were performed with younger and older adults. All the studies that investigated only younger individuals found that tooth loss was negatively associated with HRQoL. On the other hand, out of the six articles with older individuals, only four reported negative associations between tooth loss and HRQoL (Akifusa et al. 2005, Cano-Gutierrez et al. 2015, Hugo et al. 2009, Rodrigues et al. 2012).

Association between periodontal disease and HRQoL

Seven studies were identified which investigated the association between periodontal disease and HRQoL. Only one study did not perform an adjusted analysis, since its purpose was to assess disability weights for periodontal disease (Brennan et al. 2007). The majority of the studies (n = 4) consistently reported a negative association between periodontal disease and HRQoL. However, Marino and colleagues found the presence of deep periodontal pockets associated with better physical component score (PCS) and self-reported gingival bleeding associated with better mental component score (MCS) using the SF-12 (Marino et al. 2008). Nevertheless, periodontal status accounted for a very small amount of variation in the outcome, with gingival bleeding explaining only 1.5% of the variance of the MCS. Different measures were adopted for cases definition, including the American Association of Periodontology criteria and the Community Periodontal Index.

Association between dental caries and HRQoL

Three studies were identified and all of them reported that dental caries was negatively associated with HRQoL after adjustment for key confounding factors (Table 4). All the investigations involved younger and older individuals and dental caries case definitions were different across the studies. In the study by Fontanive et al. dental caries was investigated by calibrated dentists at participants' households and the DMFT index was adopted (cut-off point ≥25). In the study by Brennan and Spencer dental caries was assessed by dentists in their private clinics (having dental caries or not) (Brennan and Spencer 2005).

Discussion

Despite the different definitions of the exposures and several instruments used to assess HRQoL, a negative association between dental caries, and tooth loss with HRQoL was confirmed by the majority of the available evidence. Mixed findings were observed regarding the direction of association between periodontal disease and HRQoL.

The review confirmed that problems with mastication, swallowing, speech and smile aesthetics due to oral conditions may subsequently lead to affecting not only physical health but also self-esteem, social relationships and enjoyment of life (Gil-Montoya et al. 2015). Apart from tooth loss, the condition of the remaining teeth was also found to be important, as dental caries were demonstrated to have a negative impact on HRQoL. Considering that HRQoL measures one's general well-being, the collective evidence from the selected studies confirms that tooth loss, and dental caries have a negative impact on the general state of well-being among adults and the elderly.

Our current results substantiate the findings of a previous systematic review that evaluated the impact of tooth loss on HRQoL (Naito et al. 2006). Furthermore, the negative direction of association remained consistent by the majority of the available evidence for both edentulous/dentulous division and other measures of tooth loss with HRQoL. It was observed that the impact of tooth loss on HRQOL was more evident among younger adults than in the others. This age difference was also reported among studies on the association between tooth loss and OHRQoL, with older adults reporting better subjective oral health (Sanders et al. 2009; Dahl et al. 2011; Slade and Sanders 2011). Several factors may contribute to these differences, including age-related aspects and intergenerational effects (Slade and Sanders 2011). Regarding age-related aspects, it has been overserved that older adults showed greater resilience in relation to their oral health (McEntee 1997). A possible explanation for this adaptation may be that oral

conditions, such as tooth loss, are seen as a normal consequence of aging (McEntee, 1997). Additionally, the presence of simultaneous general health conditions at older age may mitigate the HRQoL impacts associated with oral conditions. On the other hand, intergenerational aspects may also play a role in the way individuals perceive the impacts of health conditions on their well-being (Slade and Sanders 2011). Higher levels of education, more access to information and greater initiative regarding healthy lifestyle behaviours observed in younger generations may contribute to the increase in their expectations in relation to health (Kahana and Kahana, 2014). It should be highlighted that these comparisons should be interpreted cautiously, since they refer to studies from different populations and settings. Furthermore, both tooth loss and HRQoL were investigated in different ways by these studies, limiting such comparisons.

Differently from the previous systematic review (Naito et al. 2006), dental caries was also found to be associated with impaired HRQoL in the current review. This could be attributed to the fact that the previous review included only one article with an adolescent population pertaining to dental caries and HRQoL (Broder et al. 2000). In addition, the diagnostic criteria for dental caries and the instrument used to assess HRQoL were different in the study by Broder and colleagues in comparison with the studies included in the current review. Similarly, our findings differ from the existing systematic review on the association between periodontal disease and quality of life (Buset et al. 2016). While the systematic review by Buset et al. reported a negative association between periodontal diseases and quality of life assessed through specific and generic instruments, mixed and inconclusive results were found among studies that evaluated the impact of this condition particularly for HRQoL. Although the majority of the available evidence points towards a negative association (four out of the seven studies), one study showed a positive relationship between periodontal disease and HRQoL (Marino et al.

2008). Nevertheless, periodontal status accounted for very little variance in this outcome. Furthermore, our inferences regarding the direction of association between periodontal disease and HRQoL differed from the previous review in relation to the study by Marino and colleagues, since Buset et al did not account for the positive association between periodontal disease and HRQoL.

The current review has a number of strengths and some limitations. To our knowledge, this is the first systematic review addressing the association between the most important oral health conditions for the burden of diseases dental caries, periodontal disease and tooth loss with HRQoL. Furthermore, we conducted the electronic searches in six different databases, including Embase and LILACS, aiming to reduce possible publication bias with the inclusion of papers not indexed on MEDLINE. Additionally, we excluded studies with medically compromised groups due to the broader impact of the general health conditions on HRQoL. Finally, our study adds to the evidence on the impact of periodontal disease on HRQoL added with a recent systematic review on periodontal disease on subjective oral health status and OHRQoL.

Our results should be considered under some limitations. Only studies published in English were included. Comparisons across the studies were difficult and meta-analysis was not feasible due to heterogeneity on key aspects among the included studies. First, the exposures were evaluated according to different diagnostic criteria. For the tooth loss exposure, for example, 10 different categorizations were adopted, and the case definitions of periodontal disease and dental caries were also distinct. In this sense, obtaining a pooled estimate for such different exposure categories is unlikely to provide useful information both from a theoretical and clinical perspective. In addition, the outcome was evaluated by several HRQoL instruments, which were scaled in different ways. Finally, in various studies authors choose to deal with the same HRQoL instrument

by using different approaches. Although a majority of the studies performed adjusted analyses, there was no uniformity among the confounding factors and the way they were collected. This could introduce bias to our results since factors such as sociodemographic characteristics and the presence of systemic diseases could confound the associations between oral conditions and HRQoL. Additionally, the limited number of studies that reported only crude estimates does not provide enough body of evidence to support comparisons with studies that performed adjustments for key confounding factors. Therefore, judgments on the role of these factors in the association between the exposures of interest and HRQoL cannot be drawn in the current systematic review. Finally, among the studies on more than one oral condition of interest, only the study by Brennan and Spencer clearly stated that mutual adjustment was performed, limiting judgments on the implications of simultaneous adjustment for the oral health conditions of interest.

Our findings have some important research and policy implications. Given that the available evidence is limited to cross-sectional designs, longitudinal studies are needed to investigate the impact of oral health status over time and improve the existing evidence on the importance of tooth loss, periodontal diseases and dental caries on HRQoL. Since people are retaining more teeth over time, the management of dentate older adults may be a concern regarding the demand of treatment in the future, especially for public health policies (Cronin et al. 2009; Gerritsen et al. 2010). With the increase of educational level and a more active role of individuals with regard to their health, acceptance of extractions and conventional dentures has decreased among the younger generations (Slade and Sanders 2011). The demand for high cost interventions such as implants may rise, representing a new challenge for the public sector (Cronin et al. 2009). Although the number of teeth is important, their position may also be relevant as indicated by a previous systematic review on the association between tooth loss and OHRQoL

(Gerritsen et al. 2010). Therefore, other forms of accepted dentitions for a healthy occlusion such as shortened dental arch (classification based on the number of posterior occlusal units and intact anterior teeth) and functional dentition (having at least 21 teeth) may be viable alternatives to this issue, and should be more broadly studied in respect of their impact on HRQoL (Hobdell et al. 2003, Witter et al. 1999).

The condition of the remaining teeth is also important as addressed by the negative impact of dental caries on HRQoL. In this regard, the current review suggests a health promotion and preventive approach for dental caries aiming to prevent tooth loss and improve individuals' HRQoL. In addition, considering the increasing burden of chronic conditions, together with the underlining risk factors shared by oral and systemic chronic diseases, we reinforce the integration of oral and general health policies based upon on a common risk factor approach (Petersen et al. 2005). Furthermore, future research should investigate the impact of multi-morbidity on HRQoL.

The current review concludes that dental caries and tooth loss have negative impact on HRQoL. Mixed and inconclusive findings were observed regarding the direction of association between periodontal disease and HRQoL. Although the association between tooth loss seems to be independent of HRQoL instrument, diagnostic criteria and country of investigation, the age range may influence the negative perception of tooth loss on HRQoL, being more evident among young and middle aged adults than among older individuals. We highlight the contribution of these assessments to a better targeting of treatment resources in publically funded oral healthcare.

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Table 1 Main characteristics of the included papers.

First Author/ Year	Country	Journal	Exposure	Instrument	N	Age range
Akifusa et al. 2005	Japan	Gerodontology	Tooth Loss	SF-36	207	85
Allen et al. 1998	United Kingdom	Community Dentistry And Oral Epidemiology	Tooth Loss	SF-36	88	30 to 83
Armellini et al. 2008	United States of America	The International Journal of Prosthodontics	Tooth Loss	SF-36	160	32 to 69
Brennan and Spencer 2005	Australia	Community Dental Health	Tooth Loss Periodontal Disease Dental Caries	EuroQol	375	≥ 18
Brennan et al. 2007	Australia	Journal of Dental Research	Periodontal Disease	EuroQol	879	45 to 54
Brennan et al. 2008	Australia	Quality of Life Research	Tooth Loss	EuroQol	879	45 to 54
Brennan et al. 2012	Australia	Journal of Nutrition, Health and Aging	Tooth Loss	EuroQol	444	60 to 71
Brennan et al. 2013	Australia	European Journal of Oral Sciences	Tooth Loss	EuroQol AQol	1093	30-61

Table 1 (cont) Main characteristics of the included papers.

First Author/ Year	Country	Journal	Exposure	Instrument	N	Age range
Fontanive et al. 2013	Brazil	Community Dentistry And Oral Epidemiology	Tooth Loss Dental Caries	WHOQOL-BREF	720	50 to 74
Hewlett et al. 2015	Ghana	BMC Oral Health	Tooth Loss	8 Item WHOQOL	4,724	≥ 50
Hugo et al. 2009	Brazil	Community Dentistry And Oral Epidemiology	Tooth Loss	WHOQOL-BREF	872	≥ 60
Moghadam et al. 2016	Iran	Global Journal of Health Science	Periodontal Disease	WHOQOL-BREF	700	≥ 18
Lee et al. 2007	Taiwan	Journal of Oral Rehabilitation	Tooth Loss	SF-36	720	> 65
Mack et al. 2005	Germany/ Poland	International Journal of Prosthodontics	Tooth Loss	SF-12	1,406	20 to 79
Cano-Gutiérrez et al. 2015	Colombia	Acta Odontológica Latinoamericana	Tooth Loss	EQ-VAS	2,000	≥ 60
Marino et al. 2008	Australia	Community Dentistry and Oral Epidemiology	Tooth Loss Periodontal Disease	SF-12	603	≥ 55

Table 1 (cont) Main characteristics of the included papers.

First Author/ Year	Country	Journal	Exposure	Instrument	N	Age range
Rodrigues et al. 2012	Brazil	International Journal of Environmental Research and Public Health	Tooth Loss	WHOQOL-Old	163	≥ 60
Saletu et al. 2005	Austria	Journal of Clinical Periodontology	Periodontal Disease	Quality of Life index	81	32 to 64
Sim et al. 2014	South Korea	Journal of Dental Hygiene Science	Periodontal Disease Dental Caries	EuroQol	14,231	30 to 89
Reisine et al. 1989	United States of America	Community Dentistry and Oral Epidemiology	Periodontal Disease	Sickness Impact Profile	152	≥ 18
Wang et al. 2013	Taiwan	Quality of Life Research	Tooth Loss	SF-36	15,501	18 to 64

SF-36: 36-Item Short Form Survey; EuroQol European Quality of Life instrument; AQol Assessment of quality of life, WHOQOL-BREF Abbreviated version for the World Health Organization Instrument for quality of life assessment; 8 Item WHOQOL 8-item World Health Organization Quality of Life instrument; SF-12 12-Item Short Form Survey.

Table 2 Descriptive information and summary results of the studies regarding tooth loss exposure and HRQoL.

1st Author/ Year	Reference/ Exposure	Outcome	Results	Crude or Adjusted	Main findings	Limitations/ Quality assessment
Akifusa et al. 2005	Number of teeth: ≥20 teeth ≤19 teeth	SF-36 PCS	OR (95% CI) *p<0.005: ≥20 teeth: Ref./ ≤19 teeth: 3.42 (1.06-11.01) β: 1.23*	Sex, region where individuals lived and activities of daily living.	Those with ≥20 teeth had better quality of life than those with ≤19 teeth.	Did not include patients with severely impaired activities of daily living. Quality: medium
Allen et al. 1999	Edentulous/ Dentulous	SF-36 at the item level	No associations	Crude	The SF36 did not discriminate between edentulous and dentulous.	Subjects were not randomly allocated to treatment groups. Quality: medium
Armellini et al. 2008	Dentition status: -CDA -SDA1 -SDA2	SF-36 at the item level	Means (SD): CDA/SDA1/SDA2 Physical function * p<0.05 CDA: 92.3(4.3) SDA1: 79.8(5.4)* SDA2: 75.0(19.4)* Role-physical * p<0.05 CDA: 38.5(18.0) SDA1: 79.0(18.5)* SDA2: 71.1(19.4)	Age and sex.	Participants with SDA (1 and 2) had worse Physical functioning compared with those with CDA. Those with SDA1 had better scores on Role physical that those with CDA.	Subjects with CDA were under-represented. Quality: medium

Table 2 (cont) Descriptive information and summary results of the studies regarding tooth loss exposure and HRQoL.

1st Author/ Year	Reference/ Exposure	Outcome	Results	Crude or Adjusted	Main findings	Limitations/ Quality assessment
Lee et al. 2007	Dentulous/ Edentulous	SF-36 PCS MCS	Means (SD) PCS Dentulous 53.45 (7.88) Edentulous 48.36 (9.54) Means (SD) MCS Dentulous 50.73 (8.25) Edentulous 49.53 (9.15)	Age, gender, education, income, hypertension, diabetes, asthma, OHIP scores, lifestyle satisfaction	Being edentulous did not affect the PCS and the MCS.	Focus on only dentulous and edentulous condition, (exclusion of other oral diseases). Quality: high
Brennan and Spencer, 2005	Self-reported number of teeth: cont.	EuroQol Scale scores[A]	β (SE) *p<0.005 -0.001*	Age, sex, type of visit, insurance status.	Number of teeth was not associated with quality of life.	High percentage of dental problems Quality: high
Brennan et al. 2008	Number of functional units[B] Cont.	EQ-VAS Total score	β 0.198	Sex, dental visit, ethnicity, language, income, education, concession card	The higher the number of functional units, the better the quality of life.	Low response rate. Underrepresentation of subgroups of the population i.e. homeless. Quality: high
Brennan et al. 2012	Self-reported number of teeth: ≥21/ <21	EuroQol Total score	β (SE) ≥21= Ref. <21= -0.014 (0.017)	Age, sex, place of birth, social status, oro-facial pain, sore gums, diet.	Number of teeth was not associated with health-related quality of life.	Cross sectional design; high percentage of Australians. Quality: high

Table 2 (cont) Descriptive information and summary results of the studies regarding tooth loss exposure and HRQoL.

1st Author/ Year	Reference/ Exposure	Outcome	Results	Crude or Adjusted	Main findings	Limitations/ Quality assessment
Brennan 2013	Self-reported number of teeth: ≥21/ <21	EuroQol/Aqol Score	EuroQol: Mean dif. (SE) ≤ 20 versus ≥21= 3.2 (0.5) AQol: Mean dif. (SE) ≥21/ <21= 0.12 (0.02)	Crude	Individuals with less teeth had worse quality of life.	Cross-sectional design. Low response rate. Quality: high
Cano-Gutiérrez et al. 2015	Self-reported number tooth loss: None/1-4/ 4 to half/ more than half/ edentulous	EQ-VAS Total score	Means (SE) *p<0.05: Complete dental arch: 81.2(2.7) Edentulous with denture: 70.1(0.5)* Edentulous-no denture: 72.9(2.2)* Rho EQ-VAS and edentulism:-0.102 * p values: None tooth lost: Ref. 1-4 teeth lost 0.3 4 to half teeth lost 0.034 more than half lost 0.025 1-4 teeth lost/4 to half teeth lost 0.024 4 teeth to half lost/ more than half lost 0.97	Crude	Edentulism and number of teeth negatively affect HRQoL.	Cross-sectional design. Quality: high

Table 2 (cont) Descriptive information and summary results of the studies regarding tooth loss exposure and HRQoL.

1st Author/ Year	Reference/ Exposure	Primary outcome	Summary Measures/ Results	Crude or Adjusted	Main findings	Limitations/ Quality assessment
Fontanive et al. 2013	Number of teeth >13 teeth/ ≤13 teeth	WHOQOL BREF domains	No data were reported/not significant	Age, gender, education, income.	The number of teeth did not affect the HRQoL.	Not reported Quality: high
Hugo et al. 2009	Dentulous/ Edentulous	WHOQOL BREF Domains[A]	OR(95%CI): Physical domain Dentulous (ref.): 1 Edentulous 1.67 (1.10;2.54)	Age, gender, income, education, marital status, residence, smoking, medications, chronic conditions, depression.	Being edentulous was associated with poorer HRQoL on the physical domain.	Occupation was not assessed. Self-reported medical conditions. Quality: high
Mack et al. 2005	Number of teeth: Maxilla All/13-10/ ≤ 9 Mandible All/13-10/ ≤9	SF-12 -PCS	B: Complete dental arch: Reference ≤ 9 teeth maxilla= -0.45 (p= <0.01)	Age, income, gender, education.	The presence of nine or fewer teeth on the maxilla has a negative impact on HRQoL.	Self-reported data. No information on denture Quality: medium
Marino et al. 2008	Number of teeth: cont.	SF-12 -PCS -MCS	No measures were reported in the adjusted analysis	Age, gender, occupation, living arrangement.	Number of teeth did not affect HRQoL.	Cross- sectional design. Convenience Sample. Quality: medium

Table 2 (cont) Descriptive information and summary results of the studies regarding tooth loss exposure and HRQoL.

1st Author/ Year	Reference/ Exposure	Primary outcome	Summary Measures/ Results	Crude or Adjusted	Main findings	Limitations/ Quality assessment
Hewlett et al. 2015	Self-reported: Dentulous/ Edentulous	8 item WHOQOL Total score	Means (SD): Dentulous 54.1 (13.67)/ Edentulous 60.6 (15.5) p<0.01	Age, sex, income, education and chronic diseases.	Being edentulous was associated with worse quality of life.	Self-reported data, no information on denture use. Quality: high
Rodrigues et al. 2012	Dentition Status: Dentulous/ Edentulous	WHOQOL-Old domains	PR (CI) Social Participation: 2.12 (1.1-4.0) Not significant for the other domains	Age, sex, household income.	Edentulism was associated with worse social participation.	Cross-sectional design. Quality: high
Wang et al. 2013	Self-reported number of lost teeth: None/ 1-8/ ≥9	SF-36 at the item level	β coefficient (95% CI) No tooth lost: Reference Physical function 1-8: 0.10 (-0.28, 0.49) ≥9: 1.31 (0.26, 2.37) p=0.015 General health 1-8: -0.74 (-1.38, -0.11) p= 0.022 ≥9: -0.01 (-1.77, 1.76)	Adjusted: age, sex, education, BMI, marital status, chronic diseases, alcohol use, smoking, chewing betel.	Tooth loss was associated with better physical functioning and worse general health.	Self-reported data and cross-sectional design. Quality: high

SF-36 36-Item Short Form Survey, PCS Physical Component Score, OR ODDS ratio, β Beta coefficient, CDA Complete dental arch, SDA Shortened dental arch + intact anterior regions; SDA^2 Shortened dental arch + and interrupted anterior regions, SD Standard Deviation, MCS Mental Component Score. A) The EuroQol item responses were converted to health state values, where each set of responses on the standard 5-item instrument was matched to a health state value, where 0 = death and 1.0 = perfect health, SE Standard Error, B) 95.3% of functional units corresponded to pairs of natural teeth, with the main findings replicated when tooth loss was used rather than for functional units (Pearson correlation coefficient = 0.90, P=0.0001), EQ-VAS Visual Analogue scale of the EuroQol, AQoL Assessment of quality of life. EQ-VAS Visual Analogue scale of the EuroQol, SE Standard Error, Rho, WHOQOL-BREF Abbreviated version for the World Health Organization Instrument for quality of life assessment, A the scores of each domain of the WHOQOL-BREF were categorized by their median into low (median) and high (>median), OR odds ratio, SF-12 12-Item Short Form Survey, PCS Physical Component Score, MCS Mental Component Score, SD Standard Deviation, WHOQOL 8-item World Health Organization Quality of Life instrument, PR Prevalence Ratio.

Table 3 Descriptive information and summary results of the studies regarding periodontal disease exposure and HRQoL.

1st Author/ Year	Reference/ Exposure	Primary outcome	Summary measures/ Results	Crude or Adjusted	Main findings	Limitations/ Quality assessment
Brennan and Spencer, 2005	Dentist diagnose No/Yes	EuroQol Scale scores[A]	β (SE) No Periodontal Disease: ref. Yes: -0.02 (0.03)	Age, sex, type of visit, insurance status, number of teeth.	Periodontal disease was not associated with quality of life.	Sample with high level of dental problems. Quality: high
Brennan, 2007	Gingival recession [B] Probing Depth [C] Gingivitis [D] Loss of attachment [E]	EuroQol Disability weights	No Periodontal Disease: ref. *p<0.05 Gingival recession: 0.004* 6+ mm Probing Depth: 0.018* Gingivitis 0.001* 6+ mm Loss of attachment 0.012*	Crude	Greater symptom was associated with +6mm pocket depth.	Quality: high
Sim et al. 2014	Community Periodontal Index No disease/ CPI>3	EuroQol Domains	OR *p<0.005 Usual activity domain: No disease: 1 (ref) CPI> 3: 1.19*	Age, sex, income, education, smoking, drinking, brushing, visit.	Periodontitis was associated with worse usual activity.	Lack of control for potential confounders. Quality: medium

Table 3 (cont) Descriptive information and summary results of the studies regarding periodontal disease exposure and HRQoL.

1st Author/ Year	Reference/ Exposure	Primary outcome	Summary measures/ Results	Crude or Adjusted	Main findings	Limitations/ Quality assessment
Marino et al. 2008	-Community Periodontal Index: Sound /bleeding gums, Calculus, Shallow pockets, Deep pockets. -Self-reported bleeding gums	SF-12 PCS and MCS	PCS β (SD) *p<0.05 Deep pockets (< 5 mm) No: ref/ Yes: 4.346 (1.76)* MCS β: Self-reported bleeding gums No: Ref./Yes: 1.51	Age, gender, occupation before retirement, living arrangement.	Participants with deep periodontal pockets had better PCS.	Convenience sample of volunteers. Quality: medium
Saletu et al. 2005	AAP criteria for disease severity: slight[F]/ moderate[G] / severe [H] CAL/ API/ PBI	Quality of Life index Total score	Mean (SD) *p<0.005 control: 8.5 (1.0)/ patients: 7.4 (1.5)* Correlation coefficient *p<0.005 Disease severity: -0.339* CAL: -0.292* API: -0.170/ PBI:-0.123	Age, sex and smoking status.	Periodontitis was associated with worse HRQoL.	Small sample size. Quality: high

Table 3 (cont) Descriptive information and summary results of the studies regarding periodontal disease exposure and HRQoL

1st Author/ Year	Reference/ Exposure	Primary outcome	Summary measures/ Results	Crude or Adjusted	Main findings	Limitations/ Quality assessment
Reisine et al. 1989	No disease/ Pocked depth of more than 4 mm	Sickness impact profile: % impaired individuals	>4mm pocket depth/control Rest and sleep: 6%/4% Home tasks: 12%/2% Social interaction: 18%/ 4% Intellectual: 15%/ 0% Speech: 21%/ 2% Work: 12%/ 2% Leisure: 18%/ 8%	Age, sex.	Individuals with periodontal disease had worse quality of life.	Convenience sample Quality: medium
Moghadam et al. 2015	No disease/ Clinical Attachment Loss of 5mm or more	WHOQOL-BREF Domains	β *p<0.001 No disease: Ref. Physical -4.21* Psychological -7.57* Environment -6.40* Social Relationships (not significant)	Age, sex.	Periodontal disease was negatively associated with HRQoL.	Convenience sample Quality: medium

EuroQol European Quality of Life instrument, A) Scale scores: The EuroQol item responses were converted to health state values, where each set of responses on the standard 5-item instrument was matched to a health state value, where 0 = death and 1.0 = perfect health. B) Gingival recession, cemento-enamel junction was apical to the free gingival margin by 1+ mm, C: Probing Depth, distance from the free gingival margin to the bottom of the periodontal pocket= 6+ mm. D) Gingivitis, was recorded if, after probing to the base of the pocket occurred, any bleeding was observed within 10 sec. E) Loss of attachment, gingival recession + pocket depth at each site=6+ mm. PCS physical component score, MCS mental component score F) Slight: attachment loss of 1–2mm and/or a bone loss of 10–30%. G) Moderate: attachment loss of up to 4mm and/or bone loss of 30-50%. H) Severe: attachment loss of ≥5mm and/or bone loss of >50%. CAL (clinical attachment loss); API (approximal plaque index); PBI (papillary bleeding index).

Table 4 Descriptive information and summary results of the studies regarding dental caries exposure and HRQoL outcome.

1st Author/ Year	Group of reference Exposure	Primary outcome	Summary measures/ Results	Crude or Adjusted	Main findings	Limitations/ Quality assessment
Brennan and Spencer, 2005	Having Dental Caries (main condition/ diagnosed by dentists): Yes/No	EuroQol Scale scores [A]	β (SE) No dental caries (Reference) Yes: -0.05(0.02)	Age, sex, type of visit, insurance status, number of teeth.	Dental caries was associated with worse scores of quality of life.	Higher percentage of dental problems among the patients compared to the population. Quality: high
Sim et al. 2014	DMFT index DMFT < 7/ DMFT ≥7	EuroQol Domains	OR *p<0.05 DMFT < 7: 1 (Ref.) Mobility DMFT ≥7: 1.18 * Self-care DMFT ≥7: 1.01 (not significant) Usual activity: DMFT ≥7: 1.19 * Pain/discomfort DMFT ≥7: 1.16 * Anxiety/depression DMFT ≥7: 1.05 (not significant)	Age, sex, income, education, smoking, drinking, tooth brushing frequency, regular dental visit.	Having high dental caries was associated with worse quality of life on the mobility, usual activity and pain and discomfort domains.	Cross-sectional design. Lack of investigation of potential confounders such as systemic diseases. Quality: medium

Table 4 (cont) Descriptive information and summary results of the studies regarding dental caries exposure and HRQoL outcome.

1st Author/ Year	Group of reference Exposure	Primary outcome	Summary measures/ Results	Crude or Adjusted	Main findings	Limitations/ Quality assessment
Fontanive et al. 2013	DMFT index: ≤25/>25	WHOQOL-BREF domains [B]	PR(95% CI) for the Social Relationship domain: ≤25= 1 >25= 0.73 (0.55:0.96) Not significant for the following domains: Psychological/ Social Relationships/ Environment	Age, gender, education, income, use and need of prosthesis.	Individuals with a DMFT index of 25 or more had worse quality of life on the social relationships domain.	Not reported Quality: high

EuroQol European Quality of Life instrument, A) The EuroQol item responses were converted to health state values, where each set of responses on the standard 5-item instrument was matched to a health state value, where 0 = death and 1.0 = perfect health, β beta coefficient, SE Standard Error, WHOQOL-BREF Abbreviated version for the World Health Organization Instrument for quality of life assessment, B) The scores of each domain of the WHOQOL-BREF were categorized by their median into low (median) and high (>median), PR Prevalence Ratio

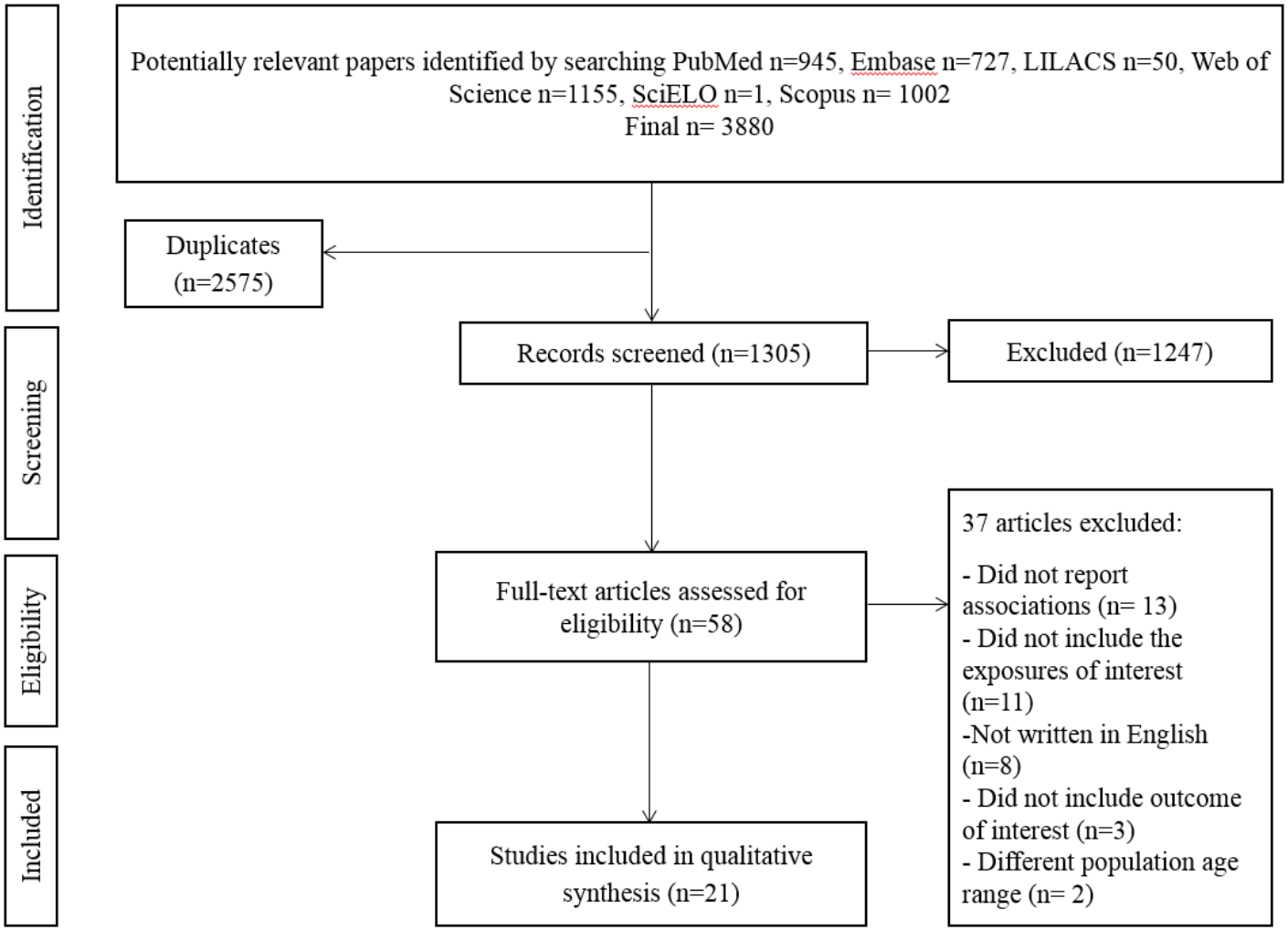

Figure 1- Study selection. Adapted from: Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gøtzsche PC, et al. (2009) The PRISMA Group.

Appendix 1- Search strategies across all the databases

PUBMED n= 945

((SF-36 OR SF-12 OR SF-9 OR SF-6 OR EUROQol OR EQ-5d OR WHOQol OR WHOQol-bref OR Aqol OR “assessment of quality of life” OR HUI OR “health utility index” OR “quality of life index” OR “quality of life inventory” OR “health-related quality of life” OR HRQol OR “general quality of life”) AND (“dental caries” OR “root caries” OR “DMF Index” OR periodontal disease* [ALL] OR gingivitis [ALL] OR periodontitis [ALL] OR periodontal pocket* [ALL] OR tooth loss* [ALL] OR “number of teeth” OR “shortened dental arch” OR “functional dentition” OR “oral health” OR “dental status”) AND (“quality of life” OR “patient satisfaction”)) NOT (child* NOT adult*)

WEB OF SCIENCE n= 1,155

TOPIC: ((((((((((((((((((SF-36 OR SF-12) OR SF-9) OR SF-6) OR EUROQol) OR EQ-5d) OR WHOQol) OR WHOQol-bref) OR azol) OR "assessment of quality of life") OR HUI) OR "health utility index") OR "quality of life index") OR "quality of life inventory") OR "health-related quality of life") OR harmol) OR "general quality of life") AND ((((((((((("dental caries" OR "root caries") OR "DMF Index") OR "periodontal disease*") OR gingivitis) OR periodontitis) OR "periodontal pocket*") OR "tooth loss*") OR "number of teeth") OR "shortened dental arch") OR "functional dentition") OR "oral health") OR "dental status")) AND ("quality of life" OR "patient satisfaction"))

SCOPUS n= 1,002

TITLE-ABS-KEY ((sf-36 OR sf-12 OR sf-9 OR sf-6 OR euroqol OR eq-5d OR whoqol OR whoqol-bref OR aqol OR "assessment of quality of life" OR hui OR "health utility index" OR "quality of life index" OR "quality of life inventory" OR "health-related quality of life" OR hrqol OR "general quality of life") AND ("dental caries" OR "root caries" OR "DMF Index" OR "periodontal disease*" OR gingivitis OR periodontitis OR "periodontal pocket*" OR "tooth loss*" OR "number of teeth" OR "shortened dental arch" OR "functional dentition" OR "oral health" OR "dental status") AND ("quality of life" OR "patient satisfaction")) AND NOT (child* AND NOT adult*)

EMBASE n= 727

'sf 36' OR 'sf 12' OR 'sf 9' OR 'sf 6' OR euroqol OR 'eq 5d' OR whoqol OR 'whoqol bref' OR aqol OR 'assessment of quality of life' OR hui OR 'health utility index' OR 'quality of life index' OR 'quality of life inventory' OR 'health-related quality of life' OR hrqol OR 'general quality of life' AND ('dental caries' OR 'root caries' OR 'dmf index' OR periodontal NEXT/1 disease* OR gingivitis OR periodontitis OR periodontal NEXT/1 pocket* OR tooth NEXT/1 loss* OR 'number of teeth' OR 'shortened dental arch' OR 'functional dentition' OR 'oral health' OR 'dental status') AND ('quality of life' OR 'patient satisfaction') AND ([adult]/lim OR [aged]/lim OR [middle aged]/lim OR [very elderly]/lim OR [young adult]/lim)

LILACS n= 50

(SF-36 OR SF-12 OR SF-9 OR SF-6 OR EUROQol OR EQ-5d OR WHOQol OR WHOQol-bref OR Aqol OR "assessment of quality of life" OR HUI OR "health utility index" OR "quality of life index" OR "quality of life inventory" OR "health-related quality of life" OR HRQol OR "general quality of life") AND ("quality of life" OR "patient satisfaction") AND ("dental caries" OR "root caries" OR "DMF Index" OR "periodontal disease" OR gingivitis OR periodontitis OR "periodontal pocket" OR "periodontal pockets" OR "tooth loss" OR "tooth losses" OR "number of teeth" OR "shortened dental arch" OR "functional dentition" OR "oral health" OR "dental status")

Filter for Human studies

SciELO n= 1

SF-36 OR SF-12 OR SF-9 OR SF-6 OR EUROQol OR EQ-5d OR WHOQol OR WHOQol-bref OR Aqol OR "assessment of quality of life" OR HUI OR "health utility index" OR "quality of life index" OR "quality of life inventory" OR "health-related quality of life" OR HRQol OR "general quality of life" [All indexes] and "quality of life" OR "patient satisfaction" [All indexes] and "dental caries" OR "root caries" OR "DMF Index" OR "periodontal disease" OR gingivitis OR periodontitis OR "periodontal pocket" OR "periodontal pockets" OR "tooth loss" OR "number of teeth" OR "shortened dental arch" OR "functional dentition" OR "tooth losses" OR "oral health" OR "dental status" [All indexes]

Appendix 2- Data extraction form

Data collection form - Observational Studies

Record any missing information as unclear or not described, to make it clear that the information was not found in the study report(s), not that you forgot to extract it.

Review title	Oral conditions and health-related quality of life: a systematic review.
Paper ID *(surname of first author and year of publication e.g. Smith 2001)*	
Notes	

General Information

Date form completed *(dd/mm/yyyy)*	
Name of reviewer	
Paper title	
Journal published	
Reference citation	
Study author contact details	
Notes:	

Characteristics of studies

Study Characteristics		Yes	No	Unclear	Location in text or source *(pg & ¶/fig/table)*
Aim of study Record the aim as stated in the paper		☐	☐	☐	
Study design according to the authors	Cohort prospective	☐	☐	☐	
	Cohort retrospective	☐	☐	☐	
	Case-control	☐	☐	☐	
	Cross-sectional	☐	☐	☐	
	Ecological Study	☐	☐	☐	

Place Identify the country		☐ ☐ ☐	
Ethically approved		☐ ☐ ☐	
Informed consent obtained		☐ ☐ ☐	
Participants and setting	Record information regarding participants and location	Age range:	
Method of recruitment of participants	☐ Randomly ☐ Convenience		
Total no. of subjects investigated			
Inclusion criteria			
Exclusion criteria			
Type of exposure	Dental Caries	☐ ☐ ☐	
	Periodontal Disease	☐ ☐ ☐	
	Tooth Loss	☐ ☐ ☐	
Exposure details	Describe how exposure was investigated and defined (categories)		
Time points	Record the time points at which the exposure was assessed		
Time frame (from exposure to follow-up)	Record time between the assessment of exposure at last time and the occurrence of PD		
Outcome: Generic			

measure for HRQol used	
Outcome details: How the outcome was analysed (as a continuous variable or categorized/ specify the categories)	
Secondary outcome	Record any secondary outcome
Covariates analysed	List covariates included
Confounding factors/ effect modifiers accounted for	
Results (specify, e.g. OR, RR, PR, IRR) (specify the reference group)	Crude (CI 95%)
	Adjusted (CI 95%)
Authors' reported limitations of study's methods/results	Record limitations presented by the authors
Key conclusions of study authors	

Appendix 3 - MAStARI Appraisal instrument

JBI CRITICAL APPRAISAL CHECKLIST FOR COHORT AND CASE CONTROL STUDIES

1. Is the sample representative of patients in the population as a whole? Yes/No/Unclear/Not Applicable
2. Are the patients at a similar point in the course of their condition/illness? Yes/No/Unclear/Not Applicable

3. Has bias been minimised in relation to selection of cases and of controls? Yes/No/Unclear/Not Applicable

4. Are confounding factors identified and strategies to deal with them stated? Yes/No/Unclear/Not Applicable

5. Are outcomes assessed using objective criteria? Yes/No/Unclear/Not Applicable

6. Was follow up carried out over sufficient time period? Yes/No/Unclear/Not Applicable

7. Were the outcomes of people who withdrew described and included in the analysis? Yes/No/Unclear/Not Applicable

8. Were the outcomes measured in a reliable way? Yes/No/Unclear/Not Applicable

9. Was appropriate statistical analysis used? Yes/No/Unclear/Not Applicable

JBI CRITICAL APPRAISAL CHECKLIST FOR STUDIES REPORTING PREVALENCE DATA

1. Was the sample representative of the target population? Yes/No/Unclear/Not Applicable

2. Were the study participants recruited in an appropriate way? Yes/No/Unclear/Not Applicable

3. Was the sample size adequate? Yes/No/Unclear/Not Applicable

4. Were the study subjects and the setting described in detail? Yes/No/Unclear/Not Applicable

5. Was the data analysis conducted with sufficient coverage of the identified sample? Yes/No/Unclear/Not Applicable

6. Was follow up carried out over sufficient time period? Yes/No/Unclear/Not Applicable

7. Were the objective, standard criteria used for the measurement of the condition? Yes/No/Unclear/Not Applicable

8. Was there appropriate statistical analysis? Yes/No/Unclear/Not Applicable

9. Are all important confounding factors/subgroups/differences identified accounted for?? Yes/No/Unclear/Not Applicable

10. Were subpopulations identified using objective criteria?

Chapter 4 Methods for the empirical paper

Study setting

The empirical papers of the current thesis used data from the *EpiFloripa* Study. The first wave was carried out in 2009 as a survey to investigate the prevalence of health conditions, and risk and protective factors that impact health of a representative sample of adults (20 to 59 years) residing in the urban area of Florianópolis. A second wave of the study was performed in 2012, and all individuals evaluated in 2009 (n=1720) were traced. Florianópolis is the state capital of Santa Catarina, a Southern state in Brazil. In 2009, the estimated population of the city was 408,163 inhabitants, and the large majority of them (over 95%) occupied urban areas. The dependency ratio of the city was 47.7%, and its human development index was 0.847 in 2010, when Florianópolis was ranked as the third most developed city in Brazil. In the same year, the infant mortality rate was 9.1/1,000 live births, and the average life expectancy was 77.3 years (IBGE, 2010).

Researchers from the Postgraduate Program in Public Health, Nutrition and Physical Education from the Federal University of Santa Catarina, as well as from the Postgraduate Program in Epidemiology and Physical Education from the Federal University of Pelotas participated in the study.

Study design

This thesis includes cross-sectional evaluations of the *EpiFloripa* study, which is a population-based prospective study.

Sampling procedures

Sample size calculations

To calculate the sample size the formula for a simple causal sample prevalence added from a relative value to the estimated design effect (cluster sampling) and a proportion of expected losses was used. For this we used Epi-Info, version 6.04:

$$n = N. z 2. P (1-P) / d 2. (N - 1) + z 2. P (1-P) X + deff\% \text{ of estimated losses}$$

Where:

n = minimum required sample size; N = Number of the reference population: 239,448 (estimated number of adults from 20 to 59 years residing in the urban area of Florianópolis); Z = confidence level (5%) expressed in standard deviation (1.96); P = expected prevalence of the phenomenon being investigated in the population: 50% (unknown data). That is, the outcome was unknown or considered to be 50% prevalence. d = expected sampling error (precision): 4.0%; deff = design effect of the study sample, by clusters, estimated as equal to 2; % estimated losses: 10%; % control of confounding factors: 20% (association studies). The sample size was equal to 1,581 and was increased to improve the statistical power of the study. Due to the availability of financial resources, the sample size of the study was estimated to be 2,016 adults.

Sampling Process

The selection of the sample was performed by clusters in two stages. Firstly, the census tracts of the city were systematically selected (60 out of 420), followed by a random selection of households. According to the census from 2000, Florianópolis has 437 census tracts. Seventeen of them were excluded due to lack of information. The average monthly income of the head of the family of all households in each tract was used to order the remaining 420 census tracts in deciles, and a systematic sample of 60 tracts (six tracts in each income decile) was adopted. This was performed as an attempt of obtaining a balanced response rate according to socioeconomic status (Figure 1). The number of households per tract varied from 61 to 840. In order to minimize this variation, tracts with a lower number of households were combined with those with a higher number of households taking the contiguity, location and socioeconomic similarities into account.

The tracts were then divided resulting in 63 tracts selected. Afterwards, a random selection of households was adopted (1134/16755). Considering a mean of 1.78 persons per household, the sampling process would identify 2016 adults. All adults residing in the selected households and aged from 20 to 59 years were eligible to participate. Exclusion criteria included amputees; bedridden individuals; individuals with casts; and those who were not able to answer the questionnaire or remain in the required position for anthropometric measurements to be obtained. Losses were defined when a participants that was visited at least three times and was not found at home (being visited at least once during the weekend and once at night time) or they refused to participate.

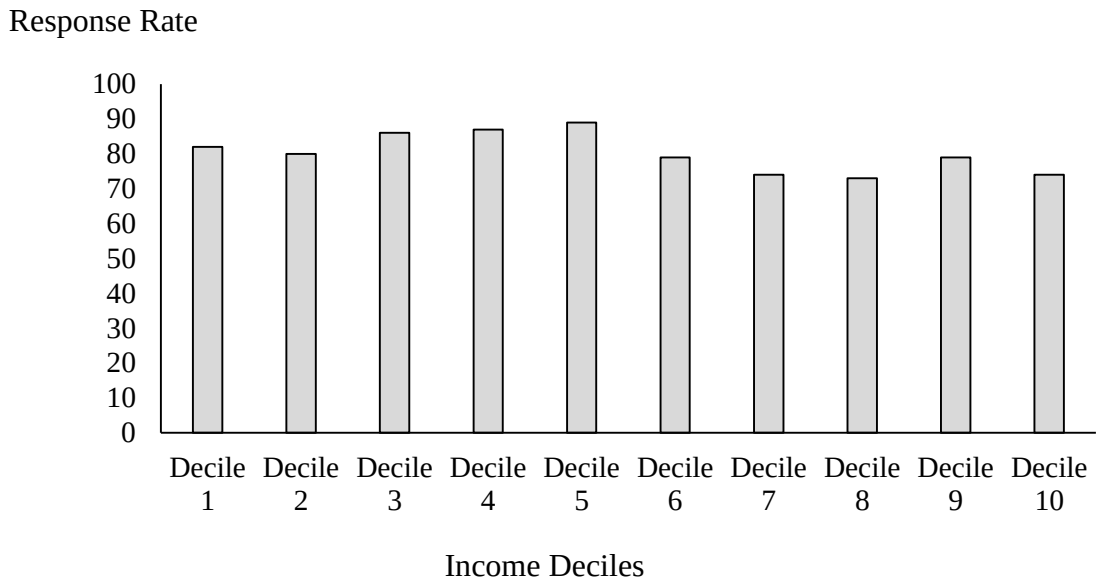

Figure 1 Distribution of response rate (n = 1,720 adults) according to census tracts income deciles. Florianópolis, 2009 (Boing et al. 2014).

Data collection

Baseline (wave 1)

In 2009, face to face interviews were conducted by 35 trained female interviewers with all participants. Individuals answered a structured questionnaire containing 232 self-reported questions regarding sociodemographic characteristics, general and oral health related conditions, medicine consumption, blood donation and domestic violence (Appendix I). Additionally, anthropometric measures, including waist circumference, height, weight and systolic and diastolic blood pressure were collected.

A pre-test questionnaire was conducted with 20 adults of the same age group that were not included in the sample. The objective of the pre-test was to adapt the questionnaire to the field work itself. A pilot study was also conducted in a census tract not included in the study, aiming at guiding key operational aspects of the field work. On average, each interview lasted from 40 to 90 minutes.

Follow up (wave 2)

Between April 2012 and January 2013, individuals interviewed in 2009 (n=1720-participation rate was 85.3%) were traced, and the interviews were conducted by 8 trained dentists at participants households. The team was able to contact 1222 individuals (participation rate in 2012 was 71.1%) and 7 persons who participated in the baseline passed away between 2009 and 2012. In the second wave of the study, a questionnaire of 259 questions on sociodemographic conditions, quality of life, discriminatory experiences, 24-hour dietary recall and oral health aspects was applied (Appendix II). Additionally, blood pressure, weight, and waist circumference were measured and clinical oral health status was assessed (dental caries, tooth loss, and periodontal outcomes).

The data collection process in both waves was supervised by professionals as well as masters, doctoral and post-doctoral students from the Postgraduate Programmes from Federal University of Santa Catarina, including Public Health, Nutrition, and Physical Education.

Key variables in the study for the purpose of the current thesis

Figure 2 shows the variables investigated in the baseline (2009) and in the follow-up (2012) of the *EpiFloripa* study that were evaluated in the current thesis.

Oral health conditions

Oral health conditions were evaluated through self-reported questions in 2009 and in 2012. In 2012, oral clinical examinations were also performed at participants' residences (Figure 2). Oral epidemiological examinations were performed on 1,140 individuals (out of the 1,222 contacted in 2012) for dental caries and periodontal status in 2012. The 'DMF-T index' (number of decayed, missing and filled teeth) was obtained according to the diagnostic criteria recommended by the World Health Organization (WHO, 1997). This index allows the estimation of the mean index and its components, prevalence of caries (% of individuals with DMFT index ≥ 1), and the proportion of each component of the index (D, M and F).

In order to obtain information on periodontal condition, two diagonal quadrants were randomly selected and six sites of all teeth within the designated quadrants were examined. Each site was investigated for the presence of periodontal pockets and periodontal attachment loss following the criteria defined by the World Health Organization (WHO, 1997). Shallow periodontal pockets were recorded when the black mark of the probe was partially covered by the gingival margin. The loss of periodontal attachment was categorized between a) 0-3 mm when cemento-enamel junction (CEJ) is not visible and pocket between 0 to 3mm b) insertion loss between 4 and 5 mm: CEJ

visible in the black probe c) insertion loss between 6 and 8 mm: CEJ visible between the upper black area of the probe and the mark of 8.5 mm, d) insertion loss between 9 and 11 mm: the CEJ visible marks 8.5 mm and 11.5 mm, and e) insertion loss of 12 mm or more: CEJ beyond the visible mark of 11.5 mm.

Diagnostic standardization was obtained by calibration training performed previously to the fieldwork. Calibration involved the repetition of the exam on the same persons, by the same examiners, followed by a comparison of the results with a "gold standard" examiner (inter-examiner error), or by the same examiner at different times (intra-examiner error) in order to reduce the discrepancy in diagnostic interpretation. During her undergraduate degree, the author of this thesis also participated in the examiners training and calibration.

Quality of life

General quality of life was assessed by the World Health Organization Abbreviated Instrument for Quality of Life Assessment-WHOQOL-BREF in the follow-up (2012). The WHOQOL-BREF assesses how an individual feels about his quality of life, health and other areas of his life regarding the previous two weeks. This instrument arises from 10 years of research on quality of life and health care by the WHOQOL Group, which is composed of fifteen centres of international collaboration.

The WHOQOL-100 was developed by the WHOQOL Group in 15 international centres, as an attempt at developing a cross-culturally adapted quality of life assessment. The WHOQOL-100 contains 24 facets (with four questions each) divided into six domains, and four general questions that address overall quality of life and health. Its classification system uses a 5-point Likert scale for each facet. The possible answers range from 1 (not at all; very poor; very dissatisfied; never) to 5 (an extreme; amount; extremely; very good; very satisfied; always). The scores of each domain are then

transformed into a linear scale, between 0 and 100, with 0 being the least favourable quality of life and 100 the most favourable (Skevington et al., 2004). The rationale for the development of the WHOQOL-100, as well, as it theoretical framework, and applicability have been extensively described in a number of publications by the WHOQOL Group (i.e. The WHOQOL Group, 1994a; The WHOQOL Group, 1995a). Overall, the first phase of its development involved a conceptualization of quality of life, followed by a qualitative pilot study aiming at breaking down the overall concept of quality of life into important domains and developing equivalent response scales for different language versions of the instrument. Patients, health professionals, and community members from the 15 centres generated a pool of over 2000 questions, out of which 236 were selected in the pilot version. These questions corresponded in the end to 29 facets of quality of life. Response scales were derived for all language versions, and their equivalence across the 15 centres was tested. This method allowed for the inclusion of semantic and conceptual aspects pertaining to that particular population. This procedure whereby various centres communicate their ideas centrally and with each other is known as 'spoke-wheel' methodology (an analogy with the spokes and hub of a bicycle wheel). This makes the WHOQOL-100 different to other instruments where the scales have limited meaning and conceptual equivalence when translated into other languages. The best questions for each facet were then chosen based on an analysis of the questions importance, considering the amount of variance of the facet that a question explained. The WHOQOL-100 has been continuously applied in different settings, allowing for comparisons of the impacts on quality of life associated with different health conditions. Although the WHOQOL is called a general quality of life measure, most of its domains are health-related, and studies have used this tool to assess the HRQoL across different

populations. Furthermore, since it is not possible to dissociate people from their environment both HRQoL and non-HRQoL may overlap.

Nevertheless, in some situations, answering 100 questions may be an unfeasible process (Skevington, 1999). The need for a shorter version of the WHOQOL-100 arose from circumstances where time is restricted, respondent burden must be minimised and facet-level details are unnecessary, such as in large epidemiological studies. In this sense, an analysis performed by the WHOQOL Group with data from the 15 centres assessed for the development of the WHOQOL-100. Items for the WHOQOL-BREF were selected based on the proportion of variance they explained within their facet and domain, for their association with the WHOQOL-100 and for their construct validity (discriminant) (The WHOQOL Group, 1998; Skevington, 1999). The resulting measure, the WHOQOL-BREF, comprised 26 facets, including two general questions and the other 24 distributed into the four domains of the instrument: physical (n = 7), psychological (n = 6), social relationship (n = 3) and environment (n = 7) (Figure 3) (Skevington et al., 2004). The possible answers also ranged from 1 (not at all; very poor; very dissatisfied; never) to 5 (an extreme; amount; extremely; very good; very satisfied; always). Similarly, the scoring system also remained consistent with the WHOQOL-100, and a linear scale from 0 to 100 indicates the quality of life for each domain of the instrument.

The psychometric properties of the WHOQOL-BREF were evaluated in different settings, including a study using cross-sectional data from surveys among adults from 23 countries (n=11,830). Overall, studies of different dimensions of reliability and construct validity properties indicate that the WHOQOL-BREF is a cross-culturally reliable and valid assessment of quality of life (Skevington et al., 2004).

Sociodemographic conditions

Sociodemographic conditions were collected in the baseline (2009), and included sex, age, household income and educational status (in years of study). The monthly per capita income was collected for all members of the family as a continuous variable in the Brazilian currency (R$1.7 was US$1).

General health conditions

Health conditions were investigated through physical and self-reported assessments. The diagnosis of cardiovascular diseases, renal disease, diabetes, back disorder, tendonitis/tenosynovitis, arthritis, fibromyalgia was self-reported and investigated in 2009 using the following question: “Have you already been told by a physician that you have (name of the condition)?”. Hypertension was self-reported in 2009, and participants also had their blood pressure assessed in 2009 and 2012. Individuals were weighed and measured in 2009 and re-weighed in 2012 in order to assess their body mass index (BMI in kg/m2). The medical diagnosis of depression was self-reported by the participants in 2009, while the occurrence of common mental disorders (CMD) was assessed using the Brazilian version of the Self Reporting Questionnaire (SRQ-20) developed by the WHO (WHO, 1994) also in 2009.

Health related behaviours

Behaviours were investigated in 2009. Smoking status was investigated by using the Fagerström Test for Nicotine Dependence as: never smoked/former smoking/light current smoking (<10 cigarettes daily)/moderate current smoking (10–20)/heavy current smoking (>20) (Heatherton et al., 1991). The Alcohol Use Disorders Identification Test (AUDIT) was used to identify alcohol consumption patterns according to the follow risk levels categories: I (score from 0 to7, the intervention is alcohol education), II (score from

8 to 15, the intervention is simple advice), III (score from 16 to 19, individuals should get simple advice plus brief counselling and continued monitoring), IV (scores from 20 to 40 intervention is referral to specialist for diagnostic evaluation and treatment) (Saunders et al., 1993). Physical activity was investigated with the following questions: In the last three months, have you practiced any physical activity?; If yes, do you practice any physical activity at least once a week? (yes/no); How many days of the week do you practice physical activity? (1 to 2 days/ 3 to 4 days/ 5 to 6 days/ everyday); When you practice physical activity, how long do you practice physical activity? (Florindo et al., 2009)

Quality control

Questionnaires were pre-tested, and a quality control check was conducted by the repetition of key questions in a random sample of 15% of the respondents in 2009 and 10% in 2012 (Kappa ranged from 0.6 to 1.0). Duplicate dental exams were not conducted due to operational reasons. However, new training and calibration were performed two months after the fieldwork started, with a similar population investigated. The Kappa index for the DMFT index ranged from 0.88 to 0.94.

Data Processing

In both waves participants' answers were registered on PDAs (Personal Digitant Assistant) and the database obtained from each device was exported to *STATA* ®. These databases were then joined and cleaned.

Ethical aspects and Funding

Both waves of the *EpiFloripa* study were approved by the ethical committee from the Federal University of Santa Catarina-Brazil (Process: 351/08 (2009) and 1772 (2012)-Appendix III). Informed consent was obtained from all individual participants included

in the study. Finally, each participant was advised about health resources in the neighbourhood and the main results of the study were communicated afterwards. The study was funded by the Brazilian National Council for the Scientific and Technological Development (CNPq - Grant numbers 485327/2007-4 and 508903/2010-6). The PhD scholarship was funded by the Brazilian Program for Overseas Scholarships- Science without borders (Process number: 201579/2014-6).

Variables	Baseline (2009)	Follow-up (2012)
Sociodemographic characteristics		
Sex	✓	
Age	✓	
Income	✓	
Education	✓	
Health-related behaviors		
Smoking status	✓	
Alcohol use	✓	
Physical activity	✓	
General health conditions		
Cardiovascular disease	✓	
Diabetes	✓	
Obesity	✓	✓
Hypertension	✓	✓
Back disease	✓	
Arthritis	✓	
Fibromyalgia	✓	
Depression	✓	
Common mental disorders	✓	
Tendonitis/Tenosynovitis	✓	
Oral health conditions		
Self-rated oral health*		✓
Dental pain*		✓
Xerostomia	✓	✓
Chewing difficulty*		✓
Use of complete denture		✓
Number of teeth		✓
DMFT		✓
Periodontal status		✓
General Quality of life (WHOQOL-BREF)		✓

* Variables investigated in both waves; however, only the follow-up data were used in the current thesis.

Figure 2 Variables in the study.

Domain	Facets incorporated within domains
1 Physical Health	Activities of daily living Dependence on medicinal substances and medical aids Energy and fatigue Mobility Pain and discomfort Sleep and rest Work Capacity
2 Psychological	Bodily image and appearance Negative feelings Positive feelings Self-esteem Spirituality / Religion / Personal beliefs Thinking, learning, memory and concentration
3 Social Relationships	Personal relationships Social support Sexual activity
4 Envirotment	Financial resources Freedom, physical safety and security Health and social care: accessibility and quality Home environment Opportunities for acquiring new information and skills Participation in and opportunities for recreation / leisure activities Physical environment (pollution / noise / traffic / climate) Transport

Figure 3 The WHOQOL-BREF domains.

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Chapter 5 Tooth loss and general quality of life in dentate adults from Southern Brazil

Statement of Authorship

Title of Paper	Tooth Loss and general quality of life in adults
Publication Status	☑ Published ☐ Accepted for Publication ☐ Submitted for Publication ☐ Unpublished and Unsubmitted work written in manuscript style
Publication Details	

Principal Author

Name of Principal Author (Candidate)	Dandara Gabriela Haag
1. Contribution to the Paper	Conceptualized the idea, performed the analyses, wrote manuscript and acted as corresponding author.
Overall percentage (%)	80%
Certification:	This paper reports on original research I conducted during the period of my Higher Degree by Research candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this thesis. I am the primary author of this paper.
Signature	Date 11/05/2017

Co-Author Contributions

By signing the Statement of Authorship, each author certifies that:

i. the candidate's stated contribution to the publication is accurate (as detailed above);

ii. permission is granted for the candidate in include the publication in the thesis; and

iii. the sum of all co-author contributions is equal to 100% less the candidate's stated contribution.

Name of Co-Author	Karen Peres
Contribution to the Paper	Conceptualized the idea, supervised development of work, provided intellectual contribution and revised guidelines
Signature	Date 11/05/2017

Name of Co-Author	David Brennan
Contribution to the Paper	Conceptualized the idea, supervised development of work, provided intellectual contribution and revised guidelines
Signature	Date 11/05/2017

Linkage to the body of work

Findings from the systematic review revealed that tooth loss has a negative impact on individuals' HRQoL, independently of the HRQoL instrument and the country of investigation. Tooth loss can impact quality of life through different pathways, leading to impairments on mastication, speech and dental aesthetics. In this sense, the position of remaining teeth within the oral cavity can influence individuals' HRQoL. The idea of this manuscript arose because testing associations between different definitions of dentition status and HRQoL will reflect different processes. While the number of teeth represents an overall evaluation of oral health, a functional dentition (>20 teeth), for example, reflects the minimum threshold for an adequate oral functionality. On the other hand, evaluating the relationship between the concept of shortened dental arch (SDA) and HRQoL can inform a rational decision for replacement of posterior missing teeth. To address this, the aim of this study was to test associations between number of teeth as a continuous measure, functional dentition and SDA with HRQoL.

Highlights

- There was a negative association between the number of teeth and the physical domain of quality of life.
- A minimum number of teeth was found to be important to adults' quality of life, and individuals without a functional dentition had their physical HRQoL impaired compared to those having 21 teeth or more.
- Participants with SDA had similar quality of life than those with more occlusal units across all domains of HRQoL.
- The presence of intact anterior teeth may mitigate the impacts of missing posterior teeth on general quality of life, since having fewer posterior occlusal units did not impair the HRQoL.

Research and Policy Implications

- Future research should further investigate the impact of location of missing teeth on the association between tooth loss and general quality of life, especially regarding differences between anterior and posterior teeth.
- Preventive strategies aiming at reducing tooth loss should receive special attention, and oral health policies should be integrated with general health.
- Future studies should further investigate the impacts of SDA on general quality of life.

Qual Life Res
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Tooth loss and general quality of life in dentate adults from Southern Brazil

Dandara Gabriela Haag[1] · Karen Glazer Peres[1] · David Simon Brennan[1]

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Abstract
Purpose This study aimed to estimate the association between the number of teeth and general quality of life in adults.
Methods A population-based study was conducted with 1720 individuals aged 20–59 years residing in Florianópolis, Brazil, in 2009. Data were collected at participants' households using a structured questionnaire. In 2012, a second wave was undertaken with 1222 individuals. Oral examinations were performed for number of teeth, prevalence of functional dentition (≥21 natural teeth), and shortened dental arch (SDA), which were considered the main exposures. General quality of life was the outcome and was assessed with the WHO Abbreviated Instrument for Quality of Life (WHOQOL-BREF). Covariates included sociodemographic factors, health-related behaviors, and chronic diseases. Multivariable linear regression models were performed to test the associations between the main exposures and the outcome adjusted for covariates.
Results In 2012, 1222 individuals participated in the study (response rate = 71.1%). Having more teeth was associated with greater scores on physical domain of the WHOQOL-BREF [$\beta = 0.24$ (95% CI 0.01; 0.46)] after adjustment for covariates. Absence of functional dentition was associated with lower scores on the physical domain [$\beta = -3.94$ (95% CI −7.40; −0.48)] in the adjusted analysis. There was no association between both SDA definitions and the domains of general quality of life.
Conclusions Oral health as measured by tooth loss was associated with negative impacts on general quality of life assessed by the WHOQOL-BREF. There was a lack of evidence that SDA is a condition that negatively affects general quality of life.

Keywords Quality of life · WHOQOL-BREF · Tooth loss · Shortened dental arch · Functional dentition

Background

Quality of life refers to all emotional, social, and physical aspects that influence individuals' well-being. In health sciences, health-related quality of life (HRQoL) encompasses aspects of general quality of life that can be clearly shown to be affected by health [1]. Severe tooth loss (<9 teeth) affects 2% of the global population, and was ranked 36th among 100 health conditions causing significant disability within populations as reported in the Global Burden Disease 2010 study [2]. Studies on the association between presence of teeth and quality of life have primarily evaluated oral health-related quality of life (OHRQoL) through oral health-specific instruments, such as the Oral Health Impact Profile (OHIP-14) [3]. Given that oral health is an inseparable part of general health, individuals' dentition status can affect quality of life related to general health, as well as individuals' overall well-being. Hence, investigations on the impact of oral conditions on general quality of life are important [4, 5].

Dentition status can impact quality of life through different pathways. First, tooth loss can adversely affect functionality, which may ultimately impact daily activities of the affected individuals, such as mastication, food choice, and speech [6]. Second, compromised dental

✉ Dandara Gabriela Haag
dandara.haag@adelaide.edu.au

[1] Australian Research Centre for Population Oral Health (ARCPOH), Adelaide Dental School, The University of Adelaide, Adelaide, SA, Australia

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aesthetics can potentially impair self-esteem and social relationships [7]. Studies have further shown that both the presence and the position of remaining teeth within the oral cavity influence individuals' quality of life [8, 9]. Due to these reasons, several definitions of dentition status are proposed based on their position and impact on functionality and aesthetics in order to ascertain their effects on oral health. Two definitions include functional dentition and the shortened dental arch (SDA). The definition of functional dentition is based on number of teeth present. A minimum of 21 teeth present in an individual qualifies as functional dentition [10]. On the other hand, SDA is defined according to the availability of occlusal units (points of contact between upper and lower teeth). Furthermore, SDA's definitions are subdivided into having either 3–5 occlusal units [11] or 4 occlusal units [12]. Apart from the presence of intact anterior teeth, which is mandatory to both definitions of SDA, clinical studies have suggested that individuals with SDA can meet the requirements for a functional and healthy occlusion, including mastication efficiency and an adequate articulation of the mandible [11, 12]. Additionally, studies on the association between SDA and OHRQoL have shown that individuals with SDA have similar quality of life in comparison with those with more posterior occlusal units [8, 9]. Apart from the definitions of functional dentition and SDA, overall number of teeth present within oral cavity also impacts oral health [3].

While some population-based studies have investigated the association between number of teeth and general quality of life, only two studies from Australia assessed the association between functional dentition and this outcome [4, 13], and no studies investigated the impacts of SDA on general quality of life. However, investigations on the association between these definitions and OHRQoL are comparatively more common [3]. Testing the association between dentition status and general quality of life is important as generic measures, such as the WHOQOL-BREF, are able to establish the impacts of oral conditions in relation to general health and overall quality of life. Furthermore, disease-specific measures were primarily developed as social dental indicators rather than a construct to measure quality of life [14]. The use of generic measures of quality of life is further justified as it also allows comparability between the impact of oral and systemic conditions on quality of life.

Testing associations between different definitions of dentition status and general quality of life is important as these associations will reflect different processes. While number of teeth represents an overall evaluation of oral health, being related to multiple general health outcomes and mortality [2], a functional dentition reflects the minimum threshold for an adequate oral functionality [10]. Furthermore, considering that SDA provides an adequate level of mastication efficiency, the differences in quality of life between individuals with more occlusal units and those with SDA will inform a rational decision for replacement of posterior missing teeth [9]. Given the lack of evidence on the association between different definitions of dentition status and general quality of life, particularly in low and middle income countries, the current study aims to fill this significant gap in the literature. To address this, the aim of this study was to test associations between number of teeth as a continuous measure, functional dentition, and SDA with general quality of life using representative population data of adults from Florianópolis, Brazil. The three underlying hypotheses are that (i) individuals with fewer teeth would have lower general quality of life, (ii) shortened dental arch would not negatively affect general quality of life, and (iii) individuals with functional dentition would report better general quality of life comparing with those with <21 teeth.

Methods

Study setting

Data were from the second wave (2012) of the population-based cohort study *EpiFloripa*. The baseline was undertaken in 2009 and the target population included all adults aged from 20 to 59 years residing in the urban area Florianópolis ($N = 408{,}163$ inhabitants in 2009; 59% adults), a middled-sized city in Southern Brazil.

Sampling procedures

In 2009, a reference population of 249,530 adults was considered for sample size estimations. The sample size was calculated to estimate the prevalence of different outcomes considering the following parameters: expected prevalence of 50% for unknown outcomes, sampling error of 4.0 percentage points, confidence level of 95%, design effect of 2.0, and percentage of 10% to compensate for refusals. The final calculation lead to a sample size equal to 2016 individuals of which a participation rate of 85.3% ($n = 1720$) was obtained.

The sampling selection was performed by clusters in two stages. Firstly, the census tracts of the city were systematically selected, followed by a random selection of households. Seventeen of the 437 census tracts were excluded due to lack of information. The average monthly income of the head of the family was used to order the 420 census tracts, adopting a systematic sample of 60 tracts (six tracts in each income decile). In order to minimize the variation in the number of households per tract, census tracts with a lower number of households were combined

with those with a higher number of households taking the contiguity, location, and socioeconomic similarities into account. The tracts were then divided resulting in 63 tracts selected. Afterwards, a random selection of households was adopted (1134/16,755). Considering a mean of 1.78 persons per household, the sampling process would identify 2016 adults. All adults residing in the selected households (20–59 years) were eligible to participate. Exclusion criteria included amputees; bedridden individuals; individuals with casts; and those who were unable to answer the questionnaire or remain in the required position for measurements. Those who could not be found after four attempts or refused to participate were considered as missing. A second wave of the study was carried in 2012, and all individuals evaluated in 2009 ($n = 1720$) were traced. Before considering the participants as losses to follow-up, four attempts of phone scheduling and a similar number of visits to the household were performed. A pilot study was performed in two census tracts that were not included in the sample. Based on the pilot study, interviewers were provided with mobile phones so the contact with the field supervisors was facilitated.

Data collection

Face to face interviews regarding sociodemographic characteristics and health-related behaviors were performed (2009). In the second wave (2012), oral examinations were also performed at participants' homes by eight dentists and the three main exposures were assessed.

Main exposure—dentition status

The number of missing, decayed, and filled teeth was assessed by the DMFT index [15]. The total number of permanent teeth was assessed by counting the number of sound, decayed, and filled teeth. Later, the prevalence of functional dentition (≥21 teeth) [10] was estimated. The number of occlusal units was computed to estimate the prevalence of SDA, which was classified in two definitions: (1) having intact anterior teeth and 3–5 natural occlusal units [11]; (2) having intact anterior teeth and 4 natural occlusal units [12]. The reference groups comprised individuals with more occlusal units than the number established by both definitions of SDA. Individuals with any anterior missing tooth were excluded for both SDA variables ($n = 277$). All edentulous subjects were excluded ($n = 36$). Dental examiners were trained and calibrated with 20 adults who were not included in the final sample. The Kappa index and intraclass correlation coefficient for the DMFT index ranged from 0.88 to 0.94.

Outcome

General quality of life was the outcome assessed in 2012 using the World Health Organization Abbreviated Instrument for Quality of Life Assessment (WHOQOL-BREF), validated in Brazil in 2000 [16]. The WHOQOL-BREF assesses the quality of life in the previous two weeks. It contains 26 questions; two general questions and 24 distributed into four domains: physical ($n = 7$), psychological ($n = 6$), social relationships ($n = 3$), and environment ($n = 8$). The items' scores range from 1 (not at all/very poor/very dissatisfied/never) to 5 (an extreme amount/extremely/very good/very satisfied/always), and were transformed into a 0–100 scale, with higher scores indicating better quality of life [17].

Covariates

Covariates were investigated using a structured questionnaire and through oral epidemiological examinations.

The monthly household income was calculated as the sum of incomes of all family members living in the household. It was collected in 2009 in the Brazilian currency (Real), converted into American dollars (1.9 Real = US$1 in 2009), and classified into tertiles: (1st: 0.00–1,315.8US$; 2nd: 1315.9–2,631.6US$, 3rd: 2,631.7US$-max). The number of individuals residing in the household was included in the regression models. Educational status (years of study) was assessed in 2009. Smoking status was investigated using the Fageström Test for Nicotine Dependence [18] in 2009 as never smoked/former smoking/light current smoking (<10 cigarettes daily)/moderate current smoking (10–20)/heavy current smoking (>20). Participants were weighed, measured, and had their blood pressure assessed in 2012. Those with systolic blood pressure above 120 mm Hg and/or a diastolic blood pressure above 90 mm Hg were considered as having hypertension [19]. The Body Mass Index (BMI) was calculated by dividing the weight in kilograms by the square of the height in metres (kg/m^2). Individuals were then categorized in normal range (18.50–24.99), overweight (25.00–29.99), or obese (≥30.00) [20]. Diabetes and cardiovascular disease were self-reported (2009) and investigated with the following questions: "Have you already been told by a physician that you have diabetes/cardiovascular disease? (yes/no)." Dental pain was investigated in 2009 by the question: "Have you had dental pain in the previous six months? (yes/no)." Xerostomia was assessed in 2012 using the *question* "How often does your mouth feel dry?": Never/occasionally/often/always (categorized as never/occasionally-often/always [21]). The number of untreated decayed teeth was assessed using the

DMFT index [15]. Individuals with ≥4 mm attachment loss and ≥4 mm periodontal pocketing in the same tooth were classified as having periodontal disease.

Quality control

Data quality control of the questionnaire was conducted by administering it through a telephone interview to 15% of the sample ($n = 248$ in 2009, $n = 183$ in 2012). Interviewer reliabilities were assessed using j statistics and intraclass correlation coefficient, ranging from 0.60 to 0.90 in 2009 and from 0.60 to 0.95 in 2012.

Statistical analysis

The descriptive statistics included the distribution of the sample according to the explanatory variables and the WHOQOL-BREF items. Linear regressions were used to test the association between the explanatory variables and the domains of quality of life, followed by multivariable linear regressions adjusted for covariates. Firstly, the outcome was included in the model, followed by sociodemographic variables (sex, age, and household income), health-related behaviors (smoking habits), health conditions (BMI, hypertension, diabetes) and oral conditions (number of decayed and filled teeth, periodontal disease, and dental pain). For the number of teeth, the use of complete denture was also controlled for. The rationale for the inclusion of the selected variables in the models as potential confounders was theoretically based. Sociodemographic factors (age, income, sex) have been associated both with the exposure [22] and outcome [23]. Similarly, general health conditions (diabetes, obesity) [24, 25], health-related behaviors (smoking status) [26, 27,] and conditions of the remaining teeth (untreated dental caries, periodontal disease) [28] have been associated with dentition status and quality life. Therefore, all potential confounders were included in the adjusted models independently of the level of statistical significance in the association between the exposure and/or outcome. The internal consistency index Cronbach's alpha was used to assess the reliability of the WHOQOL-BREF domains (acceptable value >0.70) [29]. The statistical analysis was performed on *STATA 12.0*® using the *svy* command to account for cluster sample design and sampling weight. In 2009, the weight was calculated by multiplying the inverse probability of selection of census tract by the inverse probability of household selection. Less than two individuals on average were interviewed per household. For this reason, dependence in this case was considered insignificant [30, 31]. In 2012, the sample was re-weighted, considering probability of localization.

Results

In 2012, 1222 individuals participated in the study (response rate = 71.1%). The internal consistency index Cronbach's alpha for the Physical, Psychological, Social Relationships, and Environment domains was 0.78, 0.72, 0.60, and 0.72, respectively. The correlations between the WHOQOL-BREF domains were weak to moderate, with the lowest correlation observed between the social relationships domain and environment domain ($r = 0.33$) and the highest correlation between the physical and the psychological domain ($r = 0.60$). The majority of the sample were female (56.4%), and the mean age was 38.7 years. The mean number of teeth was 25.1, and the mean of decayed teeth was 0.4 (data not shown). The prevalence of functional dentition was 83.4%, while 7.1% of the individuals had a SDA according to the first definition (3–5 occlusal units) and 4.4% of them had the second definition of SDA (4 occlusal units) (Table 1).

In the bivariate analysis, older individuals, smokers, those with xerostomia, dental pain and individuals without a functional dentition reported lower scores across all the domains of the WHOQOL-BREF. Females and individuals with lower income and education status, those with diabetes, and those with dentures had worse scores on physical, psychological, and environment domains. No difference in quality of life between individuals with SDA according to both definitions and those with other dentition status was observed (Table 1). On the other hand, the number of teeth was associated with all the domains, and the higher the number of teeth, the higher the quality of life (data not shown).

Most of the individuals reported their overall quality of life and their general health as good or very good. Similarly, the majority of the individuals reported good or very good quality of life on the Physical, Psychological, and Social Relationship domains. For the environment domain, most of the individuals reported regular and good quality of life (Table 2).

After adjusting for sex, age, household income, number of individuals per household, educational status, smoking habits, BMI, hypertension, cardiovascular disease, diabetes, number of decayed teeth, periodontal disease, xerostomia, and dental pain, the association between the absence of a functional dentition and worse quality of life remained for the physical domain [$\beta = -3.94$ (95% CI -7.40; -0.48)]. Likewise, the higher the number of teeth, the better the scores on the physical domain [$\beta = 0.24$ (95% CI 0.01; 0.46)] after adjustment for covariates. There was no association between SDA (both definitions) and quality of life. Similarly, individuals with less occlusal units than what is established by both definitions of SDA

Table 1 Characteristics of the sample and unadjusted associations of the sample characteristics according to the mean values of the WHOQOL-BREF, Florianópolis, Brazil, 2012

Variables	Sample n^a (%)[b]	Physical		Psychological		Social relationships		Environment	
		Mean (95% CI)	p	Mean (95% CI)	p	Mean (95% CI)	p	Mean (95% CI)	p
Sex (n = 1186)			<0.001		<0.001		0.068		0.005
Male	510 (43.6)	76.6 (75.4–77.9)		73.8 (72.6–75.0)		76.4 (74.9–77.9)		63.7 (62.1–65.4)	
Female	676 (56.4)	71.7 (70.1–73.1)		69.4 (68.0–70.8)		74.7 (73.4–75.9)		60.7 (58.6–62.8)	
Age (in years) (n = 1186)			<0.001		0.033		0.016		0.051
23–32	328 (29.5)	77.0 (75.5–78.6)		72.9 (71.3–74.5)		77.5 (75.5–79.6)		62.1 (60.1–64.1)	
33–42	276 (23.8)	73.3 (70.8–75.9)		70.0 (67.9–72.1)		74.2 (72.3–76.0)		60.4 (58.0–62.8)	
43–52	336 (27.0)	72.3 (70.6–73.9)		71.6 (70.1–73.1)		76.6 (72.4–76.8)		62.8 (60.9–64.7)	
53–62	246 (19.8)	70.4 (67.6–73.2)		70.2 (68.5–71.9)		73.7 (71.5–75.8)		64.1 (62.1–66.2)	
Household income (in Brazilian Reais) (n = 1160)			<0.001		<0.001		0.803		<0.001
1rd tertile (higher)	339 (29.8)	77.4 (75.9–79.0)		74.8 (73.3–76.2)		75.8 (73.8–77.8)		69.7 (67.6–71.8)	
2nd tertile	406 (35.4)	73.7 (71.8–75.6)		71.7 (69.9–73.5)		74.9 (73.1–77.8)		62.6 (60.9–64.3)	
3st tertile (lower)	415 (34.8)	71.4 (69.8–72.9)		68.4 (67.3–69.6)		75.4 (74.0–76.9)		55.3 (53.7–57.0)	
Education (in years of study) (n = 1183)			<0.001		<0.001		0.975		<0.001
12 or more	537 (45.6)	76.2 (74.8–77.6)		73.8 (72.6–75.1)		75.9 (74.4–77.5)		67.5 (66.0–69.1)	
9–11	389 (33.4)	74.4 (72.7–76.2)		71.1 (69.1–73.1)		75.1 (73.1–77.2)		59.6 (57.9–61.3)	
5–8	164 (13.6)	69.7 (66.4–73.0)		67.4 (65.1–69.8)		73.9 (70.9–76.9)		54.0 (51.2–56.8)	
Up to 4	93 (7.4)	65.6 (67.0–70.2)		65.6 (61.8–69.3)		78.6 (74.0–83.1)		54.9 (51.5–58.2)	
Smoking status (n = 1179)			0.002		0.007		0.001		<0.001
Never smoked	650 (56.1)	75.1 (73.7–76.4)		72.4 (71.2–73.6)		77.2 (76.0–78.4)		62.8 (61.1–64.7)	
Ex-smoker	317 (26.2)	74.0 (71.9–76.1)		70.6 (68.6–72.6)		73.6 (71.9–75.3)		62.9 (60.7–65.2)	
Light current smokers	95 (7.9)	71.5 (67.5–75.5)		72.1 (69.0–75.2)		73.6 (69.6–77.6)		60.2 (57.0–63.4)	
Moderate and Heavy current smokers	117 (9.9)	70.7 (66.9–74.4)		67.8 (64.6–70.9)		71.6 (67.5–75.7)		57.3 (54.4–60.2)	
BMI (Body mass index) (n = 1100)			<0.001		<0.001		0.145		0.225
Normal range	480 (44.9)	76.5 (75.1–77.9)		73.3 (72.1–74.6)		76.6 (75.1–78.1)		62.6 (60.6–64.6)	
Overweight	399 (35.5)	74.1 (72.4–75.8)		72.1 (70.9–73.4)		74.6 (72.8–76.5)		63.4 (61.7–65.1)	
Obese	221 (19.6)	69.3 (66.7–71.8)		66.5 (64.0–69.1)		75.2 (73.1–77.2)		60.5 (58.1–62.9)	
Hypertension (n = 1148)			0.459		0.657		0.911		0.214
No	598 (52.2)	74.3 (72.7–75.9)		71.6 (70.2–73.0)		75.5 (74.1–76.9)		61.7 (59.8–63.7)	
Yes	550 (47.8)	73.5 (71.9–75.2)		71.2 (69.9–72.5)		75.4 (74.1–76.7)		62.8 (61.0–64.5)	
Cardiovascular disease (n = 1185)			0.003		0.054		0.376		0.099
No	1104 (93.4)	74.6 (73.5–75.7)		71.7 (70.7–72.8)		75.6 (74.6–76.7)		62.4 (60.7–64.0)	
Yes	81 (6.7)	66.0 (60.1–71.9)		68.3 (64.7–71.9)		73.7 (69.2–78.1)		59.5 (56.1–63.0)	

Table 1 continued

Variables	Sample n^a (%)[b]	Physical		Psychological		Social relationships		Environment	
		Mean (95% CI)	p	Mean (95% CI)	p	Mean (95% CI)	p	Mean (95% CI)	p
Diabetes (n = 1185)			<0.001		<0.001		0.351		<0.001
No	1143 (96.2)	74.4 (73.2–75.6)		71.6 (70.5–72.7)		75.5 (74.4–76.6)		62.2 (60.6–63.8)	
Yes	42 (3.7)	65.6 (59.3–71.8)		70.0 (65.8–74.1)		76.3 (71.7–80.9)		61.4 (55.9–66.8)	
Xerostomia (n = 1177)			<0.001		<0.001		<0.001		0.037
Never	1056 (89.6)	75.3 (74.2–76.5)		72.5 (71.6–73.5)		76.3 (75.2–77.4)		62.5 (60.8–64.2)	
Sometimes/often/always	121 (40.5)	62.1 (58.0–66.3)		61.9 (57.8–65.9)		68.3 (64.3–72.3)		58.9 (55.5–62.4)	
Periodontal disease (n = 1104)			0.398		0.197		0.456		0.359
No	1075 (97.3)	74.0 (72.8–75.2)		71.6 (70.6–72.7)		75.4 (74.4–76.4)		62.2 (60.6–63.9)	
Yes	29 (2.7)	71.2 (64.4–78.0)		69.2 (65.1–73.3)		77.4 (71.8–82.9)		60.1 (55.0–65.1)	
Use of denture (n = 1177)			0.002		0.016		0.666		<0.001
No	1064 (91.0)	74.7 (73.5–75.9)		71.8 (70.7–73.0)		75.6 (74.5–76.7)		62.6(61.0–64.2)	
Yes	113 (9.0)	66.9 (62.4–71.3)		67.5 (64.3–70.7)		74.8 (71.4–78.2)		56.9 (53.9–59.9)	
Dental pain (n = 1177)			<0.001		0.004		0.046		0.002
No	943 (80.6)	75.2 (73.9–76.5)		72.2 (71.1–73.3)		76.1 (74.9–77.3)		63.0(61.4–64.6)	
Yes	234 (19.4)	69.6 (67.1–72.0)		68.5 (66.4–70.9)		73.1 (70.5–75.7)		58.8 (55.9–61.6)	
Dentition status (n = 1099)			<0.001		<0.001		0.020		<0.001
≥21 (Functional dentition)	906 (83.4)	75.1 (73.9–76.4)		72.2 (71.0–73.4)		75.8 (74.7–76.9)		62.9 (61.1–64.6)	
1–20	193 (16.6)	66.2 (63.1–69.2)		67.3 (65.1–69.4)		72.6 (70.1–75.1)		57.5 (55.4–59.6)	
SDA1[c] (n = 822)			0.106		0.201		0.738		0.581
>5 OU[d]	715 (86.6)	75.6 (74.3–76.9)		72.6 (71.4–73.7)		75.4 (74.0–76.7)		63.3 (61.6–65.0)	
3–5 OU (SDA 1)	71 (7.1)	70.8 (66.6–75.0)		70.4 (67.4–73.4)		78.8 (74.8–82.7)		62.1 (59.0–65.2)	
<3 OU	36 (6.8)	71.5 (63.5–79.6)		70.0 (63.9–76.1)		72.1 (65.8–78.4)		62.4 (57.8–67.2)	
SDA 2[e] (n = 822)			0.022		0.119		0.978		0.367
>4 OU	738 (89.3)	75.6 (74.3–76.9)		62.6 (71.4–73.7)		75.4 (74.1–76.7)		63.3 (61.6–65.0)	
4 OU (SDA 2)	33 (4.4)	72.0 (65.4–78.6)		70.2 (65.0–75.5)		79.0 (73.2–84.8)		61.2 (56.5–65.9)	
<4 OU	51 (6.3)	69.2 (63.3–75.2)		69.8 (65.2–74.4)		74.3 (69.1–79.5)		61.9 (57.3–66.5)	

WHOQOL-BREF World Health Organization Abbreviated Instrument for Quality Of Life Assessment

[a] Total respondents in 2012 after exclusion of edentate individuals

[b] Weighted

[c] Shortened dental arch according to the first definition (having 3–5 occlusal units)

[d] Occlusal units

[e] Shortened dental arch according to the second definition (having 3 occlusal units). p values from linear regressions

Table 2 Frequency responses (%)[a] for items of the WHOQOL-BREF[b]

Scale points/domains and facets	1 Poor	2	3	4	5 Very good
General quality of life (n = 1179)	0.5	1.9	10.7	61.2	25.7
General health (n = 1179)	1.6	11.2	12.7	58.8	15.7
Physical (n = 1175)					
Activities of daily living	1.4	5.3	14.6	55.5	23.1
Dependence on medicinal substances and medical aids	2.8	13.4	16.3	33.7	33.8
Energy and fatigue	1.3	4.7	32.7	45.4	15.9
Mobility	1.1	2.2	4.5	24.0	68.2
Pain and discomfort	2.1	10.5	19.1	28.1	40.2
Sleep and rest	4.9	16.0	18.6	39.6	20.9
Work capacity	2.3	5.2	10.9	54.4	27.2
Psychological (n = 1176)					
Bodily image and appearance	1.5	4.2	22.2	39.7	32.4
Negative feelings	3.7	3.5	12.0	65.2	15.6
Positive feelings	2.3	10.9	24.5	55.5	6.8
Self-esteem	1.4	5.1	15.8	50.8	26.9
Spirituality/religion/personal beliefs	1.0	1.6	8.6	57.8	31.0
Thinking, learning, memory, and concentration	1.0	10.1	27.9	52.6	8.4
Social relationships (n = 1178)					
Personal relationships	1.4	2.4	14.7	52.6	28.9
Social support	1.0	4.0	18.0	47.3	29.7
Sexual activity	3.2	3.5	14.4	53.3	25.6
Environment (n = 1178)					
Financial resources	3.5	16.5	52.3	18.1	9.6
Freedom, physical safety and security	1.6	6.6	28.6	53.8	9.4
Health and social care: accessibility and quality	10.8	18.3	25.7	34.0	11.2
Home environment	1.4	6.9	12.9	45.5	33.3
Opportunities for acquiring new information and skills	1.2	8.5	26.8	43.9	19.6
Participation in and opportunities for recreation/leisure	4.2	23.4	36.6	28.6	7.2
Physical environment (pollution/noise/traffic/climate)	1.4	10.3	35.6	44.3	8.4
Transport	5.5	12.7	17.9	41.6	22.3

Florianópolis, Brazil, 2012

[a] Weighted data

[b] World Health Organization Abbreviated Instrument for Quality Of Life Assessment

also had similar quality of life in comparison to those with more occlusal units (Table 3).

Discussion

The results of the current study indicate that having fewer teeth negatively affected quality of life after adjustment for covariates. Additionally, participants with SDA had similar quality of life than those with more occlusal units in the adjusted analysis. Finally, individuals without a functional dentition had their quality of life impaired compared to those having 21 teeth or more after adjustment for covariates.

Our results substantiate findings from previous evaluations on negative impacts of tooth loss on general quality of life [5, 6]. However, such comparisons are difficult since different generic instruments with distinct scales are used to assess quality of life. The categorization of the number of teeth may also contribute to this issue. For example, some authors set different cut-off points for number of teeth and others analyze it as a continuous variable. This possibility is further corroborated from a literature search we conducted on PubMed database in January, 2017, where several different categorizations of number of teeth were identified in studies that evaluated the association between this exposure and quality of life [4–6, 28, 32–34]. Despite these differences, the findings on negative impact of tooth

Table 3 Adjusted association between dental status and the domains of the WHOQOL-BREF, Florianópolis, Brazil, 2012

Variables	Physical		Psychological		Social relationships		Environment	
	Unstandardized β (95% CI)	Standardized β (95% CI)	Unstandardized β (95% CI)	Standardized β (95% CI)	Unstandardized β (95% CI)	Standardized β (95% CI)	Unstandardized β (95%CI)	Standardized β (95% CI)
Number of teeth ($n = 1012$)	0.24 (0.02; 0.46)	0.10 (0.01;0.19)	0.09 (−0.12; 0.31)	0.05 (−0.07; 0.17)	0.04 (−0.21; 0.28)	0.02 (−0.10; 0.14)	−0.03 (−0.23; 0.17)	−0.01 (−0.08;0.06)
p value	0.032		0.391		0.765		0.776	
SDA 1[a] ($n = 767$)								
>5 occlusal units	Ref		Ref		Ref		Ref	
3–5 occlusal units (SDA)	−1.64 (−5.87; 2.58)	−0.03 (−0.12; 0.05)	1.24 (−1.74; 4.21)	0.10 (−0.14; 0.34)	5.26 (1.57; 8.95)	0.10 (0.03; 0.17)	2.14 (−1.20; 5.47)	0.04 (−0.02; 0.10)
<3 occlusal units	−0.90 (−6.50; 4.60)	−0.01 (−0.07; 0.05)	−0.47 (−5.11; 4.18)	−0.01 (−0.10; 0.09)	0.10 (−5.51; 5.71)	0.01 (−0.55; 0.57)	2.88 (−2.30; 8.07)	0.04 (0.03; 0.12)
p value	0.558		0.935		0.349		0.171	
SDA 2[b] ($n = 767$)								
>4 occlusal units	Ref		Ref		Ref		Ref	
4 occlusal units (SDA)	−2.08 (−8.52; 4.35)	−0.03 (−0.12; 0.06)	−0.14 (−5.01; 4.73)	−0.01 (−0.36; 0.34)	4.31 (−1.10; 9.71)	0.06 (−0.02; 0.14)	1.51 (−3.12; 6.13)	0.02 (−0.04; 0.08)
<4 occlusal units	−3.14 (−7.55; 1.26)	−0.05 (−0.12; 0.02)	0.31 (−3.52; 4.14)	0.01 (−0.03; 0.13)	1.90 (−2.72; 6.52)	0.03 (−0.04;0.10)	2.49 (−2.00; 7.00)	0.04 (−0.03; 0.11)
p value	0.142		0.898		0.179		0.240	
Dentition status ($n = 1022$)								
≥21 (Functional Dentition)	Ref		Ref		Ref		Ref	
1–20	−3.94 (−7.40; −0.48)	−0.09 (−0.17; −0.01)	−1.22 (−3.92; 1.48)	−0.03 (−0.10; 0.04)	−1.22 (−4.08; 1.64)	−0.03 (−0.10; 0.04)	−1.56 (−4.20; 1.07)	−0.04 (−0.10; 0.03)
p value	0.026		0.371		0.397		0.240	

World Health Organization Abbreviated Instrument for Quality Of Life Assessment

[a] Shortened dental arch according to the first definition (having 3–5 occlusal units), all individuals had intact anterior teeth in all categories

[b] Shortened dental arch according to the second definition (having 3 occlusal units), all individuals had intact anterior teeth in all categories. p values from Multivariable Linear Regressions controlling for sex, age, household income, number of individuals in the household, education, smoking habits, BMI, hypertension, cardiovascular disease, diabetes, xerostomia, number of decayed teeth, periodontal disease, and dental pain. For number of teeth, the use of denture was also included in the model

loss on general quality of life in adults are consistent. An Australian study conducted with individuals aged 45–55 years old revealed that participants with less teeth had lower quality of life as measured by the EuroQol in comparison with those with more teeth after controlling for demographic and socioeconomic variables [6]. Mack et al. reported that losing nine or more teeth was negatively associated with the physical domain of quality of life among adults living in Germany and Poland [34]. It is likely that the broadly studied relationship between the number of teeth and OHRQoL may also pertain to general quality of life, and the number of teeth may affect general quality of life through different pathways such as food selection, speech, and aesthetics resulting in poorer well-being [6].

Similar observations were made for the association between functional dentition and quality of life. Evidence from an Australian study of a similar age group as the current investigation reported better general quality of life for participants with 21 or more teeth present than those without. This was confirmed using two different instruments, the EuroQol and the Assessment of quality of life (Aqol) [4]. The ≥21 teeth threshold is based on clinical principles for a healthy occlusion, and it has been associated with nutritional adequacy [10]. Therefore, the lack of a functional dentition could be associated with pain due to chewing discomfort, being related to the items included in the physical domain of the WHOQOL-BREF. Furthermore, previous studies have shown that poor chewing ability is associated with lower quality of life. This may be related to the impact of chewing on food choice, enjoyment of meals and diet, reflecting the importance of number of teeth to overall well-being [5, 6].

Dissimilarity in the consistency of evidence according to age is noteworthy on the negative impact of tooth loss and functional dentition on quality of life. Although reports with adults support inverse associations between the number of teeth and quality of life, findings from population-based studies with elderly show different results. Studies among older adults in Brazil [32] and Australia [13] have reported no impact of tooth loss or lack of functional dentition on quality of life. However, the categories of tooth loss and the quality of life measures were different between these studies. Several factors may contribute to these differences across generations. These may include higher levels of education and more access to information regarding oral health among younger people. In addition, a possible explanation for this difference could relate to the greater resilience among the elderly and to high expectations about health among younger individuals [35].

Participants with SDA reported similar scores across all the quality of life domains in comparison with those with more occlusal units. Similar findings were observed in studies that investigated the association between SDA and OHRQoL [8, 9]. This might be related to an adequate chewing ability among these individuals, since both definitions of SDA contain a number of occlusal units considered acceptable for a healthy occlusion. Our results also showed that individuals with fewer occlusal units than the minimum number established by both SDA definitions also had similar quality of life scores in comparison with those with more occlusal units. However, studies on OHRQoL have shown that these individuals had poorer quality of life in comparison with those with more occlusal units [8, 9]. It is possible that the number of occlusal units may affect OHRQoL, but is not related to general quality of life. Additionally, the presence of intact anterior teeth may mitigate the impacts of missing posterior teeth on general quality of life. Our findings are suggestive that future research should further investigate the impact of location of missing teeth on the association between tooth loss and general quality of life. This particularly relates to the differences between anterior and posterior teeth [3].

Our study has a number of strengths, but also some limitations. To the best of our knowledge, the association between SDA and general quality of life has only been investigated in clinical settings before [33]. Apart from analyzing the number of teeth as a continuous variable, the cut-off point adopted for this variable (>21/≥21 teeth) was based upon occlusion principles that have implications on nutrition and functionality. Means were adopted as the central tendency measure for the outcome, while other studies used medians as cut-off points to classify the participants as having low and high quality of life for each domain of the WHOQOL-BREF [5, 32]. There is no consensus regarding the best approach to deal with this data; however, we followed the instructions proposed by the WHOQOL-BREF user's manual guide [36]. Finally, the domains of the WHOQOL-BREF met acceptable reliability standards, apart from the Social Relationship Domain. Similar values of internal consistency were also observed for the Social Relationships domain in other studies, and this has been attributed to the small number of questions in this dimension [36, 37].

An important limitation of the current investigation is that the presence of chronic diseases was self-reported. The assessment of these diseases through clinical examination and diagnosis would probably be more valid as they are important confounders in the studied association. Furthermore, our study was restricted to the variables collected in the primary survey, and it is possible that residual confounding may exist. Similarly, no psychological conditions were investigated in 2012, limiting the adjustment for this variable. Additionally, individuals with SDA may have different perceptions of quality of life in relation to their

prosthetic status [9]. Our study is a secondary analysis; hence, it is limited to the variables collected in the primary survey. Availability of information on prosthetic status would have provided insight on this association. Finally, causal inferences are limited due to the study cross-sectional design.

Our research has some important policy implications. One of the global goals for oral health 2020 is to increase the number of individuals with functional dentitions at ages 35–44 [10]. The evidence provided by this study supports this goal and highlights that preventive strategies aiming at reducing tooth loss should receive special attention. Furthermore, oral health policies should be integrated with general health [3]. Risk factors associated with tooth loss, such as smoking and high sugar intake, are common to other chronic health conditions like cardiovascular disease and diabetes. Furthermore, these risk factors tend to co-occur among the same individuals, mainly among those with lower socioeconomic position, increasing their vulnerability to both systemic and oral conditions [38]. Therefore, preventive strategies should tackle the underlining risk factors for tooth loss by adopting a common risk factor approach.

In the studied population, oral health as measured by tooth loss was associated with negative impacts on general quality life. There was lack of evidence that SDA is a condition that negatively affects quality of life. The current investigation adds to the evidence the study of the association between two forms of accepted dentitions for a healthy occlusion, the SDA and the functional dentition, and adults' general quality of life. A minimum number of teeth was found to be important to adults' quality of life, and future studies should further investigate the impacts of SDA on general quality of life. Prospective studies in different settings should investigate the impact of dentition status on quality of life over time and elaborate on the existing evidence on its importance on the different domains of general quality of life among adults.

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Compliance with ethical standards

Conflict of interest The authors declare no conflict of interest.

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Chapter 6 Clustering of chronic health conditions and health-related quality of life in adults

Statement of Authorship

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Principal Author

Name of Principal Author (Candidate)	Dandara Gabriela Haag
1. Contribution to the Paper	Conceptualized the idea, performed the analysis, wrote the manuscript and acted as corresponding author.
Overall percentage (%)	80%
Certification:	This paper reports on original research I conducted during the period of my Higher Degree by Research candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this thesis. I am the primary author of this paper.
Signature	Date 11/05/2017

Co-Author Contributions

By signing the Statement of Authorship, each author certifies that:

i. the candidate's stated contribution to the publication is accurate (as detailed above);

ii. permission is granted for the candidate in include the publication in the thesis; and

iii. the sum of all co-author contributions is equal to 100% less the candidate's stated contribution.

Name of Co-Author	Karen Peres
Contribution to the Paper	Supervised development of work, provided intellectual contribution and revised guidelines
Signature	Date 11/05/2017

Name of Co-Author	David A. González-Chica
Contribution to the Paper	Conceptualized the idea, supervised the data analysis, provided intellectual contribution and revised guidelines
Signature	Date 11/05/2017

Name of Co-Author	Diego A.S. Silva
Contribution to the Paper	Supervised development of work, provided intellectual contribution and revised guidelines
Signature	Date 11/05/2017

Name of Co-Author	David Brennan
Contribution to the Paper	Supervised development of work, provided intellectual contribution and revised guidelines
Signature	Date 11/05/2017

Linkage to the body of work

Findings from the systematic review and from the first empirical study of the current thesis indicate that oral conditions have adverse impacts on general HRQoL. In this sense, a common policy recommendation between the two studies concerns the integration of oral and general health policies based upon on a common risk factor approach. This recommendation is based on the fact that oral and general non-communicable diseases (NCDs) share common risk factors, such as smoking, high sugar diet, and stress (Valderas et al., 2009). The presence of any of these risk factors and their combinations may increase the vulnerability of an individual to more than one health condition. Multimorbidity between oral and general health conditions has been well established by clinical and epidemiological investigations (Nascimento et al., 2015; Schmitt et al., 2015). In addition, multimorbidy has been associated with poorer HRQoL (Fortin et al., 2004). The idea of this manuscript arose from the fact that less attention has been given to assessing the HRQoL impacts associated with the presence of multimorbidity taking oral conditions into account. The use of a generic HRQoL instrument to evaluate the association between patterns of multimorbidity and HRQoL provides a common yardstick of comparison between diseases of different natures, highlighting for the importance of oral conditions and simplifying the understanding of their burden for health policy makers.

Highlights

- The most prominent clustering pattern between groups of NCDs included cardiometabolic, mental and musculoskeletal conditions, but only when individuals also had oral health conditions.

- The higher the number of health conditions within each group (cardiometabolic, mental, oral, musculoskeletal), and the higher the number of groups of health conditions, the lower the HRQoL.
- Mental conditions were observed to be common across groups that were associated with poorer HRQoL in domains including psychological, social relationships and environment

Research and Policy Implications

- Future research should investigate whether the determinants of clusters of risk factors, such as social disadvantage, are also common to clusters of health conditions.
- Future research should further investigate the impacts of multimorbidity on HRQoL, taking oral health conditions into account.
- Strategies focused on multiple health conditions and their risk factors may be substantially more effective than single risk factor/health condition interventions, and may improve individuals' HRQoL.
- Patient reported outcomes, such as HRQoL, are recommended for a greater understanding of how health-related conditions impacts individuals' overall well-being.

Authors

Dandara Gabriela Haag[1]

Karen Glazer Peres[1]

David A. Gonzélez-Chica[2]

Diego A.S. Silva[3]

David S. Brennan[1]

[1] Australian Research Centre for Population Oral Health (ARCPOH), Adelaide Dental School, The University of Adelaide, Adelaide, South Australia, Australia.

[2] Discipline of General Practice, Adelaide Medical School, NHMRC Centre of Research Excellence to Reduce Inequality in Heart Disease, The University of Adelaide, Adelaide, South Australia, Australia.

[3] Post-Graduate Program in Physical Education, Federal University of Santa Catarina, Florianópolis, Brazil.

Corresponding author:

Dandara Gabriela Haag

Adelaide Health and Medical Sciences Building, Adelaide, SA 5005 Tel: +61 8 83132557 Fax: +61 8 8313 3070

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Abstract

PURPOSE: To assess the association between clusters of chronic health conditions (within- and between-groups) and health-related quality of life (HRQoL) among Brazilian adults.

METHODS: Population-based cohort study conducted with adults (20-59 years) from Southern Brazil, investigated in 2009 (n=1,720) and 2012 (n=1,223). Four groups of health conditions were investigated: cardiometabolic, mental, musculoskeletal and oral conditions. HRQoL (physical, psychological, social, and environmental domains) was investigated using the WHOQOL-BREF questionnaire. Clustering within-group was assessed by counts of health conditions in each group, while clustering between-groups was identified through the observed/expected (O/E) prevalence ratio for different group combinations. Multiple linear regression was used in the analyses, adjusted for sociodemographic and lifestyle variables.

RESULTS: 47.8% of the sample had 2+ health conditions. Two prominent patterns of clustering between-groups were identified: cardiometabolic+ mental+ oral (2.5%; O/E=1.7) and all the four groups (3.3%; O/E=3.3). The strongest and most consistent pattern was observed for the association between multimorbidity and the physical domain. Compared to individuals who were free from the selected health conditions, those with all the four groups had a quality of life that was 30%, 19%, 14%, and 9% lower on the physical, psychological, social, and environment domains, respectively.

CONCLUSIONS: Clustering exists both within- and between-groups of health conditions. Multimorbidity has a stronger association with the physical than with the other domains of HRQoL. Strategies focused on multiple health conditions and their risk

factors may be substantially more effective than single risk factor/health condition interventions

Introduction

As a result of technological advances and healthcare improvements, life expectancy has increased worldwide [1]. Concomitantly, there has been a change in the global burden of diseases. While a decline was observed for mortality due to infectious diseases, deaths due to non-communicable chronic diseases (NCDs) caused 71·3% (70·9–72·0) of deaths (39·8 million, 39·2 million to 40·5 million) worldwide in 2015. The increase of NCDs is a particular issue for low- and middle-income countries, as they account for about three-quarters of all NCD death, affecting mainly economically active individuals (young or middle-aged adults) [2]. NCDs also impact the daily lives of affected individuals due to their adverse effects on self-esteem, social relationships and psychological health [3]. As a consequence, NCDs may impair health-related quality of life (HRQoL), which is an important patient-centered outcome that assesses the impact of health conditions on activities of daily living [4].

More than one NCD tends to occur simultaneously among the same individuals (multimorbidity) [5] and several explanations have been proposed to explain the coexistence of these conditions. First, multiple NCDs share common risk factors such as smoking, unhealthy diet, alcohol and stress [6]. As a result, the presence of any of these risk factors can subsequently increase the vulnerability of an individual to more than one NCD. Second, these risk factors do not occur in isolation, and tend to cluster together [7-9]. Consequently, the presence of multiple risk factors within the same individual further increases the chances of multimorbidity. Additionally, clusters of these risk factors tend to have common underlying factors such as social disadvantage, which both directly or indirectly through different risk factors may lead to multimorbidity [7, 8]. Finally, presence of one NCD can itself amplify the risk of other disease by generating an overall immune suppression and/or a general state of inflammation [6].

The association between specific NCDs and HRQoL has been broadly investigated, and studies have repeatedly reported that these conditions have negative impacts on this outcome [10]. There is a lack of population-based studies investigating the relationship between multimorbidity and this outcome. Furthermore, it is possible that depending on the combination or cluster of NCDs, some domains of HRQoL may be more affected, but little is known about which clusters may have a stronger effect on this outcome [10]. Additionally, most of the few available population-based studies investigating the association between multimorbidity and HRQoL have some methodological limitations. First, the majority of them have not accounted for potential confounders such as age, gender, and/or socioeconomic factors [3]. Second, these studies have limited they analysis to some specific NCDs, such as cardiovascular diseases, diabetes and cancer [3]. However, according to a systematic review of the literature, health conditions tend to cluster into three major groups of conditions: cardiometabolic, musculoskeletal, and mental conditions [10]. Furthermore, these studies ignored other common health conditions also associated with reduced HRQoL, such as oral diseases [11-13]. Third, few studies have investigated this topic in low-and-middle-income countries [13-15]. Although these studies showed an inverse trend relationship between the number of health conditions and HRQoL, the association between clusters of NCDs and its different domains was barely explored and the results were limited to elderly individuals.

The lack of studies on the association between multimorbidity and HRQoL makes it difficult to identify the most relevant clusters of NCDs and limits the reorientation of health care systems to address the needs of people affected by these conditions, particularly among low-and middle-income countries. Therefore, the current study aimed

to assess clustering of chronic conditions and to explore the association between the patters of multimorbidity and the different domains of HRQoL among Brazilian adults.

Methods

Study setting

We used data from the first and second wave of the population-based cohort study *EpiFloripa*. The baseline study was carried out in 2009 and included a representative sample of adults (59% of the population) aged 20-59 years and residing in the urban area of Florianópolis (N = 408,163 inhabitants in 2009), a state capital in Southern Brazil.

Sampling procedures

In 2009, a reference population of 249,530 adults was considered for sample size estimations. A minimum sample size was estimated at 2,016 adults considering the following parameters: expected prevalence of 50% for unknown outcomes (due to the multiple objectives of the study), sampling error of 4.0 percentage points, confidence level of 95%, design effect of 2.0 (because of cluster sampling), and percentage of non-respondents of 10%.

In summary, the sampling process was performed in clusters, considering two stages. Firstly, ten census sectors were systematically selected in each decile of household income (63/420), and then, the households (1134/16755) were systematically selected. Considering a mean of 1.78 adults per dwelling, the sampling process would identify 2016 adults. All adult residents in the selected households aged 20 to 59 years old were considered eligible. Exclusion criteria included amputees, bedridden individuals, and those with some mental impairment. Details about the methodology of the *EpiFloripa* Study have been published elsewhere [16]. A second wave of the study was performed in 2012, and all individuals evaluated in 2009 (n=1720) were traced. Interviews at home

in 2012 were phone scheduled or, when this method failed, the interviewer directly visited the participant´s household. Four attempts of phone scheduling and a similar number of visits to each household were performed (at least one on the weekend and another in the evening) with all cohort members. Interviewers were trained and standardized in the assessment of anthropometric measurements.

Main exposures - Chronic health conditions

The main exposure variables were four groups of chronic conditions: 1) cardiometabolic conditions (hypertension, diabetes, cardiovascular disease, renal disease and obesity); 2) mental conditions (common mental disorders (CMD) and depression); 3) musculoskeletal conditions (back disorder, tendonitis/ tenosynovitis, arthritis and fibromyalgia); and 4) oral health conditions (inadequate dentition, untreated dental caries, periodontal disease and xerostomia).

The diagnosis of hypertension, diabetes, cardiovascular disease, renal disease, back disorder, tendonitis/ tenosynovitis, arthritis and fibromyalgia was self-reported and investigated in 2009 using the following question: "Have you already been told by a physician that you have (name of the condition)?". Individuals were weighted and measured. The body mass index (BMI in kg/m2) was estimated and obesity was defined as having a BMI ≥30.0 kg/m2 [17]. The medical diagnosis of depression was self-reported by the participants in 2009, while the occurrence of CMD was assessed using the Brazilian version of the Self Reporting Questionnaire (SRQ-20) developed by the WHO [18]. Individuals with more than seven positive answers were considered as having CMD [19].

Oral health conditions were assessed in 2012 through face-to-face interviews and oral examinations performed by 8 dentists at participants' residences. The number of permanent teeth was assessed by counting the number of sound, decayed and filled teeth

(DMFT index) [20]. The prevalence of inadequate dentition (<21 natural teeth) [21] and untreated dental caries ("D" component of the DMFT index>0) was then estimated. Oral epidemiological examinations were performed for periodontal disease, which was defined as ≥4mm attachment loss or ≥4mm periodontal pocketing. Dental examiners were subjected to rigorous training and standardization, prior to the fieldwork, with 20 adults who were not included in the final sample of the study. The Kappa index and intra-class correlation coefficient for the DMFT index ranged from 0.88 to 0.94. Xerostomia was investigated using the question "How often does your mouth feel dry?" with the following response options: never, occasionally, often, and always. Those who reported often or always were considered as having xerostomia [22].

Outcome

The outcome was HRQoL assessed in 2012 using the Brazilian validated version of the World Health Organization Abbreviated Instrument for Quality of Life Assessment (WHOQOL-BREF) [23, 24]. The instrument contains twenty-six 5-point Likert scale questions distributed into 4 domains: physical, psychological, social relationships, and environment. The item responses were converted into scores (0-100 scales), with higher scores indicating better HRQoL [25].

Covariates

Sociodemographic and lifestyle variables were included in the models as possible confounders, as they have been previously associated with both the exposures and the outcome [3, 26, 27] They were collected in 2009 and included sex, age (years), education level (years of schooling), per capita family income, smoking status, alcohol consumption, and physical activity. The monthly per capita household income (in the Brazilian currency, 1.7 Real = US$1.0 in 2009) was calculated from the income of all family members living in the same household, and then dividing into tertiles. Smoking

status was classified as never smoked, former smoker, light (<10 cigarettes/day), moderate (10–20 cigarettes/day), or current heavy smoker (>20 cigarettes/day) [28]. The Alcohol Use Disorders Identification Test (AUDIT) was used to identify alcohol consumption patterns according to the follow risk levels categories: I (score from 0 to7, the intervention is alcohol education), II (score from 8 to 15, the intervention is simple advice), III (score from 16 to 19, individuals should get simple advice plus brief counselling and continued monitoring), IV (scores from 20 to 40 intervention is referral to specialist for diagnostic evaluation and treatment) [29]. Individuals who reported moderate to vigorous physical activity practice more than once a week in the three months preceding the interview were considered physically active [30].

Quality Control

Questionnaires were pre-tested, and a quality control check was conducted by the repetition of key questions in a random sample of 15% of the respondents in 2009 and 10% in 2012 (Kappa ranged from 0.6 to 1.0). The Kappa index for the DMFT index ranged from 0.88 to 0.94.

Statistical Analysis

The descriptive statistics included the distribution of the sample according to covariates. Mean and standard deviation or median and interquartile range (p25-p75) were used to describe continuous variables, while absolute and relative frequencies were adopted for categorical variables.

Clustering and its different features were assessed both within and between groups of health conditions. The degree of clustering within groups was assessed by counting the number of health conditions in each of the four groups (cardiometabolic, mental, musculoskeletal, and oral health conditions) [6]. In order to assess clustering between

groups, the counts of chronic conditions within each group were converted into binary variables (0 or 1+ condition in that specific group). By combining these four binary variables, 16 possible combinations were obtained. Prominent patterns of clustering between groups were assessed through the ratio between the observed and the expected (O/E) prevalence for each combination [6-8]. The expected prevalence was obtained by multiplying the observed probability of each health condition, assuming their independent occurrence in the population. An O/E ratio >1.2 was considered as a prominent pattern of clustering for health conditions [8].

Linear regressions models were used to test the crude and adjusted associations between the clustering of health conditions (within and between groups) and the four HRQoL domains. The adjusted models were controlled for sociodemographic (sex, age, family income, and education level) and lifestyle variables (smoking, alcohol intake, and physical activity). All possible confounders were included in the adjusted models independently of the level of statistical significance in the association between the exposure and/or outcome. Predicted adjusted means of HRQoL domains and their respective standard errors (SE) or 95% confidence intervals (95%CI) were estimated for each category of the main exposure variables. Wald test was used to obtain p-values for trend (clusters within group) or heterogeneity (clusters between group), and an alpha of 5% was considered as indicative of statistical significance. The determination coefficient (R2) was used to estimate the overall model fit, while the variance inflation factor (VIF) was adopted as an indicator of multicollinearity between the explanatory variables [321. The internal consistency index Cronbach's alpha was used to assess the reliability of the WHOQOL-BREF domains, with an acceptable value set at > 0.70 [32]. All the statistical analyses were performed using STATA 12.0® (Stata Corporation, College Station,

United States) using the cluster sample design and sampling weights (probability of selection in 2009 and probability of localization in 2012).

Results

In 2012, 1,222 individuals participated in the study (71.1% of the original cohort). The sociodemographic characteristics and lifestyle variables of the participants are described in Table 1. The mean age in the sample was 36.1 (SD 11.4) years, the median per capita household income was R$ 947, 00 (p25-p75 R$500.0 -R$1750.0; 1 USD = R$1.7 in 2009), and the median years of study was 11 (p25-p75 10-15) years (data not shown in the table). The internal consistency index Cronbach's alpha for the Physical, Psychological, Social Relationships and Environment domains was 0.79, 0.73, 0.60 and 0.72, respectively.

Table 2 presents the distribution of the sample according to independent conditions and counts of the health conditions within each of the four groups. The most frequent independent health conditions were back disorder, untreated caries, obesity, tendonitis/tenosynovitis, depression, common mental disorders, hypertension, and inadequate dentition (all with a prevalence >10%). Among the groups of health conditions, musculoskeletal conditions were the most frequent (40.6% had 1+ musculoskeletal conditions), followed by oral health (36.2%), cardiometabolic (32.2%), and mental conditions (21.2%). Clustering within groups (having 2+ conditions in the same group) ranged from 6.1% (mental conditions) to 11.9% (musculoskeletal conditions), and simultaneous occurrence of 2+ individual health conditions (independently of the group) was identified in 47.8% of the sample.

Table 3 displays the observed and expected prevalence as well as the O/E ratios for the different combinations of group of health conditions. One-quarter (26.6%) of the

participants did not have any condition, 34.7% had one group of health condition, 23.8% had two, 11.7% had three, and 3.3% had the four groups of health conditions. The expected prevalence for the four groups of health conditions was 1.0%, but 3.3% of the individuals had, at least, one condition within each group, indicating an increase of 3.3 of what would be randomly expected (O/E ratio = 3.3). The simultaneous presence of cardiometabolic, mental, and oral health conditions also showed a prominent clustering pattern. Except from the absence of all group of conditions, none of the other combinations presented an O/E ratio >1.2.

Figure 1 shows the adjusted means for the four HRQoL domains according to the clusters within group. An inverse trend association was observed between the number of health conditions within all groups and the physical domain. A similar association was observed for the other domains of HRQoL, but the trends were less marked. The associations between the number of cardiometabolic and musculoskeletal conditions with the social and environment domains were not significant, as well as the association between musculoskeletal conditions and the psychological domain.

Table 4 shows the relationship between the clusters between group and the HRQoL domains. In general, there was an inverse trend association across all domains indicating that, in most occasions, the higher the number of groups of diseases the lower the HRQol. Compared to individuals who were free from the selected health conditions, those with all the four groups had a decrease of 30%, 19%, 14%, and 9% lower on the physical, psychological, social, and environment domains, respectively. The strongest and most consistent pattern was observed for the association with the physical domain, with the cluster between group explaining 22% of the variance for this outcome in the crude analysis. None of the two prominent patterns of clustering between group (positives for the four groups or positives for cardiometabolic, musculoskeletal, and oral health

conditions) showed a stronger association with HRQoL than the observed for the other combinations of three conditions. On the other hand, mental conditions were a key group for the psychological, social relationship, and environment domain, as lower scores were found for combinations that involved this group of diseases.

The mean VIF did not exceed 1.51 in any model, indicating no multicollinearity between the explanatory variables.

Discussion

The results from the current study showed that the simultaneous occurrence of chronic health conditions is high, as almost a half of the individuals had multimorbidity. Furthermore, more than one-third had multimorbidity involving at least one condition from two or more groups. The patterns of clustering between groups that presented higher prevalence than expected included cardiometabolic, mental and oral conditions and all the four health conditions. Overall, the higher the number of health conditions within each group, the lower the HRQoL. A similar pattern was observed for the association with the clusters between group, as HRQoL tended to be lower across all domains when the individuals were positive for a larger number of groups of health conditions. The physical domain was the most affected dimension, either for the associations with the clusters within or between groups. Finally, mental conditions were observed to be common across groups that were associated with poorer HRQoL in domains including psychological, social relationships and environment.

A systematic review of 14 studies on multimorbidity reported three major combinations of health conditions: cardiometabolic, mental and musculoskeletal conditions [10]. These findings are corroborated in the current study as clustering was found within these groups. Additionally, we identified that the most prominent clustering

pattern between groups included these three groups of health conditions, but only when individuals also had oral health conditions. There is an increasingly evidence on the connection between oral health and diverse NCDs, such as obesity, hypertension, diabetes, cardiovascular diseases and arthritis [33-35]. Furthermore, general health conditions may cause or be worsened by oral health conditions. For example, individuals with diabetes are more susceptible to infections, increasing their vulnerability to periodontal disease. On the other hand, the increase of inflammatory cytokines caused by periodontal disease may predispose people to a poor blood sugar control [36]. Finally, oral health is itself determined by multiple factors including a high sugar diet, smoking and alcohol use, which are common to a number of other chronic diseases.

Our results substantiate the findings from other studies of an adverse impact of multimorbidity on HRQoL [3]. Previous investigations have also reported a larger magnitude of association for the physical domain of HRQoL, while the results for the other domains are inconclusive [3, 15, 37]. According to our results, the psychological, social and environment domains of HRQoL were also impaired by multimorbidity. However, most of the previous studies on this topic were conducted in clinical settings, did not investigate clusters of chronic conditions, and/or failed to assess different domains of HRQoL, limiting comparisons with our results [3, 13-15]. One of the few population-based studies investigating clustering of chronic conditions and its association with HRQoL included over 40000 adults from six countries (China, Ghana, India, Mexico, Russia, and South Africa) and found an inverse trend association between the number of chronic conditions and HRQoL [15]. Although the HRQoL instrument (8-item WHOQOL) adopted by the mentioned study did not allow for the investigation of different domains, yet the study showed that multimorbidity lead to adverse outcomes on activities of daily living and mental health. A potential explanation for the association

between multimorbidity and the psychological and social domains may be related to aesthetical, motivational and social connections issues, which result affected by chronic conditions [38]. Furthermore, the environment domain covers items such as individuals' satisfaction regarding access to health services. It has been suggested that the suffering related to multimorbidity could also negatively affect the satisfaction with health care [38]. On the other hand, access issues may also explain the coexistence of multiple conditions. This bi-directional association between the two should be examined in future longitudinal studies.

Mental conditions were observed to be common across groups and were associated with poorer HRQoL in domains including psychological, social relationships and environment. These results are consistent with previous investigations [39, 40]. A systematic review including both population-based and clinical studies on the association between comorbid mental disorders and HRQoL found that those with comorbid mental disorders had worse HRQoL on different dimensions in comparison to individuals without comorbid mental conditions [39]. Furthermore, a report with data from 60 countries showed that depression combined with other comorbidity incrementally worsened health compared with depression alone, with other chronic diseases alone, and with any combination of chronic diseases without depression [40]. Although our results corroborate with previous studies on the association between mental conditions and HRQoL, it has been argued that the assessment of HRQoL among these individuals is fundamentally problematic, leading to what is named as the "affective fallacy" [41]. People make judgments about how happy/satisfied they are with life in general based on their momentary affective state, and this is intensified among individuals with mental conditions, who usually see their well-being as worse than they appear to an independent observer [41]. Although the "affective fallacy" is inherent to the assessment of HRQoL

among individuals with mental health conditions, studies suggest that the use of HRQoL measures that provide a profile, such as the WHOQOL-BREF, is more appropriate than single item tools that provide a global evaluation. This happens due to the different importance attached to different life domains among these individuals, who usually have few resources to cope with life problems, low social support, cognitive skills, and environmental assets [41].

To our knowledge, this is the first population-based study undertaken in adults from a middle-income setting that assessed the association between clusters of health conditions and different domains of HRQoL. In addition, a detailed tool for HRQoL assessment was used and all domains of the WHOQOL- BREF met acceptable reliability standards, with exception of the Social Relationships domain. Similar values of internal consistency were previously observed for the Social Relationships domain, and this has been attributed to the small number of questions in this dimension [41]. Rigorous methodological procedures for sample selection and data collection, including a pilot study, were performed. However, some limitations must be recognized. First, the presence of chronic health conditions was self-reported and they were probably underestimated in our study. However, this possible source of information bias is less likely to explain the observed relationship between multimorbidity and HRQoL, as it would reduce the effect magnitude of the associations. Second, collapsing independent health conditions to evaluate the presence of clustering between groups limited our ability to evaluate all possible combinations of individual health conditions, but this allowed us to have enough participants in each cluster. Comparisons with previous studies should be done cautiously, considering that different health conditions investigated and the instruments adopted to assess HRQoL. Furthermore, the 3 year time-lapse between the assessment of exposures and outcome can lead to bias on our results. Although chronic

conditions such as cardiometabolic and musculoskeletal diseases tend to be stable, mental conditions might not remain constant overtime [40]. Finally, causal inferences are limited due to the cross-sectional design of the current study.

This study concludes that clustering exists both within and between major groups of health conditions, and that multimorbidity is associated with adverse outcomes on different domains of HRQoL, especially on the physical domain. These findings have important policy and research implications. Strategies focused on multiple health conditions and their risk factors may be substantially more effective than single risk factor/health condition interventions [37, 42]. For example, in developing interventions for individuals with cardiometabolic conditions a set of interventions, which includes physical activity and healthy diet stimulation programs, could simultaneously improve the management of other chronic health conditions [37]. Therefore, health policies focused on the simultaneous occurrence of diseases and their underlining risk factors may increase life expectancy while improving HRQoL. This study address the importance of assessing patient-orientated outcomes, such as HRQoL, for a greater understanding of how health-related conditions impacts individuals' overall well-being. Furthermore, future research should investigate whether the determinants of clusters of risk factors, such as social disadvantage, are also common to clusters of health conditions.

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Table 1 Characteristics of the sample (N=1222). Florianópolis, Brazil, 2009-2012.

	n	(%)
Sex		
Male	522	48.3
Female	700	51.7
Age		
20-29	328	38.8
30-39	277	22.8
40-49	345	21.0
50-59	272	17.5
***Per capita* family income** *(Brazilian Reais[A])*		
3 rd tertile (1,300.10; 33,333.00)	382	33.3
2 nd tertile (566.10; 1,300.00)	409	33.1
1 st tertile (0.00; 566.00)	415	33.6
Schooling (years of study)		
12 or more	543	44.4
9 to 11	394	35.4
5 to 8	174	13.5
Up to 4	108	6.8
Smoking status		
Never smoked	664	58.2
Ex-smoker	324	23.8
Light smokers	98	7.8
Moderate and heavy smokers	129	10.2
Alcohol abuse (AUDIT scores)		
0-7	1,024	81.6
8-15	162	15.3
16-19	26	2.4
20-40	10	0.7
Physical Activity (the last 3 months)		
Yes	565	47.3
No	655	52.8
Cardiometabolic conditions		
Diabetes	48	3.5
Cardiovascular diseases	90	6.5
Renal diseases	31	2.5
Obesity**	231	18.9
Hypertension	299	13.5
Mental conditions		
Depression	206	14.2
Common mental disorders	176	13.5
Musculoskeletal conditions		
Back disorder	403	29.5
Tendonitis/ Tenosynovitis	238	16.6
Arthritis	109	7.0
Fibromyalgia	41	3.4
Oral conditions		
Inadequate dentition (<21 teeth)	167	11.8
Untreated dental caries	234	19.8
Periodontal disease***	44	3.3
Xerostomia	112	9.2

[A]: 1.9 Brazilian Real was US$1 at the time of data collection. **Obesity was defined as having a BMI ≥ 30. ***Periodontal disease: ≥4mm attachment loss or ≥4mm periodontal pocketing

Table 2 Cardiometabolic, mental, musculoskeletal and oral conditions among adults (N=1222). Florianópolis, Brazil, 2009-2012.

	n	(%)
Cardiometabolic conditions (any)	435	32.2
Diabetes	48	3.5
Cardiovascular diseases	90	6.5
Renal diseases	31	2.5
Obesity**	231	18.9
Hypertension	299	13.5
Count (cardiometabolic conditions)		
None	787	67.8
1	303	23.3
2	105	7.3
3 +	27	1.6
Mental conditions (any)	295	21.2
Depression	206	14.2
Common mental disorders	176	13.5
Count (mental conditions)		
None	927	78.7
1	207	15.2
2	88	6.1
Musculoskeletal conditions (any)	556	40.6
Back disorder	403	29.5
Tendonitis/ Tenosynovitis	238	16.6
Arthritis	109	7.0
Fibromyalgia	41	3.4
Count (musculoskeletal conditions)		
None	665	59.4
1	375	28.7
2	133	9.2
3 +	48	2.7
Oral conditions (any)	485	36.2
Inadequate dentition (<21 teeth)	167	11.8
Untreated dental caries	234	19.8
Periodontal disease***	44	3.3
Xerostomia	112	9.2
Count (oral conditions)		
None	737	63.8
1	344	26.8
2	111	7.4
3 +	30	2.0

**Obesity was defined as having a BMI ≥ 30. ***Periodontal disease: ≥4mm attachment loss or ≥4mm periodontal pocketing

Table 3 Cardiometabolic, mental, musculoskeletal and oral conditions among adults (N=1222). Florianópolis, Brazil, 2009-2012.

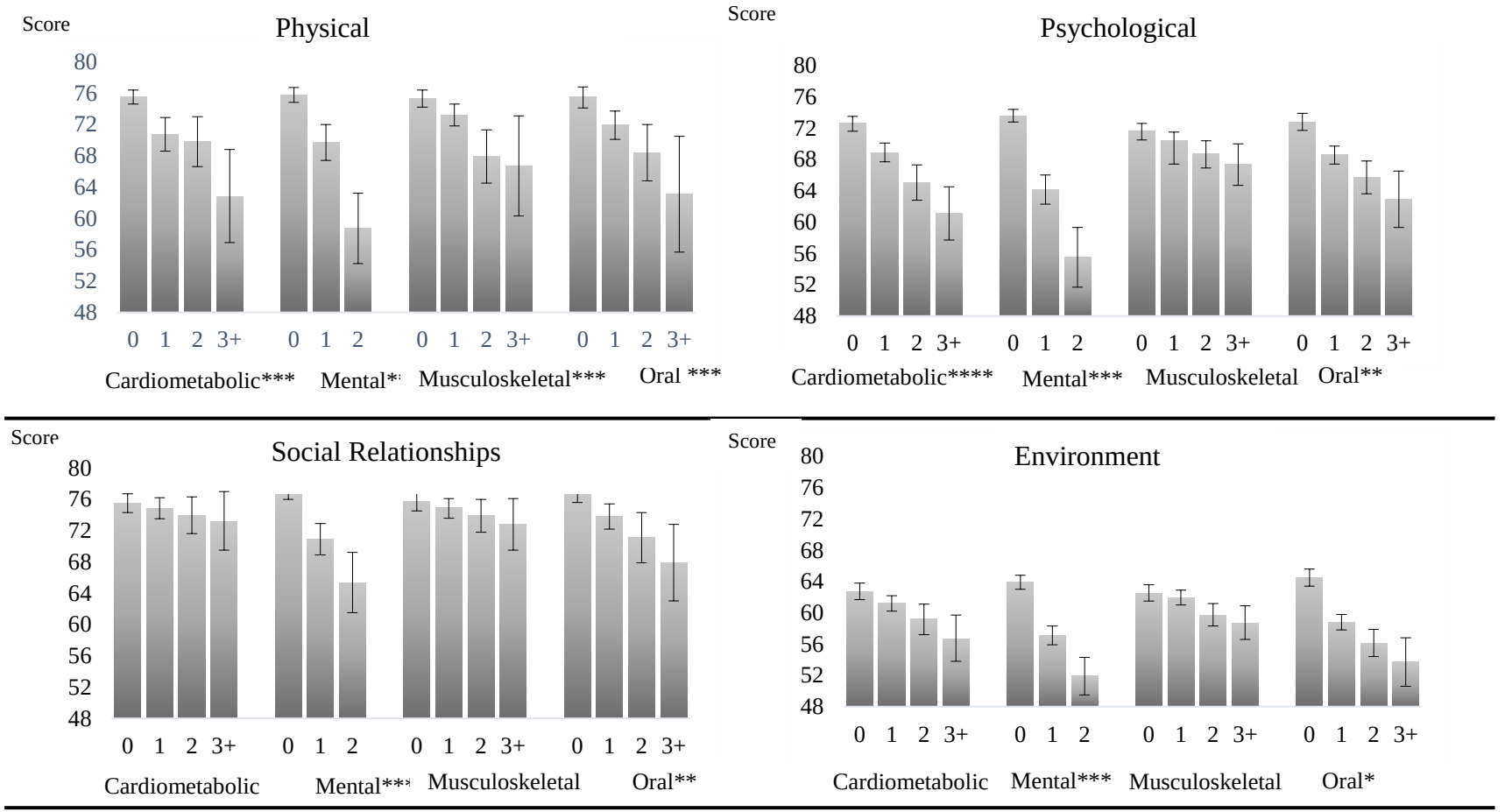
Clusters	Total Sample		Cardiometabolic conditions	Mental conditions	Musculoskeletal conditions	Oral conditions	Prevalence		
	n	**%**					Observed (95% CI)	Expected	O/E
None	**275**	**26.6**	-	-	-	-	26.6 (22.8;30.9)	20.2	1.3
1 group	**91**	**8.1**	+	-	-	-	8.1 (6.4;10.3)	9.6	0.8
	37	**3.3**	-	+	-	-	3.3 (2.4;4.6)	5.5	0.6
	163	**13.7**	-	-	+	-	13.7 (11.2;16.6)	13.8	1.0
	108	**9.6**	-	-	-	+	9.6 (7.5;12.2)	11.4	0.8
2 groups	**19**	**1.4**	+	+	-	-	1.4 (0.8;2.2)	2.6	0.5
	69	**4.8**	+	-	+	-	4.8 (3.7;6.1)	6.6	0.7
	74	**5.3**	+	-	-	+	5.3 (4.2;6.8)	5.4	1.0
	52	**3.8**	-	+	+	-	3.8 (2.7;5.2)	3.7	1.0
	31	**2.5**	-	+	-	+	2.5 (1.6;3.8)	3.1	0.8
	84	**6.0**	-	-	+	+	6.0 (4.8;7.4)	7.8	0.8
3 groups	**31**	**2.2**	+	+	+	-	2.2 (1.5; 3.2)	1.8	1.2
	63	**4.6**	+	-	+	+	4.6 (3.1;6.6)	3.7	1.2
	30	**2.5**	+	+	-	+	2.5 (1.7;3.6)	1.5	1.7
	37	**2.4**	-	+	+	+	2.4 (1.6;3.4)	2.1	1.1
4 groups	**57**	**3.3**	+	+	+	+	3.3 (2.3;4.7)	1.0	3.3

+ presence of condition; – absence of condition; O: Observed prevalence; E: Expected prevalence; O/E: Ratio between observed and expected prevalence.
Cardiometabolic conditions: diabetes, cardiovascular disease, renal disease, obesity and hypertension.
Mental conditions: depression and common mental disorders.
Musculoskeletal conditions: back disorder, arthritis, tendonitis/tenosynovitis and fibromyalgia.
Oral conditions: inadequate dentition, untreated dental caries, periodontal disease, xerostomia.

Table 4 Association between groups of health conditions and the domains of the WHOQOL-BREF in the adult population. Florianópolis, Brazil (2009–2012).

	Sample		Physical Domain		Psychological Domain		Social Relationships		Environment Domain	
	n	%	Mean (SE)		Mean (SE)		Mean (SE)		Mean (SE)	
			Crude	Adjusted	Crude	Adjusted	Crude	Adjusted	Crude	Adjusted
No disease (reference)	**275**	**26.6**	80.5 (0.6)	79.4 (0.7)	75.1 (0.7)	74.2 (0.7)	78.6 (0.9)	77.7 (0.9)	64.5 (1.0)	63.4 (0.9)
One group only										
Cardiometabolic conditions	**91**	**8.1**	77.0 (1.6)	76.4 (1.6)	72.5 (1.2)	72.5 (1.2)	76.8 (1.3)	76.4 (1.3)	63.6 (1.5)	62.8 (1.1)
Mental conditions	**37**	**3.3**	74.7 (3.6)	75.1 (3.5)	68.9 (3.3)	69.3 (3.3)	76.9 (3.1)	77.2 (2.9)	63.1 (2.6)	63.3 (2.1)
Musculoskeletal conditions	**163**	**13.7**	77.7 (0.9)	76.6 (1.0)	76.2 (1.0)	74.8 (1.0)	76.8 (1.2)	76.8 (1.3)	67.9 (1.1)	64.6 (1.2)
Oral Conditions	**108**	**9.6**	76.4 (1.4)	76.6 (1.4)	71.9 (1.3)	72.2 (1.2)	75.1 (1.7)	74.7 (1.8)	59.6 (1.7)	62.8 (1.3)
Combinations between 2 groups										
Cardiometabolic + Mental	**19**	**1.4**	70.5 (3.9)	71.1 (4.7)	60.2 (5.3)	59.8 (5.5)	71.9 (2.5)	73.3 (2.7)	59.7 (2.7)	57.6 (2.0)
Cardiometabolic + Musculoskeletal	**69**	**4.8**	72.4 (2.1)	72.2 (2.1)	74.0 (1.2)	72.8 (1.3)	80.8 (1.8)	80.7 (1.9)	69.8 (1.5)	66.9 (1.6)
Cardiometabolic + Oral	**74**	**5.3**	68.6 (2.0)	69.5 (2.0)	69.9 (1.8)	70.8 (1.9)	77.3 (2.0)	78.0 (1.9)	60.1 (1.7)	61.9 (1.7)
Mental + Musculoskeletal	**52**	**3.8**	70.2 (1.6)	70.8 (1.7)	68.2 (1.8)	68.7 (1.8)	70.4 (2.4)	70.8 (2.3)	57.0 (1.6)	57.6 (1.3)
Mental + Oral	**31**	**2.5**	68.4 (2.8)	68.1 (2.6)	67.3 (2.8)	67.6 (2.7)	66.7 (3.6)	66.4 (4.5)	57.5 (3.3)	58.2 (2.6)
Musculoskeletal + Oral	**84**	**6.0**	74.0 (1.5)	75.1 (1.4)	71.8 (1.3)	73.2 (1.2)	74.4 (2.7)	75.3 (2.7)	60.4 (1.7)	62.2 (1.5)
Combinations between 3 groups										
Cardiometabolic + Mental + Musculoskeletal	**31**	**2.2**	59.0 (3.8)	60.3 (3.8)	58.2 (3.6)	59.5 (3.4)	72.3 (3.3)	73.5 (3.3)	56.0 (2.5)	56.4 (2.4)
Cardiometabolic + Musculoskeletal + Oral	**63**	**4.6**	67.2 (2.0)	68.7 (1.8)	71.9 (1.2)	73.1 (1.3)	77.0 (2.2)	78.4 (2.3)	59.5 (1.5)	60.6 (1.4)
Cardiometabolic + Mental + Oral[A]	**30**	**2.5**	59.1 (2.7)	60.4 (2.8)	55.1 (3.4)	56.2 (3.3)	65.2 (4.0)	65.9 (3.8)	48.4 (2.8)	51.4 (2.6)
Mental + Musculoskeletal + Oral	**37**	**2.4**	56.0 (4.7)	57.7 (4.7)	62.0 (3.8)	63.8 (3.5)	66.3 (4.6)	66.7 (4.4)	50.3 (3.2)	51.6 (3.4)
Combination between all the 4 groups[A]	**57**	**3.3**	52.0 (3.2)	55.3 (3.2)	56.9 (2.6)	60.2 (2.5)	66.6 (3.8)	67.1 (3.8)	53.0 (1.9)	57.5 (1.9)
R^2	**-**	**-**	**0.2167**	**0.2468**	**0.1598**	**0.2011**	**0.0613**	**0.0843**	**0.1197**	**0.2802**
P value	**-**	**-**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**0.001**	**<0.001**	**<0.001**

WHOQOL-BREF: World Health Organization Abbreviated Instrument for Quality Of Life Assessment. A: Prominent patterns of clustering. Cardiometabolic conditions: diabetes, cardiovascular disease, renal disease, obesity and hypertension. Mental conditions: depression and common mental disorders. Musculoskeletal conditions: back disorder, arthritis, tendonitis/tenosynovitis and fibromyalgia. Oral conditions: inadequate dentition, untreated dental caries, periodontal disease, xerostomia. Adjusted means and P values from linear regressions: sex, age, income, education, smoking status, alcohol abuse, physical activity.



WHOQOL-BREF: World Health Organization Abbreviated Instrument for Quality Of Life Assessment. Cardiometabolic conditions: diabetes, cardiovascular disease, renal disease, obesity and hypertension. Mental conditions: depression and common mental disorders. Musculoskeletal conditions: back disorder, arthritis, tendonitis/tenosynovitis and fibromyalgia. Oral conditions: inadequate dentition, untreated dental caries, periodontal disease, xerostomia. Adjusted means: sex, age, income, schooling, smoking status, alcohol use, physical activity. P values from linear trend ***p<0.001 **p<0.01 *p<0.05.

Figure 1 Association between health conditions within groups and the domains of the WHOQOL-BREF in the adult population. Florianópolis, Brazil (2009–2012)

Chapter 7 Testing a health-related quality of life conceptual model for untreated dental caries

Statement of Authorship

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Name of Principal Author (Candidate)	Dandara Gabriela Haag
1. Contribution to the Paper	Conceptualized the idea, interpreted the data, wrote the manuscript and acted as corresponding author.
Overall percentage (%)	80%
Certification:	This paper reports on original research I conducted during the period of my Higher Degree by Research candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this thesis. I am the primary author of this paper.
Signature	Date 11/05/2017

Co-Author Contributions

By signing the Statement of Authorship, each author certifies that:

i. the candidate's stated contribution to the publication is accurate (as detailed above);

ii. permission is granted for the candidate in include the publication in the thesis; and

iii. the sum of all co-author contributions is equal to 100% less the candidate's stated contribution.

Name of Co-Author	Karen Peres
Contribution to the Paper	Supervised development of work, provided intellectual contribution and revised guidelines
Signature	Date 11/05/2017

Name of Co-Author	David A. González-Chica
Contribution to the Paper	Supervised development of work, provided intellectual contribution and revised guidelines
Signature	Date 11/05/2017

Name of Co-Author	Diego A.S. Silva
Contribution to the Paper	Supervised the analysis and development of work, provided intellectual contribution and revised guidelines
Signature	Date 11/05/2017

Name of Co-Author	Sergio Chrisopoulos
Contribution to the Paper	Supervised development of work, provided intellectual contribution, data analysis and revised guidelines
Signature	Date 11/05/2017

Name of Co-Author	David Brennan
Contribution to the Paper	Supervised development of work, provided intellectual contribution and revised guidelines
Signature	Date 11/05/2017

Linkage to the body of work

Untreated dental caries, ranked as the most important condition for the global burden of oral conditions, affects 2.5 billion people globally (Kassebaum et al., 2017). Furthermore, dental caries is associated with poor HRQoL outcomes, as indicated by the systematic review from the current thesis. A possible mechanism for such an association is related to subjective experiences of this condition, such as symptoms and functional status that may impair individuals' wellbeing, as indicated by the most widely adopted HRQoL theoretical frameork proposed by Wilson and Cleary. The idea of this manuscript arose from the fact that while previous studies effectively answer questions regarding the impact of dental caries on HRQoL, the lack of a spectrum of clinical and nonclinical conditions within the same analysis makes it impossible to establish the direct or mediated linkages between them and HRQoL (Baker et al., 2007). In parallel, variables for all levels of Wilson and Cleary's model for HRQoL were investigated in the *EpiFloripa*. Furthermore, the WHOQOL-BREF contains two questions which address the final levels of the model concerning overall health perceptions and general quality of life. In this sense, a HRQoL theoretical framework may guide the understanding of the relationships between dental caries and other nonclinical conditions with HRQoL, contributing to a better targeting of specific points for effective intervention strategies in order to improve individuals' quality of life (Ferrans et al., 2005).

Highlights

- The findings support Wilson and Cleary's model for HRQoL as applied to untreated dental caries: 1) untreated dental caries predicted dental pain; 2) dental pain was associated with more chewing difficulty; 3) chewing difficulty predicted poorer SROH, and; 4) a lower SROH was associated with poorer quality of life.

- There were associations between variables at nonadjacent levels, and these pathways were both direct and indirect.
- More untreated dental caries directly predicted more chewing difficulty and poorer SROH, whereas dental pain predicted poorer quality of life.
- There was no direct relationship between untreated dental caries and overall quality of life.
- Functional status, as indicated by chewing difficulty, was a key mediator in the relationship between dental pain and SROH, which, in turn, was associated with poorer overall quality of life.

Research and Policy Implications

- Broad quality of life indicators are recommended, since they may be more informative and appropriate than measures of health status indicators and measures of psychological distress.
- Future studies with a longitudinal design should explore the use of alternative approaches for causal inference, such as the potential outcome approach, and elaborate on the evidence for the applicability of Wilson and Cleary's model for untreated dental caries among adults
- The findings reinforce the importance of assessing intermediate factors between clinical oral conditions and individuals' HRQoL, both in research and clinical settings. In this sense, a theoretically driven model should be adopted when investigating the impacts of oral conditions on HRQoL.

Authors

Dandara Gabriela Haag[1]

Karen Glazer Peres[1]

David A. Gonzélez-Chica[2]

Sergio Chrisopoulos[1]

Diego A.S. Silva[3]

David S. Brennan[1]

[1] Australian Research Centre for Population Oral Health (ARCPOH), Adelaide Dental School, The University of Adelaide, Adelaide, South Australia, Australia.

[2] Discipline of General Practice, Adelaide Medical School, NHMRC Centre of Research Excellence to Reduce Inequality in Heart Disease, The University of Adelaide, Adelaide, South Australia, Australia.

[3] Post-Graduate Program in Physical Education, Federal University of Santa Catarina, Florianópolis, Brazil.

Corresponding author:

Dandara Gabriela Haag

Adelaide Health and Medical Sciences Building, Adelaide, SA 5005 Tel: +61 8 83132557 Fax: +61 8 8313 3070

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Abstract

Aim: To test the applicability of Wilson and Cleary's conceptual model of the direct and indirect pathways between dental caries and quality of life.

Methods: A population-based cohort study was started in 2009 in Florianópolis (Southern Brazil) with 1,720 individuals aged 20-59 years, and followed-up in 2012. Data was collected at participants' household including sociodemographics (sex, age, income, educational level), self-reported symptoms (dental pain-no/yes), functional status (frequency of chewing difficulty- never/sometimes/often and always), self-rated oral health (SROH-very good/good/fair/poor/very poor) and quality of life (very good/good/neither poor nor good/poor/very poor). In 2012, oral health examinations were also performed to detect untreated dental caries ("D" component of the DMFT index). Structural Equation Models were adopted.

Results: 1,074 individuals with complete information were included (56.7% females; 41.9±11.2 years). Variables at adjacent levels were positively associated: 1) untreated dental caries predicted dental pain; 2) which was associated with more chewing difficulty; 3) chewing difficulty predicted poorer SROH, and; 4) a lower SROH predicted poorer quality of life. All indirect pathways between variables at non-adjacent variables were positive and statistically significant, and chewing difficulty mediated the association between dental pain and SROH. Untreated dental caries directly predicted more chewing difficulty and poorer SROH, while dental pain predicted poorer quality of life. Untreated dental caries was not directly associated with quality of life.

Conclusions: The findings support Wilson and Cleary's model as applied to untreated dental caries. The investigation of both, clinical and nonclinical conditions, may contribute to a better targeting of interventions for improving quality of life.

Introduction

Health-related quality of life (HRQoL) is an important patient-centred outcome that reflects the impacts associated with health conditions on general wellbeing. This outcome has been increasingly adopted as part of treatment decision processes alongside clinical indicators. Previous studies have suggested that untreated dental caries ranked as the most important disease for the global burden of oral conditions (Marcenes et al., 2013; Kassebaum et al., 2017), and is associated with poor HRQoL (Brennan and Spencer, 2005; Fontanive et al., 2013). A possible mechanism for such an association is related to subjective experiences of this condition, such as symptoms and functional status that may impair individuals' wellbeing (Wilson and Cleary, 1995). While previous studies effectively answer questions regarding the impact of dental caries on HRQoL, the lack of a spectrum of clinical and nonclinical conditions within the same analysis makes it impossible to establish the direct or mediated linkages between them and HRQoL (Baker et al., 2007). In this sense, a HRQoL theoretical framework may guide the understanding of the relationships between dental caries and other nonclinical conditions with HRQoL, contributing to a better targeting of specific points for effective intervention strategies (Ferrans et al. 2005).

The most widely adopted HRQoL theoretical model is Wilson and Cleary's conceptual framework, consisting of five main consecutive levels; 1) physiological/clinical variables, 2) symptom status, 3) functional health, 4) general health perceptions, and 5) overall quality of life (Figure 1) (Wilson and Cleary, 1995). Individual and environmental characteristics are also likely to be related to all levels included in the model. In general, studies support Wilson and Cleary's model as applied to different health conditions, including lung diseases (Linder and Singer, 2003), HIV (Sousa and Kwok, 2006), Parkinson's disease (Chrischilles et al., 2002), cardiovascular

diseases (Bennet et al., 2001) and oral conditions, such as such as edentulism (Baker et al., 2007, Santos et al., 2015) and dry mouth (Baker et al., 2008). Oral health studies which adopted Wilson and Cleary's framework have reported both direct and indirect (mediated) pathways between objective and subjective oral health variables. This suggests that a broader understanding of the impacts of oral health conditions on HRQoL may be better captured by the simultaneous assessment of clinical and non-clinical factors (Baker et al., 2007; Baker et al. 2008; Baker et al., 2010; Gupta et al., 2015; Santos et al., 2015).

While these studies have reported relevant results, they were limited to few oral conditions (i.e. edentulism and dry mouth) or latent constructs for more than one clinical condition (Rebelo et al., 2016). The subjective experiences (symptoms, physical impacts) associated with different clinical oral health conditions are likely to differ, indicating that each level of variables in Wilson and Cleary's model would change according to the clinical condition being examined (first level variable). For example, while low salivary flow may lead to xerostomia, dental caries is more likely to be related to symptoms such as dental pain and discomfort. Furthermore, previous studies were limited to small sample sizes (Baker et al., 2007, Baker et al., 2008), older populations (Baker et al., 2007; Baker et al., 2008; Rebelo et al., 2016; Santos et al., 2015) and children or adolescents (Baker et al., 2010; Gururatana et al., 2014). In this regard, the impact of oral conditions seems to be influenced by age (more evident among younger adults), making it relevant to assess the applicability of this model in different age groups (Slade and Sanders, 2011). Importantly, the inclusion of all five levels of the model was inconsistent across studies (Baker et al., 2008). Including indicator variables in each level is likely to provide a more comprehensive picture of the impact of oral health conditions on HRQoL, since relationships between variables at non-adjacent levels may exist (Ferrans et al., 2005).

A valid HRQoL conceptual model for untreated dental caries may enhance the understanding about the relationship between this condition and individuals HRQoL, translating the relevance of this outcome on targeting specific points of interventions to improve individuals' well being (Sousa and Kwok, 2006). The aim of the current study was to test the applicability of Wilson and Cleary's conceptual model of the direct and indirect pathways between dental caries and quality of life among adults.

Methods

Study setting

Data were from the first and second waves of the population-based cohort study *EpiFloripa*. The baseline was conducted in 2009 and included a representative sample of adults aged 20-59 years residing in the urban area of Florianópolis, Southern Brazil (N=249,530 adult inhabitants, corresponding to 59% of the population in the city).

Sampling procedures

In 2009, the sample size was estimated in 1,720 adults considering the following parameters: expected prevalence of 50% for unknown outcomes, sampling error of 3.5 percentage points, confidence level of 95%, design effect of 2.0 due to cluster sampling, and percentage of non-respondents of 10%.

The sampling procedures were performed in clusters, considering two stages. Firstly, the census tracts of the city were systematically selected, followed by a random selection of households. The average monthly income of the head of the family was used to order the 420 census tracts, adopting a systematic sample of 60 tracts (six tracts in each income decile). Secondly, the households (1,134 out of 16,755) were randomly selected. Considering a mean of 1.78 adults per dwelling, the sampling process would identify 2,016 adults. All residents in the selected households aged 20-59 years old were

considered eligible to participate. Exclusion criteria included amputees, bedridden individuals, and those with some mental impairment who were unable to answer the questionnaire. Details about the methodology of the *EpiFloripa* Study have been published elsewhere (Boing et al., 2013). A second wave of the study was performed in 2012, and all individuals evaluated in 2009 (n=1,720) were traced. Interviews in 2012 were phone scheduled or, when this method failed, the interviewer directly visited the participant's household. Four attempts of phone scheduling and a similar number of visits to each household were performed (at least one on the weekend and another in the evening).

Variables in the study

Five main levels of the model

All levels of the Wilson and Cleary model were investigated in the second wave of the study (2012). Oral health variables were investigated through face-to-face interviews and through oral epidemiological examinations. Dental examiners were subjected to rigorous training and standardisation prior to the fieldwork. Compared to gold-standard trainees, the Kappa index and intra-class correlation coefficient for the DMFT index ranged from 0.88 to 0.94.

The DMFT index was adopted in the oral epidemiological examinations and the number of decayed teeth (untreated dental caries or "D" component) was then estimated (WHO 1997). Untreated dental caries was considered for the first level (biological/clinical condition). For the second level (symptom status), dental pain was investigated with the question "Have you had dental pain in the last six months? (No/Yes)". Functional status (level 3) was measured by the frequency of chewing difficulty and individuals were asked how often they had problems with chewing (never, occasionally, often, or always). For Health perceptions (level 4), participants were asked to rate their oral health as very good,

good, fair, poor, or very poor. General quality of life (level 5) was investigated using the question “How would you rate your quality of life?” from the World Health Organization Abbreviated Instrument for Quality of Life Assessment (WHOQOL-BREF) (The WHOQOL Group, 1998; Fleck et al., 2000). This question investigates the quality of life in the previous 2 weeks, considering the alternative answers very good, good, neither poor nor good, poor, or very poor.

Covariates

Covariates were collected in the baseline (2009) and included sex, age (20-29, 30-39, 40-49, 50-59 years), education level (12 or more years of schooling; 9-11; 5-8; up to 4) and per capita household income. The monthly per capita household income (in the Brazilian currency, R$ 1.7 = US$1.0 in 2009) was calculated from the income of all family members living in the same household, and then divided into tertiles.

Statistical analysis

The sample was described according to sociodemographic characteristics and the main variables of interest. Mean and standard deviation or median and interquartile range (p25-p75) were used to describe continuous variables, while absolute and relative frequencies were adopted for categorical variables. The polychoric correlation coefficients between all variables included in the models were estimated. Structural Equation Models (SEM) were adopted to assess the direct and indirect (mediated) effects of untreated dental caries on quality of life. Three models were tested following the updated theoretical framework proposed by Wilson and Cleary:

Model 1

Wilson and Cleary hypothesised that the associations between the main adjacent levels of the model would be the dominant pathways. Therefore, Model 1 included only the pathways between the five adjacent levels (untreated dental caries-> dental pain -

>chewing difficulty -> poor SROH -> poor quality of life), taking the covariates (age, sex, income and education) into account (Figure 1).

Model 2

According to Wilson and Cleary, direct pathways between variables at non-adjacent levels may exist. For example, clinical conditions may affect functioning through a direct pathway, which is not necessarily mediated by symptoms. Since direct relationships between variables at all levels are theoretically plausible, Model 2 was the saturated model, which included direct pathways both between adjacent and non-adjacent levels. Model 2 was compared to Model 1 in order to verify if the inclusion of direct pathways between non-adjacent levels was relevant. For this, change in chi square statistics were adopted and an alpha of 5% was considered as indicative of statistical significance.

Model 3

Considering that Wilson and Cleary proposed that the direct pathways between the five main adjacent levels would be the dominant ones, the direct pathways between non-adjacent levels that were not significant in Model 2 were removed. The objective of the third model was to create a more parsimonious model, theoretically supported by Wilson and Cleary's conceptual framework. Model 3 was then compared to Model 2 in order to verify whether removing non-significant pathways between non-adjacent levels was important to the model.

The direct, indirect and total effects of untreated dental caries on quality of life were assessed by using the Weighted Least Squares estimation method, which is appropriate when categorical variables are included in the model (Acock, 2013). The Standardized Root Mean Square Residual (SRMR), the Root Mean Square Error of Approximation

(RMSEA), the Normed Fit Index (NFI) and the Comparative Fit Index (CFI) were used to assess whether the model fit well to the data. For the SRMR and the RMSEA indices values from zero up to 0.08 were taken as indicative of acceptable model fit, while for the NFI and CFI 0.95 was taken as a minimum value for inferring model fit (Kline, 2011). All analysis were conducted using SAS 9.4 ©.

Results

In 2012, 1,222 individuals participated in the study (71.1% from the original cohort). Only 1,074 individuals with full responses for all variables of interest were included in the analyses. The characteristics of these individuals are displayed in Table 1. There was a higher proportion of females (56.7%) and the mean age was 41.9 years (SD 11.2). The median per capita household income was R$ 947, 00 (p25-p75 R$500.0 -R$1750.0), and the median years of study was 11 (p25-p75 10-15) years (data not shown in tables). One in 5 individuals had one or more untreated dental caries and a similar proportion had dental pain in the previous six months. Approximately 30% of the individuals reported some level of chewing difficulty, and 20.6% of the individuals self-reported bad or very bad oral health, whereas 12.6% had fair, poor or very poor quality of life.

Table 2 shows the means, standard deviations and pairwise polychoric correlations between all variables included in the models. There was a positive and significant correlation between more untreated dental caries, dental pain, more frequent chewing difficulty, poorer SROH and poorer quality of life.

3.1 Model 1

Model 1 included only direct pathways between variables at adjacent levels, taking individual factors (sex, age, income and education) into account. All pathways between the main five adjacent levels were significant (untreated dental caries-> dental pain -

>chewing difficulty -> poorer SROH -> poorer quality of life). The clinical condition as measured by untreated dental caries was positively associated with the symptom status (pathway A on Figure 1; β=0.3482 SE=0.0870) indicated by dental pain. Similarly, dental pain was associated positively with functional impairments represented by chewing difficulty (pathway B on Figure 1; β=0.3188 SE=0.0357), which, in turn, was associated with poorer SROH (pathway C on Figure 1; β=0.3522 SE=0.0338). Finally, poorer self-perceived oral health was associated with poorer general quality of life (pathway D on Figure 1; β=0.1278 SE=0.0388). Fit indices for model 1 indicated that this model did not fit the data well: SRMR=0.1119, RMSEA = 0.1181 (90 % CI = 0.0979–0.1395), NFI= 0.9164 and CFI: 0.9191.

3.2 Model 2

Model 2 was the saturated model and incorporated all direct pathways between variables at non-adjacent levels, taking the individual factors (sex, age, income and education) into account. Table 3 shows the standardized coefficients for the direct, indirect and total effects of untreated dental caries on quality of life according to this model. Model 2 was significantly different from Model 1 (ΔX^2 (6): 95.7532; $p<0.001$), indicating that direct pathways between variables at non-adjacent levels were important to the model.

3.2.1 Direct effects

Similar to Model 1, all pathways between adjacent levels were significant in Model 2. There were three additional significant direct pathways between variables at non-adjacent levels. More untreated dental caries was directly associated with more chewing difficulty and poorer SROH. With regards to the third additional significant path in Model 2, there was a direct effect of dental pain on poor quality of life (Table 2).

3.2.2 Indirect effects

All indirect pathways were positive and significant, with exception of the indirect effect of dental pain on poor quality of life. The indirect and positive effect of dental caries on poor quality of life was cancelled out by the negative direct effect of untreated dental caries on this outcome, which was not statistically significant. In this case, the proportion of the total effect of dental caries on poor quality of life mediated by the intermediate variables (mediated effect) included in the model (dental pain, chewing difficulty, poor SROH) was 75.2%. Similarly, for the association between dental pain and poor SROH, most of the effect was accounted for by the indirect pathway mediated by chewing ability, being responsible for 63.2% of the total effect (Table 2).

3.2.3 Individual factors

In comparison with younger subjects, older individuals had more untreated dental caries (β=0.0818 SE=0.0347), more chewing problems (β=0.24640 SE=0.03097) and poorer self-reported oral health (β=0.1120 SE=0.0309). Women had less untreated dental caries (β=-0.1528 SE=0.0298), but reported more dental pain (β=0.0990 SE=0.0313) than men. The lower the income and education status, the worse the quality of life (β=0.1803 SE=0.0439; β=0.1801 SE=0.0441), and the higher the number of untreated dental caries (β=0.2240 SE=0.0396; β=0.2267 SE=0.0467). Individuals with lower income also reported more chewing difficulty in comparison with those in higher income groups (β=0.0894 SE=0.0453). Educational status was also associated with poor SROH, and individuals with less years of study perceived their oral health as worse in comparison with those with more years of study (β=0.1236 SE=0.0429) (data not shown in the tables).

3.3 Model 3

In Figure 3, non-significant direct pathways between variables at non-adjacent levels from Model 2 were removed. Therefore, the direct pathways between dental caries ->

poorer quality of life; dental pain -> poorer SROH, and chewing problem -> poorer quality of life were removed in Model 3. This new measurement model showed an almost perfect fit to the data: SRMR= 0.0098, RMSEA = 0.000 (90 %CI =0.000; 0.051), NFI= 0.9975 and CFI=1.0000. A chi-square difference test showed that the difference between Model 3 and Model 2 (saturated model) was not significant (ΔX^2 (3): 2.83; p=0.4151), indicating that non-significant direct pathways between variables at non adjacent levels from Model 2 was not important to the model, and Model 3 was a better fit to the data (Table 4). The proportions of the total effect accounted for by the direct and indirect effects remained similar from Model 2. There was an additional significant indirect effect of dental pain on poor quality of life. Nevertheless, most of the total effect of dental pain on poor quality of life was accounted for by the direct effect of dental pain on this outcome (94.2%).

Discussion

Our findings support Wilson and Cleary's model for HRQoL as applied to untreated dental caries: 1) untreated dental caries predicted dental pain; 2) dental pain was associated with more chewing difficulty; 3) chewing difficulty predicted poorer SROH, and; 4) a lower SROH was associated with poorer quality of life. Additionally, there were associations between variables at nonadjacent levels, and these pathways were both direct and indirect. All indirect pathways between variables at non-adjacent variables were positive and significantly associated in the final model. In this regard, functional status, as indicated by chewing difficulty, was a key mediator in the relationship between dental pain and SROH, which, in turn, was associated with poorer overall quality of life. Concerning the direct pathways, more untreated dental caries directly predicted more chewing difficulty and poorer SROH, whereas dental pain

predicted poorer quality of life. Importantly, there was no direct relationship between untreated dental caries and overall quality of life.

To our knowledge, this was the first study that evaluated the applicability of a HRQoL conceptual framework for untreated dental caries in a large sample of working age adults. The robust statistical technique used (SEM) allowed us to evaluate the complex associations between oral conditions with quality of life through an *a priori* conceptual model. Additionally, we were able to include indicators for all levels of Wilson and Cleary's model, taking sociodemographic characteristics into account.

Our findings, however, should be considered under the limitations of the current study. First, it was not possible to define the exact temporal relationship among the studied variables, given the cross-sectional nature of the current analysis. It should be noted, though, that while untreated dental caries reflects a history of disease, the symptom of dental pain referred to the previous six months, whereas chewing difficulty, SROH and quality of life were investigated in relation to the current period. In this sense, considering the recall period to which each of the variables refers, it is more likely that untreated dental caries preceded, for instance, current chewing difficulty and SROH than the opposite. Second, the use of SEM for mediation analysis has been the object of some controversy in the literature, given the strong assumptions concerning linearity among multiple variables included in the model and the inability of accounting for exposure-mediator interactions. (VanderWeele, 2012; De Stavola et al., 2015). In this regard, the use of the potential outcome approach for causal inference may represent an alternative method to answer our research question, since its assumptions are far weaker (VanderWeele, 2012). Nevertheless, although the causal inference approach to effect decomposition for multiple mediators has been drawn (VanderWeele and Vansteelandt, 2014), its applicability is still limited within epidemiology.

In accordance with previous research, oral health conditions lead to adverse outcomes on individuals' overall HRQoL through direct and indirect pathways (Baker et al., 2007; Baker et al., 2008; Santos et al., 2015). Nevertheless, previous investigations reported a lack of association between the fourth (SROH) and the fifth level (quality of life) of the model, differently from the current investigation (Baker et al., 2007; Santos et al., 2015). Several aspects may contribute to these differences. While SROH was investigated in a similar way across studies, the tools used to capture overall quality of life were distinct. The study by Santos and colleagues used the OHIP-14 as an overall wellbeing measure. This tool was developed as a social dental indicator, and is more likely to reflect the third level of the Wilson and Cleary's model (functional status), rather than measuring overall quality of life (Locker and Allen, 2007). Not surprisingly, Santos and colleagues, reported the strongest association between the third (functional status) and fifth levels (OHIP-14), and this might be related to the similar constructs captured in these two levels. Second, Baker and colleagues adopted a psychological distress measure as an indicator of overall wellbeing (Baker et al., 2007). It is possible that the lack of comprehensiveness of this tool may explain the absence of association between SROL and quality of life, since psychological health represents one of the multiple facets of quality of life. In this regard, the adoption of such a narrow indicator may limit the inferences on the relationship between oral health conditions and overall wellbeing, especially because dental caries have been associated with impairments on multiple dimensions of quality of life, such as the physical and social domains (Fontanive et al., 2013). Broad quality of life indicators may be more informative and appropriate to evaluate the association between oral health conditions and quality of life. Importantly, single item quality of life measures, such as the one adopted in the current investigation, are useful summary ratings of quality of life, but to an expense of detail. Nevertheless,

their benefits are well acknowledged in terms of cost-effectiveness, and ease of understanding (Bolwig, 2005).

Similar to previous studies, our results reinforce the importance of assessing intermediate factors between clinical oral conditions and individuals' HRQoL, both in research and clinical settings (Baker et al., 2007; Baker et al., 2008; Santos et al., 2015). The significant indirect (mediated) and positive association between untreated dental caries and overall quality of life underlines the key mediation role of dental pain, chewing difficulty and SROH in this relationship. Additionally, the lack of a direct association between untreated dental caries and quality of life suggests that interventions focused solely on the clinical status may not be entirely effective. Therefore, individuals' subjective experiences in relation to the disease may also be considered in future research when evaluating the HRQoL impacts associated with oral diseases. Particularly, we highlight the importance of functional status, which, consistently with previous studies, was identified as a key mediator on the relationship between symptoms and SROH (Baker et al., 2007; Baker et al., 2008; Santos et al., 2015). Importantly, we included a primarily physical indicator (chewing difficulty) to represent this level of the model, and future studies should explore other dimensions of functioning, such as social and psychological impacts associated with oral conditions in the light of a HRQoL conceptual framework.

Different reasons may explain the direct associations between variables at non-adjacent levels. For example, how did untreated dental caries impair someone's SROH in a pathway which is not mediated by dental pain or chewing difficulty? First, it is possible that other factors associated with dental caries may influence oral health perception, such as aesthetical and social issues for instance (Sischo and Broder, 2011). Since we adopted unidimensional indicators for nonclinical oral health conditions, the effect of other factors on perceived impacts of untreated dental caries on HRQoL cannot

be ruled out. Alternatively, while the sociodemographic characteristics we included (sex, age, income and education) are more likely to be confounding factors in these associations, personal factors, such as sense of coherence, health locus of control and self-esteem have also been identified as potential mediators on the associations between the different levels included in the Wilson and Cleary's model (Baker et al., 2010; Gupta et al., 2015). Importantly, as one moves from the left to the right in the model, the concepts are increasingly difficult to measure, and there is also an increasing number of factors that cannot be controlled for (Wilson and Cleary, 1995).

Given the limited number of studies that adopted a theoretical framework to evaluate the association between oral conditions and HRQoL, our findings further extend the applicability of Wilson and Cleary's model for untreated dental caries. We highlight the importance of considering a spectrum for clinical and nonclinical conditions under a theoretically driven model when investigating the impact of untreated dental caries on general wellbeing. This may facilitate the understanding of the processes underlying experiences of oral conditions and general quality of life both in research and clinical settings, highlighting potential points for intervention. Furthermore, future studies with a longitudinal design should explore the use of alternative approaches for causal inference, such as the potential outcome approach, and elaborate on the evidence for the applicability of Wilson and Cleary's model for untreated dental caries among adults.

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Table 1 Characteristics of the sample (N=1,074). Florianópolis, Brazil, 2009-2012.

	n	(%)
Sex		
Male	465	43.3
Female	609	56.7
Age (years)	292	27.2
20-29	256	23.8
30-39	308	28.7
40-49	218	20.3
50-59		
***Per capita* family income** *(Brazilian Reais[A])*		
3 rd tertile (higher)	310	28.9
2 nd tertile	372	34.6
1 st tertile	392	36.5
Education (years of study)		
12 or more	483	45.0
9 to 11	354	33.0
5 to 8	153	14.3
Up to 4	84	7.8
Dental Pain *(in the previous six months)*		
No	858	79.9
Yes	216	20.1
Chewing Difficulty		
Never	753	70.1
Sometimes	183	17.0
Occasionally	105	9.8
Often	18	1.7
Always	15	1.4
Self-Rated Oral Health		
Very good	100	9.3
Good	380	35.4
Fair	373	34.7
Bad	129	12.0
Very bad	92	8.6
General Quality of life		
Very good	260	24.2
Good	679	63.2
Fair	110	10.2
Bad	20	1.9
Very bad	5	0.5

A: R$ 1.7 = US$1.0 in 2009

Table 2: Polychoric correlation coefficients for the variables included in the hypothesised models (N=1074). Florianópolis, Southern Brazil, 2012.

Variables	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
1 Untreated Dental Caries	1.00								
2 Dental pain	**0.28**	1.00							
3 Chewing difficulty	**0.31**	**0.32**	1.00						
4 Poor self-rated oral health	**0.47**	**0.23**	**0.45**	1.00					
5 Poor quality of life	**0.19**	**0.18**	**0.19**	**0.24**	1.00				
6 Sex	**-0.13**	0.06	0.03	-0.02	0.05	1.00			
7 *Per capita* family income	**0.35**	**0.10**	**0.19**	**0.25**	**0.32**	0.05	1.00		
8 Age (years)	**0.11**	-0.03	**0.26**	**0.24**	**0.08**	0.04	-0.08	1.00	
9 Education (years of study)	**0.38**	0.07	**0.24**	**0.34**	**0.33**	0.02	0.60	0.21	1.00
Means	0.43	0.20	1.47	2.75	1.91	1.57	1.08	2.42	0.85
Standard Deviation	1.10	0.40	0.84	1.06	0.67	0.50	0.81	1.09	0.94

Bold values are statistically significant ($p<0.05$). Higher scores indicate: more untreated dental caries, presence of dental pain, higher frequency of chewing difficulty, poorer self-rated oral health, poorer quality of life, being female, lower income, being older and having less years of education.

Table 3: Standardized coefficients for the direct, indirect and total effects of untreated dental caries on quality of life from the Structural Equation Model (Model 2). Florianópolis, Southern Brazil (N=1074).

Predictor		Direct Effects		Indirect Effects		Total Effect
		β	% of total effect	β	% of total effect	β
Untreated Dental Caries	Dental Pain	0.3118***	100.0	-	-	0.3118***
	Chewing difficulty	0.1591**	65.3	0.0845***	34.7	0.2437***
	Poor Self-rated oral health	0.3048***	78.6	0.0829***	21.4	0.3877***
	Poor Quality of Life	-0.0271^{ns}	24.8	0.0822***	75.2	0.0551^{ns}
Dental Pain	Chewing difficulty	0.2711***	100.0	-	-	0.2711***
	Poor Self-rated oral health	0.0445^{ns}	36.7	0.0767***	63.2	0.1213**
	Poor Quality of Life	0.1233***	86.3	0.0196^{ns}	13.7	0.1429***
Chewing difficulty	Poor Self-rated oral health	0.2831***	100.0	-	-	0.2831***
	Poor Quality of Life	0.0304^{ns}	53.4	0.0265*	46.6	0.0569^{ns}
Poor self-rated oral health	Poor Quality of Life	0.0937*	100.0	-	-	0.0937*

ns: not significant ***p<0.001 **p<0.01 *p<0.05. The model was adjusted for age, sex, income and education

Table 4: Standardized coefficients for the direct, indirect and total effects of untreated dental caries on quality of life from the StructuralEquation Model (Model 3- Final Model). Florianópolis, Southern Brazil (N=1074).

Predictor		Direct Effects		Indirect Effects		Total Effect
		β	% of total effect	β	% of total effect	β
Untreated Dental Caries	Dental Pain	0.3203***	100.0	-	-	0.3203***
	Chewing difficulty	0.1570**	63.9	0.0887***	36.1	0.2457***
	Poor Self-rated oral health	0.3270***	81.7	0.0730***		0.4002***
	Poor Quality of Life	-	-	0.0773***	100.0	0.0773***
Dental Pain	Chewing difficulty	0.2768***	100.0	-	-	0.2768***
	Poor Self-rated oral health	-	-	0.0823***	100.0	0.0823***
	Poor Quality of Life	0.1242***	94.2	0.0077*	5.8	0.1319***
Chewing difficulty	Poor Self-rated oral health	0.2871***	100.0	-	-	0.2971***
	Poor Quality of Life	-	-	0.0278*	100.0	0.0278*
Poor self-rated oral health	Poor Quality of Life	0.0937*	100.0	-	-	0.0937*

ns: not significant ***p<0.001 **p<0.01 *p<0.05. The model was adjusted for age, sex, income and education

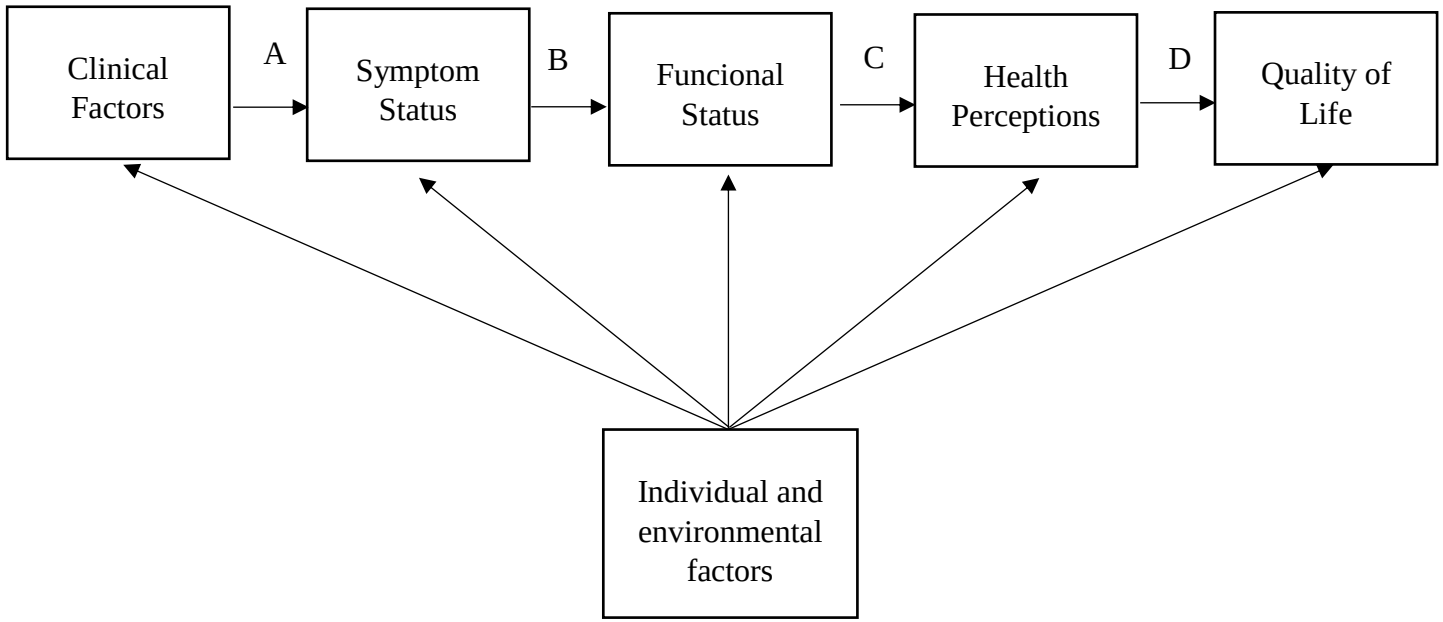
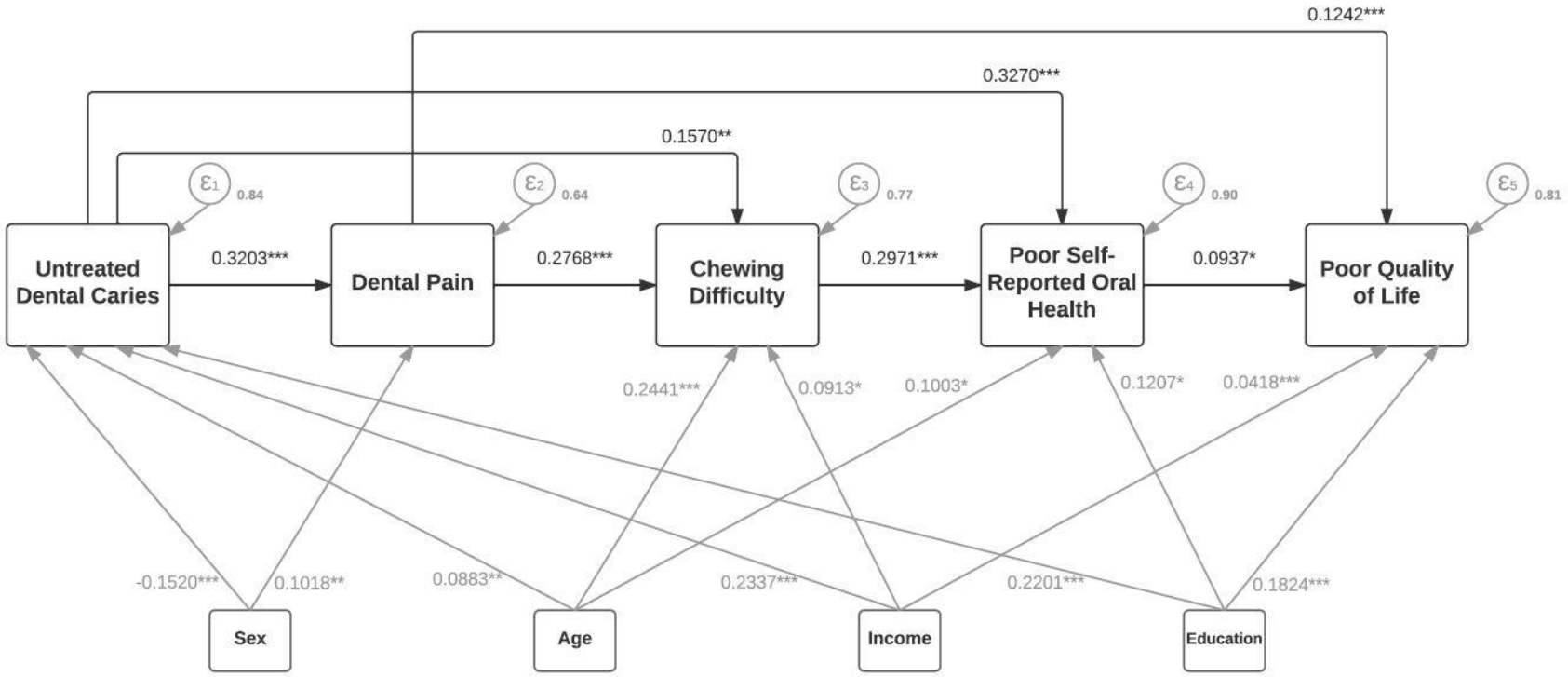


Figure 1 Conceptual Model from Wilson and Cleary for health-related quality of life (Addapted by Ferrans et al., 1999).



The figure shows standardized coefficients. Black lines: Direct effects; grey lines: pathways that were not of primary interest in the assessment of the study hypotheses.
*p<0.05 **p<0.01 ***p<0.001

Figure 2: Model 3 (Final Model) Structural equation model of the direct effects of untreated dental caries on general quality of life among adults aged 20 to 50 years. Florianópolis, Southern Brazil (N=1074).

Chapter 8 Final considerations

This chapter presents the summary of findings, an overall discussion of the results presented in the four papers (Chapter 4, 6, 7 and 8), limitations related to the methodology, conclusions and implications for future research.

Summary of Findings

Findings from this study are reported in four papers.

In the systematic review, while the majority of the available evidence reported a negative association between tooth loss and dental caries with HRQoL, mixed findings were observed regarding the direction of association between periodontal disease and HRQoL.

The first empirical paper presented on chapter 5 showed that tooth loss as a continuous variable has a negative impact on the physical domain of HRQoL. Additionally, participants with a shortened dental arch had similar HRQoL than those with more occlusal units across all domains. Finally, individuals without a functional dentition had their physical HRQoL impaired compared to those having 21 teeth or more.

The second empirical paper presented on chapter 6 showed that the most prominent clustering pattern between groups of chronic diseases included cardiometabolic, mental and musculoskeletal conditions, but only when individuals also had oral health conditions. Finally, the higher the number of health conditions within each group (cardiometabolic, mental, oral, musculoskeletal), and the higher the number of groups of health conditions, the worse the HRQoL.

Findings from the final empirical paper supported Wilson and Cleary's model for HRQoL as applied to untreated dental caries: untreated dental caries predicted dental pain; dental pain was associated with more chewing difficulty; chewing difficulty predicted poorer SROH, and; a lower SROH was associated with poorer quality of life.

Interestingly, there was no direct relationship between untreated dental caries and overall quality of life, and functional status, as indicated by chewing difficulty, was a key mediator in the relationship between dental pain and SROH, which, in turn, was associated with poorer overall quality of life.

General discussion

The systematic review provided a summary of the evidence on the HRQoL impacts associated with the three most important conditions for the global burden of oral diseases, which affect together 3.5 billion people worldwide (Kassebaum et al., 2017). Importantly, the findings from the review had key implications on the development of the rationale and methodological aspects of the manuscripts comprising the empirical component of the current thesis.

The findings from the systematic review substantiate the results of a previous review that evaluated the impact of tooth loss on HRQoL (Naito et al., 2006). The negative association between this exposure and this outcome was consistent among studies evaluating both the edentulous/dentulous division, as well as other measures of tooth loss. Regarding the periodontal disease exposure, while a previous systematic review reported a negative association between this exposure and the outcome of quality of life, mixed findings were observed regarding the direction of association in our systematic review (Buset et al., 2016). This difference may be related to the fact that specific and generic instruments of HRQoL were treated collectively as HRQoL measures in the systematic review by Buset and colleagues. Furthermore, another systematic review on this exposure and the outcome of quality of life was recently published, but no differentiation was made among generic and disease-specific HRQoL instruments, making comparisons with our results difficult (Ferreira et al., 2017). In

addition, the large majority of the studies included in the previous reviews adopted disease-specific instruments (Buset et al., 2016, Ferreira et al., 2017). Finally, differently from a previous systematic review (Naito et al., 2006), dental caries was found to be associated with impaired HRQoL in our systematic review, and this might be related to the fact that the previous review included only one article with an adolescent population pertaining to dental caries and HRQoL (Broder et al., 2000).

The majority of the investigations identified in the systematic review were carried out in high-income countries. Quality of life is a multidimensional phenomenon and, therefore, highly influenced by cultural aspects (Testa and Simonson, 1996). In this sense, the association between oral conditions and HRQoL may be different according to the context in which is being investigated. Hence the use of HRQoL instruments based on a cross-culturally sensitive concept is crucial. In order to address this, we adopted a HRQoL instrument which is well acknowledged for being cross-culturally adapted- the WHOQOL-BREF, as discussed on chapter 4. Furthermore, this instrument was developed based on the conceptualization of quality of life proposed by the WHO, and offers the possibility of investigating different dimensions of quality of life, as well as evaluations of overall health and quality of life in a single instrument. Finally, the empirical studies of the current thesis were conducted using data from a representative sample of a capital city in Southern Brazil. According to our limited knowledge the *EpiFloripa* study is possibly the largest cohort of adults in South America that contains data from oral health examinations and HRQoL.

It was further observed in the systematic review that there was no consistency on confounding factors taken into account when evaluating the association between oral conditions and HRQoL. Furthermore, while some studies reported crude estimates (Allen

et al., 1999; Cano-Gutierrez, et al., 2015), others performed an adjusted analysis based on a theoretical model (Brennan and Spencer, 2005; Brennan and Singh, 2012), and others used a stepwise and backward technique to select the confounding factors in the regression models (Fontanive et al., 2013, Marino et al 2008). This could explain why different studies had different results, and the lack of adjustment for confounding factors could have introduced bias in the estimates reported by the studies included in the systematic review. Unfortunately, the body of evidence was restricted to a limited number of studies and a segregated evaluation regarding adjustment for confounding factors was not possible in the systematic review. In this regard, factors such as sociodemographic characteristics, health-related behaviours, and presence of systemic diseases are clearly potential confounding factors on the association between oral conditions and HRQoL. Therefore, not adjusting for these factors may compromise the internal validity of the results in those studies that did not report adjusted findings. Furthermore, there is a wide recognition of the limitations of stepwise multiple regression, which is ultimately related to the fact that the interpretation of a covariate estimate is different than for the exposure estimate (Greenland, 1989). Considering the abovementioned aspects, the associations between oral health dimensions and HRQoL were evaluated in the current thesis on the light of theoretical frameworks designed *a priori*. Particularly, the *EpiFloripa* dataset contained comprehensive information regarding important confounding factors for the association between oral health dimensions and HRQoL, and this may have contributed to increase the internal validity of the findings reported in the empirical papers.

With regards to the tooth loss exposure, the systematic review identified that there was no uniformity in the way cases were defined. This makes comparisons across the studies difficult, particularly because the different definitions of tooth loss reflect distinct processes, and, consequently, their impacts on HRQoL may also be different. In addition,

while the number of teeth is important, their position may also be relevant as indicated by a previous systematic review on the association between tooth loss and OHRQoL (Gerritsen et al., 2010). In order to address this, the first empirical paper of the thesis aimed to evaluate the HRQoL impacts associated with three different definitions of tooth loss, including overall number of teeth, functional dentition and SDA.

Theoretical models for the association between each of the three exposures and HRQoL were conceptualized based on the different processes that each definition reflects. Concerning this, the number of teeth represents an overall evaluation of oral health, while a functional dentition reflects the minimum threshold for an adequate oral functionality. Finally, the concept of SDA is based on an adequate level of mastication efficiency and satisfactory aesthetics, given that a minimum number of posterior occlusal units is required and the presence of intact anterior teeth is mandatory for both definitions of SDA. Consistently with previous investigations, the overall number of teeth was found to be important for HRQoL, as well as the <20 teeth threshold (Brennan and Spencer, 2005; Brennan et al., 2008). In addition, individuals with SDA had similar HRQoL in comparison with those with more posterior occlusal units. Interestingly, previous studies on the association between SDA and OHRQoL found similar results in Australia and Brazil, indicating that the position of the remaining teeth may be important for both OHRQoL and HRQoL (Tan et al., 2015; Antunes et al., 2016). To our knowledge, the association between SDA and general HRQoL has only been investigated in clinical settings before (Armellini et al., 2008) and this was the first study to examine this relationship in a large sample of working age adults.

The third empirical paper addressed one of the main advantages of adopting generic HRQoL evaluations in the context of oral health, which is the possibility of

assessing the simultaneous impacts of different diseases on HRQoL. To our limited knowledge, this was the first study that examined the HRQoL impacts associated with multimorbidity taking oral conditions into account, even though the co-occurrence of oral and general diseases has been well established at the biological level. The findings showed that individuals with cardiometabolic, mental and musculoskeletal conditions were also more likely to have oral conditions, and, consistently with previous investigations, multimorbidity was negatively associated with different domains of quality of life (Fortin et al., 2004). Besides the fact that the oral conditions included in the analyses (untreated dental caries, periodontal disease and tooth loss) are highly prevalent, the GBD report update indicates that as countries continue to advance in development, the prevalence of NCDs, including oral health conditions, is likely to increase (Kassebaum et al., 2017). In this sense, establishing the relationship between oral and general conditions not only at the biological level, but also from a PRO perspective, is key for integrating oral and general health policies, aiming at reducing the burden of oral diseases and improving quality of life.

While the findings from the systematic review and from the empirical papers effectively answer questions regarding the impacts of oral conditions on HRQoL, they do not establish the potential pathways through which clinical oral conditions may lead to adverse outcomes on HRQoL. In this sense, availability of information on symptom status, functioning, health perceptions and overall quality of life allowed us to investigate the applicability of the most used HRQoL conceptual framework- the Wilson and Cleary model, for untreated dental caries. Besides being highly prevalent, affecting 2.5 billion people worldwide, untreated dental caries was found to be consistently negatively associated with HRQoL in the systematic review, reinforcing the selection of this condition as the oral disease of interest. In this sense, the fourth paper aimed at

investigating the association between the continuum of symptom status and function disability related to the clinical condition of untreated dental caries, with health perceptions and overall quality of life. Evidence from this study have key implications for a broader understanding of the processes underlying experiences of oral health dimensions and HRQoL. In this regard, there was no direct effect of untreated dental caries on overall quality of life, addressing the importance of the assessment of intermediate non-clinical factors both in research and clinical contexts. This particularly relates to the functional status, which was also found to be a key mediator of the association between other oral conditions and overall quality of life (Baker et al., 2007; Baker et al., 2008; Santos et al., 2015). To our limited knowledge, this was the first evaluation of the applicability of the Wilson and Cleary conceptual framework for HRQoL for untreated dental caries. Furthermore, the use of SEM allowed us to evaluate the complex direct and mediated linkages between clinical and nonclinical oral conditions with quality of life through an *a priori* conceptual model.

Overall, findings from the systematic review and from the three empirical papers supported a negative association between dimensions of oral health and general HRQoL. We were able to investigate the impacts of different dentition status on HRQoL, as well as the impacts of oral conditions on this outcome in the context of multimorbidity. Finally, we also investigated the potential pathways for the association between untreated dental caries and poorer quality of life. Considering the increasing burden of chronic conditions, together with the underlying risk factors shared by oral and systemic chronic diseases, the evidence provided by the current thesis reinforces the integration of oral and general health policies based upon a common-risk factor approach.

Limitations

The findings from the current thesis should be considered under a number of limitations.

First, it was not possible to define the exact temporal relationship among the studied variables, since oral conditions and HRQoL were both assessed in the follow-up of the *EpiFloripa* study. In this sense, the cross-sectional nature of our analysis is a fundamental limitation for establishing potential causal relationships between oral conditions and HRQoL. It should be noted, though, that while oral conditions, such as untreated dental caries reflects a history of disease, the WHOQOL-BREF investigates the HRQoL in the previous two weeks. In this sense, it is more likely that oral health conditions preceded the outcome of HRQoL, than the opposite.

With regards to the outcome of HRQoL, the WHOQOL-BREF is essentially a profile measure. Accordingly, the psychometric properties of this instrument do not allow for estimating health utility indexes, which is a major feature of instruments such as the EuroQol, for example (Brooks, 1995). The advantage of HRQoL utility scores is that they can be used in cost-utility and cost-effectiveness analyses. Therefore, they are important for the establishment of priorities and for estimating the cost and burden of various diseases from a public health perspective (Torrance, 1987). Nevertheless, the measure adopted for the assessment of HRQoL in the current thesis captures a greater level of detail regarding the different dimensions of HRQoL which are affected by multiple health conditions.

From a data collection perspective, our study was restricted to the variables collected in the primary survey, and this has a number of implications. First, it is possible that important confounding factors for the associations tested in the different empirical

studies were not collected. In this regard, it can be highlighted the lack of information on removable partial prosthesis. This information would be particularly relevant for the first empirical paper, since the association between tooth loss and HRQoL may be different among those with and without partial removable prosthesis. Furthermore, this limits our study to provide recommendations regarding prosthetic replacement of missing teeth, particularly among those individuals with SDA. Nevertheless, it should be noted that even though unmeasured confounding may exist, we were able to adjust the analyses performed in the empirical papers for variety of confounding factors. These include sociodemographic characteristics, health-related behaviours and general health conditions.

Another limitation concerning the data collection is the fact that some variables in the study were not assessed using the most appropriate, or "gold standard" method. For example, the medical diagnosis of general chronic diseases, such as diabetes, cardiovascular diseases, renal disease and arthritis, was self-reported. It is possible that misclassification for these conditions could have occurred, and individuals who actually have the disease, but are not aware of it, could have been included in the comparison group. The assessment of these conditions through more sophisticated diagnosis methods would probably be more appropriate, as they were treated as important confounding factors in the first empirical study and as exposures in the second manuscript. In addition, more sophisticated diagnosis methods, such as clinical examinations and blood tests, could inform on whether the chronic conditions are being treated or not. This is important considering that the treatment of these conditions could potentially mitigate their negative impacts on HRQoL. Finally, with regards to the study on multimorbidity and HRQoL, this possible source of information bias is less likely to explain our findings, as it would reduce the effect magnitude of the studied associations.

Around 500 individuals who participated in the baseline of the *EpiFloripa* study (n=1720) were not followed-up in 2012 (n= 1222). Nevertheless, it is unlikely that selection bias due to loss on follow-up have occurred, in the sense of these losses being independent of the associations under study. Furthermore, it should also be mentioned that even though the sample was re-weighted in 2012 as an attempt of ensuring representativeness, the aim of the current study was to investigate the associations between oral and general health conditions with HRQoL, and not to define their prevalence in the target population. In this sense, the generalization of results is likely to be dependent of the mechanisms underlying the observed association and its biological plausibility, rather than being dependent of the statistical representativeness of the sample (Rothman and Greenland, 1998).

Structural Equation Modelling was the statistical technique of choice when testing the applicability of the Wilson and Cleary model for HRQoL in the final empirical paper. This approach has been the object of some controversy in the literature, given the strong assumptions concerning linearity among the studied associations (VanderWeele, 2012; De Stavola et al., 2015). More importantly, researches who work with models of causal inference in epidemiology have pointed out that this technique does not account for the presence of exposure-induced mediator outcome confounders. This happens when multiple mediators are evaluated in a single model, and, unless they act along separate pathways, there might be intermediate confounding which is induced by the previous mediator. In this regard, the use of the potential outcome approach for causal inference may represent an alternative method to answer the research question of the third empirical paper of the current thesis, since its assumptions concerning linearity, for example, are far weaker (VanderWeele, 2012). Marginal Structural Models, for example, follow the counterfactual logic, and have been increasingly used within epidemiological studies.

Nevertheless, they are applicable when only one mediator is being studied, which is not the case of our model where three mediators are being analysed. Although the counterfactual approach to effect decomposition for multiple mediators has been drawn, and it does account for exposure-induced mediator outcome confounder, its applicability is still limited in epidemiological studies (VanderWeele and Vansteelandt, 2014). Furthermore, differently from the SEM, the effect decomposition in the counterfactual approach is more feasible when all the variables are dichotomised, and important information could be lost in this process.

Concluding Statement

The current study provides a comprehensive evaluation of the association between oral health dimensions and HRQoL among adults. Our findings reinforce the relationship between oral and general health from a psychosocial perspective, to the existing knowledge of their biological relationship. Considering the increasing burden of chronic conditions, together with the underlying risk factors shared by oral and systemic chronic diseases, the evidence provided by the current thesis reinforces the integration of oral and general health policies based upon a common-risk factor approach. Although we were able to successfully show that there was a negative association between oral conditions and general HRQoL, and that this association persisted following adjustment for confounding factors in the empirical papers, these findings should be considered under the methodological limitations of the current study. To this end, the following sub-section proposes future directions into oral health and HRQoL research.

Future Directions

A number of gaps in the literature regarding the association between oral health conditions and HRQoL were identified in the systematic review. Furthermore, the empirical component of the current thesis solely included cross sectional evaluations of the association between oral health dimensions and HRQoL in an adult population of Southern Brazil. Future investigations aiming to improve the evidence on this relationship will need to account for several elements as listed herein:

- More studies are needed on the association between the most prevalent oral conditions and HRQoL in different settings in order to reinforce the relationship between oral and general health from a PRO perspective. In this regard, prospective investigations are encouraged, given the cross-sectional nature of the current available evidence. Special attention should be given to periodontal disease and dental caries, since few studies have investigated the HRQoL impacts associated with these conditions.
- The use of health utility measures for evaluating the HRQoL impacts associated with oral conditions are encouraged in order to estimate their the cost and population burden. This would enhance their socioeconomic impact, reinforcing oral diseases as an important public health issue.
- When investigating the relationship between oral health conditions and HRQoL, studies should attempt to take into account important confounding factors in this association, such as sociodemographic characteristics, health-related behaviours and general health conditions. We recommend that conceptual models for examining such associations should be designed *a priori* in order to increase the internal validity of the estimates.

- Future research should further investigate the impact of location of missing teeth on the association between tooth loss and HRQoL. This particularly relates to the differences between anterior and posterior teeth and to the presence of different definitions of SDA. Considering that people are retaining more teeth over time, and the management of dentate older adults may be a concern regarding the demand for treatment in the future specially in publically funded oral health care, studies on the association between SDA and HRQoL taking the prosthetic status into account are encouraged (Cronin et al., 2009; Gerritsen et al., 2010). This could potentially inform a rational decision for replacement of posterior missing teeth.
- The presence of clustering of oral and general health conditions should be further explored. In this sense, general conditions should be assessed by using more valid diagnosis methods, and information on whether these conditions are being treated or not should also be taken into account. In addition, other groups of NCDs, such as respiratory diseases and gastrointestinal disorders should be included in these evaluations. More importantly, the impacts of multimorbidity of general and oral conditions on HRQoL should be assessed in different settings in order to inform policy makers on the importance of interventions based on a common risk factor approach aiming at reducing their burden and improving individuals' HRQoL. Future research should investigate whether the determinants of clusters of risk factors, such as social disadvantage, are also common to clusters of health conditions. This would make it possible to understand the impacts or oral conditions for the community in a more broadly way, and their implications in the reduction in a person's capacity for economic and social participation. In addition, besides the common risk factor approach, such studies would promote a deeper

integration of oral and general health policies such as the provision of dental care in nursing homes and co-location of dental clinics with general practitioners centres.

- We suggest that more studies should investigate the mechanisms through which different oral health conditions (i.e. periodontal disease and tooth loss) lead to poor outcomes on HRQoL in the light of a conceptual model, taking clinical and non-clinical factors into account. This helps to systematically define the constructs being examined and to identify specific points for interventions aiming at improving individuals' lives. In this sense, a longitudinal design will allow for the mechanisms through which oral conditions may affect HRQoL to be more broadly understood. In this sense, future research should explore other statistical methodologies for mediation analysis, such as the counterfactual approach, aiming at accounting for the presence of exposure-induced mediator outcome confounders. With regards to the potential mediation pathways, future studies should explore other dimensions of functioning, such as social and psychological impacts associated with oral conditions in the light of a HRQoL conceptual framework.

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Appendices

Apendix I Questionnaire 2009

PROGRAMA DE PÓS-GRADUAÇÃO EM SAÚDE PÚBLICA

UNIVERSIDADE FEDERAL DE SANTA CATARINA
ESTUDO POPULACIONAL SOBRE SAÚDE DO ADULTO
FLORIANÓPOLIS 2009

Meu nome é <…> . Sou pesquisadora da UFSC e estou realizando uma pesquisa sobre a saúde dos adultos de Florianópolis e preciso de sua colaboração. Sua participação é muito importante. Podemos conversar? *(Se tiverem dúvidas é um bom momento para explicar – Entregar o consentimento pré-informado. Agradecer se sim ou não. Se marcou p/outro dia – anotar na planilha de campo Dia e Hora da entrevista agendada)***.** *Caso concordou ou ficou na dúvida continue:* **gostaríamos de lhe fazer algumas perguntas sobre a sua saúde e também tomar algumas medidas como, por exemplo, sua altura e peso. Este questionário não possui respostas certas ou erradas. As informações dadas pelo(a) Sr(a) não serão divulgadas nem as respostas que o(a) Sr(a) nos der.** *Neste momento deve ser lido o consentimento e a assinatura deve ser pega apenas no final da entrevista.*	
BLOCO A: GERAL	**Número do questionário: _____** ID_QUEST **Tipo de entrevista: _____** TIPOENT
Setor censitário ___ ___ ___ ____ _____ Número do domicílio: ___ ___ ___ ___ **Número de pessoas residentes no domicílio de até 15 anos: ___ ___** **Número de pessoas residentes no domicílio com 60 anos e mais: ___ ____** **Nome do(a) entrevistado(a)**_____ **Nome da mãe do(a) entrevistado(a)**_____ Nome do entrevistador: _____	setor_cens num_dom num_res_ate_15_anos num_res_mais_60_anos nome_ent nome_mae_ent NOME_ENTREVISTADOR
Data da 1ª visita: _____/ _____/ ___ Data da 2ª visita: _____/ _____/ _____ Data da 3ª visita: _____/ _____/ _____ CEP do logradouro: ___ ___ - ___ ___ ___ ___ ____ **Telefone residencial (fixo)**_____ **Celular do entrevistado (a)** _____ **Telefone trabalho** _____ **Celular de outro membro da família:** _____ **Nome do outro membro da família:**_____ **Telefone de um parente/amigo próximo**_____ **Nome do parente/amigo próximo**_____	data_1a_visita data_2a_visita data_3a_visita cep_log tel_fixo tel_cel tel_trab outro_cel outro_nome prox_tel prox_nome
AS PERGUNTAS 1 e 2 DEVEM SER APENAS OBSERVADAS PELO(A) ENTREVISTADOR(A)	

1. Sexo do (a) entrevistado(a); assinale uma das opções abaixo: (1) masculino (2) feminino	ASEXO
2. Cor/raça do (a) entrevistado (a), assinale uma das opções abaixo (1) branca (2) parda (3) negra ou preta (4) amarela (5) indígena (9) IGN	ACORPEL
AGORA VOU FAZER ALGUMAS PERGUNTAS SOBRE O (A) SR.(A), SUA FAMÍLIA E SUA CASA	
3. Quantos anos o (a) Sr.(a) tem? *(Marcar os anos completos)* idade |__ __| *(99) não informou*	ANOS
4. Qual sua data de nascimento? dia |__ __|mês |__ __| ano |__ __ __ __| (99) IGN	DN
5. Neste momento o (a) Sr.(a) está? **(1) casado(a) ou morando com companheiro(a)** **(2) solteiro(a)** **(3) divorciado(a) ou separado(a)** **(4) viúvo(a)** (9) IGN	ECIVIL
6. O (A) Sr.(a) considera a sua cor da pele: **(1) Branca** **(2) Parda** **(3) Negra ou preta** **(4) Amarela** **(5) Indígena** (9) IGN	CORPEL
7. Quantas pessoas no total contando com o Sr(a) moram na sua casa? npess |__ __| (99) IGN	NPESS
8. Quantos cômodos da sua casa são usados para dormir? cômodos |__ __| (99) IGN	NCOMOD

O (A) Sr.(a) estudou na escola?

(1) Sim (2) Não (9) IGN	ESC

Até que série/ano o (a) Sr.(a) completou na escola?(*Marcar série/ano de estudo completo)*

(1) Anesc |__ __| (77) Outros (especificar)_____ (88) NSA (99) IGN	ANOSEST

No ultimo mês o (a) Sr.(a) trabalhou e ganhou pelo trabalho?

(1) sim, com carteira assinada **(2) sim, sem carteira assinada** **(3) sim, funcionário público ou militar** **(4) sim, estudante** **(5) não** **(6) não, estudante** **(7) não, aposentado/pensionista** (9) IGN	TRAB

Em qual emprego/trabalho o Sr.(a) trabalhou mais tempo na vida?

_____	MTRAB

Qual o principal trabalho que o (a) Sr.(a) realiza atualmente?

_____	PTRAB

BLOCO B: PERGUNTAS ESPECÍFICAS

AGORA EU VOU PERGUNTAR SOBRE A SUA SAÚDE. POR FAVOR, AGUARDE QUE EU TERMINE DE LER AS OPÇÕES E ENTÃO ESCOLHA UMA DELAS.

Em geral o (a) Sr.(a) diria que sua saúde é:

(1) Muito boa **(2) Boa** **(3) Regular** **(4) Ruim** **(5) Muito ruim** (9) IGN	SS1
Com relação aos seus dentes o (a) Sr.(a) está : **(1) Muito satisfeito** **(2) Satisfeito** **(3) Nem satisfeito nem insatisfeito** **(4) Insatisfeito** **(5) Muito insatisfeito** (9) IGN	AVALBUCO

AGORA VOU FAZER ALGUMAS PERGUNTAS SOBRE O BAIRRO EM QUE O (A) SR.(A) MORA.

Há quanto tempo o (a) Sr.(a) mora neste bairro?

_____ano(s) _____meses (999) IGN	TANOMES

AGORA VOU FAZER ALGUMAS PERGUNTAS SOBRE PROBLEMAS DO BAIRRO EM QUE O(A) SR(A) MORA. PARA CADA UM DOS PROBLEMAS QUE EU DISSER O (A) SR.(A) PODERÁ ESCOLHER UMA DAS TRÊS OPÇÕES: NÃO, ALGUM OU MUITOS PROBLEMAS.

Há problemas no bairro em que o (a) Sr.(a) mora com relação a:

Lixo e entulho

(0) Não	(1) Algum	(2) Muitos	(9) IGN	V1	
10. Calçamentos irregulares e perigosos	(0) Não	(1) Algum	(2) Muitos	(9) IGN	V2

11. Barulho	(0) Não	(1) Algum	(2) Muitos	(9) IGN	V3
12. Vandalismo (pichações em estátuas, muros ou prédios, escolas, brinquedos em praças quebrados, placas ou sinalizações quebradas, orelhão quebrado)	(0) Não	(1) Algum	(2) Muitos	(9) IGN	V4
13. Má fama da vizinhança	(0) Não	(1) Algum	(2) Muitos	(9) IGN	V5
14. Velocidade do trânsito	(0) Não	(1) Algum	(2) Muitos	(9) IGN	V6
15. Cheiros desagradáveis	(0) Não	(1) Algum	(2) Muitos	(9) IGN	V7
16. Poluição de ar, terra ou água	(0) Não	(1) Algum	(2) Muitos	(9) IGN	V8
17. Agressão física, roubos, furtos e assaltos	(0) Não	(1) Algum	(2) Muitos	(9) IGN	V9
18. Arrombamentos	(0) Não	(1) Algum	(2) Muitos	(9) IGN	V10
19. Seqüestros ou assassinatos	(0) Não	(1) Algum	(2) Muitos	(9) IGN	V11
20. Tráfico e uso de drogas	(0) Não	(1) Algum	(2) Muitos	(9) IGN	V12
21. Problemas com a polícia	(0) Não	(1) Algum	(2) Muitos	(9) IGN	V13
22. Andar pela região depois que escurece	(0) Não	(1) Algum	(2) Muitos	(9) IGN	V14
23. Falta de lugares seguros para as crianças brincarem	(0) Não	(1) Algum	(2) Muitos	(9) IGN	V15
24. Transporte urbano (ônibus)	(0) Não	(1) Algum	(2) Muitos	(9) IGN	V16

AGORA VAMOS CONVERSAR SOBRE APARÊNCIA FÍSICA
(*Mostrar o cartão com as figuras de corpos*)

25. Qual é a figura que melhor representa a sua aparência física atualmente? SIREAL

(01) (02) (03) (04) (05) (06) (07) (08) (09) (99) IGN

26. Qual é a figura que melhor representa a aparência física que (o)a Sr.(a) gostaria de ter? SIDEAL

(01) (02) (03) (04) (05) (06) (07) (08) (09) (99) IGN

27. Qual é a figura que representa a aparência física que (o)a Sr.(a) considera ideal para o sexo oposto ao seu? SIOPOS

(01) (02) (03) (04) (05) (06) (07) (08) (09) (99) IGN

NAS PRÓXIMAS QUESTÕES VOU PERGUNTAR SOBRE SUAS ATIVIDADES FÍSICAS DO DIA-A-DIA

28. Nos últimos três meses, o (a) Sr.(a) praticou algum tipo de exercício físico ou esporte? VIGAF1

(0) Não ➔ ***pule para questão 42***
(1) Sim
(9) IGN ➔ ***pule para questão 42***

29. Qual o principal exercício físico ou esporte que o (a) Sr.(a) praticou? (00) Caminhada (não vale deslocamento para trabalho) (01) Caminhada em esteira (02) Corrida (03) Corrida em esteira (04) Musculação (05) Ginástica aeróbica (06) Hidroginástica (07) Ginástica em geral (10) Natação (11) Artes marciais e luta (12) Bicicleta (13) Futebol (14) Basquetebol (15) Voleibol (16) Tênis (77) Outros (*especificar*) _____ (88) NSA (99) IGN	VIGAF2
30. O (A) Sr.(a) pratica o exercício ou esporte pelo menos uma vez por semana? (0) Não ➔ ***pule para questão 42*** (1) Sim (8) NSA (9) IGN ➔ *pule para questão 42*	VIGAF3
31. Quantos dias por semana o (a) Sr.(a) costuma praticar exercício ou esporte? (0) **1 a 2 dias por semana** (1) **3 a 4 dias por semana** (2) **5 a 6 dias por semana** (3) **Todos os dias** (8) NSA (9) IGN	VIGAF4
32. No dia que o (a) Sr.(a) pratica exercício ou esporte, quanto tempo dura esta atividade? (0) Menos que 10 minutos (1) Entre 10 e 19 minutos (2) Entre 20 e 29 minutos (3) Entre 30 e 39 minutos (4) Entre 40 e 49 minutos (5) Entre 50 e 59 minutos (6) 60 minutos ou mais (8) NSA (9) IGN	VIGAF5
33. Nos últimos três meses, o (a) Sr.(a) trabalhou ? (0) Não ➔ ***pule para questão 47*** (1) Sim (9) IGN ➔ ***pule para questão 47***	VIGAF6
34. No seu trabalho, o (a) Sr.(a) anda bastante a pé?	

(0) Não (1) Sim (8) NSA (9) IGN	VIGAF7
35. No seu trabalho, o(a) Sr.(a) carrega peso ou faz outra atividade pesada? (0) Não (1) Sim (8) NSA (9) IGN	VIGAF8
36. Para ir ou voltar ao seu trabalho, o(a) Sr.(a) faz algum trajeto a pé ou de bicicleta? (0) **Não** ➔ ***pule para questão 47*** (1) **Sim, todo o trajeto** (2) **Sim, parte do trajeto** (8) NSA (9) IGN ➔ ***pule para questão 47***	VIGAF9
37. Quanto tempo o(a) Sr.(a) gasta para ir e voltar neste trajeto a pé ou de bicicleta? (0) Menos que 10 minutos (1) Entre 10 e 19 minutos (2) Entre 20 e 29 minutos (3) Entre 30 e 39 minutos (4) Entre 40 e 49 minutos (5) Entre 50 e 59 minutos (6) 60 minutos ou mais (8) NSA (9) IGN	VIGAF10
38. Atualmente, o(a) Sr.(a) esta freqüentando algum curso/escola ou leva alguém em algum curso/escola? (0) Não ➔ ***pule para questão 50*** (1) Sim (9) IGN ➔ ***pule para questão 50***	VIGAF11
39. Para ir ou voltar a este curso ou escola, faz algum trajeto a pé ou de bicicleta? (0) **Sim, todo o trajeto** (1) **Sim, parte do trajeto** (2) **Não** ➔ ***pule para questão 50*** (8) NSA (9) IGN ➔ ***pule para questão 50***	VIGAF12
40. Quanto tempo o(a) Sr.(a) gasta para ir e voltar neste trajeto a pé ou de bicicleta? (0) Menos que 10 minutos (1) Entre 10 e 19 minutos (2) Entre 20 e 29 minutos (3) Entre 30 e 39 minutos (4) Entre 40 e 49 minutos (5) Entre 50 e 59 minutos	VIGAF13

(6) 60 minutos ou mais (8) NSA (9) IGN	
41. Quem costuma fazer a faxina da sua casa? (0) Eu sozinho ➔ ***pule para questão 52*** (1) Eu com outra pessoa (2) Outra pessoa ➔ ***pule para questão 52*** (9) IGN ➔ ***pule para questão 52***	VIGAF14
42. A parte mais pesada da faxina fica com: (0) **O (A) Sr.(a)** (1) **Outra pessoa** (2) **Ambos** (8) NSA (9) IGN	VIGAF15
NAS PRÓXIMAS QUESTÕES, VOU PERGUNTAR SOBRE SUA ALIMENTAÇÃO	
43. Quantas refeições o(a) Sr.(a) faz por dia? *Considerar que refeição é qualquer alimento consumido em horários que caracterizam um hábito para o entrevistado. Devendo, portanto, considerar os lanches consumidos entre refeições principais*. |___| refeições (99) IGN	VIGNUT1
NAS PRÓXIMAS QUESTÕES O (A) SR.(A) DEVE CONSIDERAR OS DIAS DA SEMANA PARA RESPOSTA. DESTA FORMA O (A) SR.(A) DEVE CONSIDERAR DE 0 A 7 DIAS, SENDO 0 = NENHUM DIA/NUNCA/QUASE NUNCA, 1= UMA VEZ, 2= DUAS VEZES, 3=TRÊS VEZES, 4=4VEZES, 5=5VEZES, 6=6 VEZES E 7= TODOS OS DIAS DA SEMANA.	
44. Em quantos dias da semana o(a) Sr.(a) toma café da manhã? |___| dias (9) IGN	VIGNUT2
45. Em quantos dias da semana, o (a) Sr.(a) costuma comer salada de alface e tomate ou salada de qualquer verdura ou legume cru? |___| dias ➔ ***Se a resposta for 0 pule para questão 56*** (9) IGN	VIGNUT3
46. Num dia comum, o(a) Sr.(a) come este tipo de salada: **(1) no almoço** (*uma vez por dia*) **(2) no jantar** **(3) no almoço e no jantar** (*duas vezes por dia*) (8) NSA (9) IGN	VIGNUT4
47. Em quantos dias da semana, o(a) Sr.(a) costuma comer verdura ou legume cozido junto com a comida ou na sopa, como por exemplo, couve, cenoura, chuchu, berinjela, abobrinha, sem contar batata, aipim ou inhame? |____| dias ➔ ***Se a resposta for 0 pule para questão 58*** (9) IGN	VIGNUT5
48. Num dia comum, o(a) Sr.(a) come verdura ou legume cozido: **(1)No almoço** (*uma vez por dia*) **(2)No jantar** **(3)No almoço e no jantar** (*duas vezes por dia*)	VIGNUT6

(8) NSA (9) IGN	
49. Em quantos dias da semana o(a) Sr.(a) costuma comer carne vermelha (boi, porco ou cabrito)? |___| dias ➔ ***Se a resposta for 0 pule para questão 60*** (9) IGN	VIGNUT 7
50. Quando o(a) Sr.(a) come carne vermelha com gordura, o(a) Sr.(a) costuma: (0)**Tirar sempre o excesso de gordura visível** (1)**Comer com a gordura** (2)**Não come carne vermelha com muita gordura** (8) NSA (9) IGN	VIGNUT 8
51. Em quantos dias da semana o(a) Sr.(a) costuma comer frango/galinha? |___| dias ➔ ***Se a resposta for 0 pule para questão* 62** (9) IGN	VIGNUT 9
52. Quando o(a) Sr.(a) come frango/galinha com pele, o(a) Sr.(a) costuma: (0)**Tirar sempre a pele** (1)**Comer com a pele** (2)**Não come pedaços de frango/galinha com pele** (8)NSA (9) IGN	VIGNUT 10
53. Em quantos dias da semana o(a) Sr.(a) costuma tomar suco de frutas natural? |___| dias ➔ ***Se a resposta for 0 pule para questão* 64** (9) IGN	VIGNUT 11
54. Num dia comum, quantas copos o(a) Sr(a) toma de suco de frutas natural? (0)**Um copo** (1)**Dois copos** (2)**Três ou mais copos** (8) NSA (9) IGN	VIGNUT 12
55. Em quantos dias da semana o (a) Sr(a) costuma comer frutas? |___| dias ➔ ***Se a resposta for 0 pule para questão* 66** (9) IGN	VIGNUT 13
56. Num dia comum, quantas vezes o(a) Sr.(a) come frutas? (0)**Uma vez no dia** (1)**Duas vezes no dia** (2)**Três ou mais vezes no dia** (8) NSA (9) IGN	VIGNUT 14
57. Em quantos dias da semana o(a) Sr.(a) costuma tomar refrigerante (ou suco artificial tipo Tampico)? |___| dias ➔ ***Se a resposta for 0 pule para questão* 69** (9) IGN	VIGNUT 15
58. Que tipo? (0) **Normal** (1) **Diet/light/zero** (2) **Ambos**	VIGNUT 16

(8) NSA (9) IGN	
59. Quantos copos/latinhas o(a) Sr.(a) costuma tomar por dia? |___|___| copos/latinhas (88) NSA (99) IGN	VIGNUT 17
60. Em quantos dias da semana o(a) Sr.(a)costuma tomar leite? |__ | dias ➔ ***Se a resposta for 0 pule para questão 71*** (9) IGN	VIGNUT 18
61. Quando o(a) Sr.(a) toma leite, que tipo de leite costuma tomar? (0)**Integral** (1)**Desnatado ou semi-desnatado** (2)**Os dois tipos** (*integral + desnatado ou semi-desnatado*) (8) NSA (9) IGN	VIGNUT 19
62. Em quantos dias na semana o(a) Sr.(a) come alimentos fritos, como batata frita, ovo frito, pastel, aipim frito, bolinho frito? |___| dias (9) IGN	VIGNUT 20
AGORA EU GOSTARIA DE VERIFICAR SUA PRESSÃO, ALTURA, PESO E MEDIR SUA CINTURA	
63. Pressão arterial sistólica (1º medida): PAS 1|__ __ __| (999) IGN	PAS1
64. Pressão arterial diastólica (1º medida): PAD1|__ __ __| (999) IGN	PAD1
65. Peso: __ __ __ , __ kg (9999) IGN	PESO
66. Estatura 1: Estatura1__ __ __ cm (999) IGN	ESTAT1
67. Estatura 2: Estatura2 __ __ __ cm (999) IGN	ESTAT2
68. Perímetro da cintura: *(fazer a medida duas vezes e registrar a média encontrada)* __ __ __ cm (999) IGN	CINTM
AGORA EU VOU FAZER ALGUMAS PERGUNTAS PARA O(A) SR.(A) SOBRE DOR	
69. Atualmente, o(a) Sr.(a) sofre de *alguma* dor na maioria dos dias? (0) Não ➔ ***pule para questão 80*** (1) Sim (8) NSA (9) IGN	DC1
70. Há quanto tempo o(a) Sr.(a) sofre de dor na maioria dos dias?	

(0) Menos de 3 meses (1) Entre 3 e 6 meses (2) Mais de 6 meses (8) NSA (9) IGN	DC2
71. No último mês o(a) Sr.(a) sentiu dores em várias partes do corpo, açima e abaixo da cintura? (por exemplo: braços e pernas; cabeça e pernas) (0) Não ➔ ***pule para questão 82*** (1) Sim (9) IGN	DCD1
72. Esta dor em várias partes do corpo durou mais que 15 dias? (0) Não ➔ ***Se também respondeu "não" (0) na questão 82, pule para questão*** *85* (1) Sim (8) NSA (9) IGN	DCD2
AGORA EU GOSTARIA DE SABER O QUANTO ESTA DOR TE DOEU NA ÚLTIMA SEMANA, PARA ISSO USAREI UMA PEQUENA ESCALA DE DOR. (*Treine com o entrevistado: dor do parto X dor de barriga, ver manual).* **CONSIDERE A ESQUERDA SEJA A AUSÊNCIA DE DOR (ZERO) E A DIREITA A DOR MÁXIMA SUPORTÁVEL (100)** (*Após treinar pergunte:*) **. MOSTRE-ME NA ESCALA COMO O (A) SR.(A) AVALIA SUA DOR NA ÚLTIMA SEMANA?**	
73. A dor média na semana passada:_____ (888) NSA (999) IGN	DCI
74. A dor mais forte na semana passada: _____ (888) NSA (999) IGN	DCIMAX
75. A dor mais fraca na semana passada:_____ (888) NSA (999) IGN	DCIMIN
76. Nos últimos 6 meses, isto é<MÊS>, o(a) Sr.(a) teve dor de dente? (1) Sim (2) Não ***pule para questão 88*** (8) NSA (9) IGN	DDEN
77. O(a) Sr.(a) poderia apontar na escala da dor o quanto esta dor te doeu? 0 (zero) significa nenhuma dor e 100 (cem) uma dor muito forte *(mostrar a escala)* (88) NSA (99) IGN	DDENI
78. Esta dor que o(a) Sr.(a) sentiu impediu de realizar alguma atividade? (0) Não (1) Trabalhar (2) Realizar os trabalhos domésticos	

(3) Dormir (4) Mastigar certos tipos de alimentos (5) Conversar com outras pessoas (6) Estudar (77) Outros *(especificar*)_____ (8) NSA (9) IGN				DDENT
AGORA VOU FAZER MAIS ALGUMAS PERGUNTAS SOBRE A SUA SAÚDE				
Algum médico ou profissional de saúde já disse que o(a) Sr.(a) tem:				
79. Doença de coluna ou costas?	(0) Não	(1) Sim	(9) IGN	CRON1
80. Artrite ou reumatismo?	(0) Não	(1) Sim	(9) IGN	CRON2
81. Fibromialgia?	(0) Não	(1) Sim	(9) IGN	CRON3
82. Câncer?	(0) Não	(1) Sim	(9) IGN	CRON4
83. Diabetes?	(0) Não	(1) Sim	(9) IGN	CRON5
84. Bronquite ou asma?	(0) Não	(1) Sim	(9) IGN	CRON6
85. Hipertensão (pressão alta)?	(0) Não	(1) Sim	(9) IGN	CRON7
86. Doença do coração ou cardiovascular?	(0) Não	(1) Sim	(9) IGN	CRON8
87. Insuficiência renal crônica?	(0) Não	(1) Sim	(9) IGN	CRON9
88. Depressão?	(0) Não	(1) Sim	(9) IGN	CRON10
89. Esquizofrenia?	(0) Não	(1) Sim	(9) IGN	CRON11
90. Tuberculose?	(0) Não	(1) Sim	(9) IGN	CRON12
91. Tendinite ou tendossinovite?	(0) Não	(1) Sim	(9) IGN	CRON13
92. Cirrose?	(0) Não	(1) Sim	(9) IGN	CRON14
93. Derrame, AVC ou isquemia cerebral?	(0) Não	(1) Sim	(9) IGN	CRON15
94. Úlcera no estômago ou duodeno?	(0) Não	(1) Sim	(9) IGN	CRON16
AGORA VAMOS CONVERSAR SOBRE A SAÚDE DA SUA BOCA				
95. Lembrando dos seus dentes de cima, o(a) Sr.(a) tem *(adultos têm no máximo 16 dentes em cima, incluindo o dente do siso):* **(1) 10 dentes naturais ou mais** **(2) < 10 dentes naturais** **(3) Nenhum dente natural** (9) IGN				DENCIMA
96. Lembrando dos seus dentes de baixo, o(a) Sr.(a) tem *(adultos têm no máximo 16 dentes embaixo incluindo o dente do siso)* : **(1) 10 dentes naturais ou mais** **(2) < 10 dentes naturais** **(3) Nenhum dente natural** (9) IGN				DENBAIXO
97. O(a) Sr.(a) acha que precisa de algum tratamento dentário? (1) Sim (2) Não (9) IGN				TRATDENT
98. O(a) Sr.(a) usa chapa (dentadura, prótese total) ? (1) Sim (2) Não (9) IGN				USOCHAPA

99. O(a) Sr.(a) acha que precisa de chapa (dentadura, prótese total)? *(se a resposta for sim, pergunte imediatamente se em cima e/ou embaixo)* **(1) Sim, em baixo** **(2) Sim, em cima;** **(3) Em cima e embaixo** **(4) Não** (9) IGN	NECHAPA
100. Com que freqüência o(a) Sr.(a) sente sua boca seca? **(1) Nunca** **(2) De vez em quando** **(3) Freqüentemente** **(4) Sempre** (9) IGN	BOCASECA
101. Com que freqüência o(a) Sr.(a) tem dificuldade em se alimentar por causa de problemas com seus dentes ou dentadura? **(1) Nunca** **(2) Raramente** **(3) De vez em quando** **(4) Freqüentemente** **(5) Sempre** (9) IGN	DIFICOME
AGRADEÇO SUA COLABORAÇÃO ATÉ AQUI E PEÇO, POR FAVOR, PARA CONTINUAR A ENTREVISTA	
AGORAVOU FAZER ALGUMAS PERGUNTAS SOBRE DOAÇÃO DE SANGUE	
102. O(a) Sr.(a) já doou sangue alguma vez na sua vida? (0) Não ➔ ***pule para questão 115*** (1) Sim (9) IGN	DSG1
103. Quando foi a última vez que o (a) Sr.(a) doou sangue? ___ ___ anos ___ ___ meses (88) NSA (99) IGN	DSG2m
104. No último ano, isto é, desde <*mês*> **do ano passado até hoje, quantas vezes o(a) Sr.(a) doou sangue?** ___ ___ vezes (88) NSA (99) IGN	DSGXX
105. Qual o principal motivo que levou o(a) Sr.(a) a doar sangue? **(01) Ajudar alguém conhecido** **(02) Para ajudar as pessoas em geral/porque sou doador** **(03) Saber se tinha alguma doença** **(04) Imposição do quartel** **(05) Afinar o sangue** **(06) Campanhas** (88) NSA (99) IGN	DSGMOT

106. Algum outro morador desta casa já doou sangue alguma vez na vida? (0) Não ➔ ***pule para questão 117*** (1) Sim (9) IGN	DSGFAM
107. Contando com o (a) Sr.(a), quantas pessoas desta casa já doaram sangue alguma vez na vida? ___ ___ número de pessoas (88) NSA (99) IGN	DSGNF
AGORA VOU CONVERSAR SOBRE O USO DE SERVIÇOS DE SAÚDE EM FLORIANÓPOLIS. ESTAS QUESTÕES SÃO REFERENTES AO USO DE SERVIÇO NA CIDADE DE FLORIANÓPOLIS.	
108. Nas últimas duas semanas, isto é, desde <*dia/ mês*> **até hoje, o(a) Sr.(a) esteve em consulta com o médico?** **(0) Sim** **(1) Não** ➔ ***pule para questão 122*** (88) NSA (99) IGN	COMED
109. Qual o motivo principal pelo qual o(a) Sr.(a) procurou esse atendimento médico nas últimas 2 semanas, isto é, desde <*dia/ mês*> **até hoje?** **(1) Acidente ou lesão** **(2) Doença** **(3) Atestado de saúde** **(4) Para fazer consulta de rotina (ou Check-up)** **(5) Outros atendimentos preventivos** (88) NSA o (99) IGN	MOTIVO
110. Onde procurou o primeiro atendimento por esse mesmo motivo nas últimas 2 semanas, isto é, desde <*dia/ mês*> **até hoje?** **(1) Posto de Saúde** **(2) Consultório médico particular** **(3) Ambulatório ou consultório de empresa ou sindicato** **(4) Ambulatório ou consultório de clínica** **(5) Ambulatório de hospital** **(6) Pronto-socorro ou emergência** **(7) Atendimento domiciliar** (88) NSA (99) IGN	LOCAL
111. Qual foi o principal atendimento de saúde que o(a) Sr.(a) recebeu? **(1) Consulta médica de clínico geral** **(2) Consulta de médico especialista** **(3) Encaminhamento à emergência ou à internação hospitalar** **(4) Somente marcação de consulta** (88) NSA (99) IGN	ATEND
112. Esse serviço de saúde onde o (a) Sr.(a) foi atendido era:	

(1) Público- (do SUS) **(2) Particular** **(3) Por convênio** (88) NSA (99) IGN	TIPOSERV
113. Nos últimos 12 meses, isto é, desde <*dia/ mês do ano passado*> **até hoje, o(a) Sr.(a) esteve internado por qualquer problema de saúde menos parto ou problemas da gravidez?** (0) Sim (1) Não (99) IGN	INTERN
114. Nos últimos 12 meses, isto é, desde <*dia/ mês*> **até hoje, o(a) Sr.(a) recebeu a visita do agente comunitário de saúde da equipe do PSF, com exceção do agente que faz a vistoria da dengue?** (0) Sim (1) Não (99) IGN	ACS
115. O(a) Sr.(a) possui plano de saúde? (1) Sim (2) Não (99) IGN	PLAN
116. Alguma vez na vida, o(a) Sr.(a) já foi ao consultório do dentista? (0) Sim (1) Não➔ ***pule para questão 128*** (9) IGN	DENT
117. Quando consultou dentista pela ultima vez? **(1) Menos de 1 ano** **(2) 1 a 2 anos** **(3) 3 anos ou mais** (8) NSA (9) IGN	CONSUL
118. Onde foi a última consulta? (1) Consultório particular (2) Consultório público (3) Outros. Qual?_____ (8) NSA (9) IGN	ONDEDEN

AGORA VOU FAZER ALGUMAS PERGUNTAS SOBRE OUTROS PROBLEMAS DE SAÚDE QUE O(A) SR.(A) POSSA TER SENTIDO NOS ÚLTIMOS 30 DIAS. O(A) SR.(A) PODE RESPONDER SIM OU NÃO PARA AS QUESTÕES.

128. Tem dores de cabeça freqüentes?	(0) Não	(1) Sim	(9) IGN	SRQ1
129. Tem falta de apetite?	(0) Não	(1) Sim	(9) IGN	SRQ2
130. Dorme mal?	(0) Não	(1) Sim	(9) IGN	SRQ3
131. Assusta-se com facilidade?	(0) Não	(1) Sim	(9) IGN	SRQ4
132. Tem tremores de mão?	(0) Não	(1) Sim	(9) IGN	SRQ5

133. Sente-se nervoso(a), tenso(a) ou preocupado(a)?	(0) Não	(1) Sim	(9) IGN	SRQ6
134. Tem má digestão?	(0) Não	(1) Sim	(9) IGN	SRQ7
135. Tem dificuldade de pensar com clareza?	(0) Não	(1) Sim	(9) IGN	SRQ8
136. Tem se sentido triste ultimamente?	(0) Não	(1) Sim	(9) IGN	SRQ9
137. Tem chorado mais do que de costume?	(0) Não	(1) Sim	(9) IGN	SRQ10
138. Encontra dificuldades para realizar com satisfação suas atividades diárias?	(0) Não	(1) Sim	(9) IGN	SRQ11
139. Tem dificuldades para tomar decisões?	(0) Não	(1) Sim	(9) IGN	SRQ12
140. Tem dificuldades no serviço (seu trabalho é penoso, causa sofrimento)?	(0) Não	(1) Sim	(9) IGN	SRQ13
141. É incapaz de desempenhar um papel útil em sua vida?	(0) Não	(1) Sim	(9) IGN	SRQ14
142. Tem perdido o interesse pelas coisas?	(0) Não	(1) Sim	(9) IGN	SRQ15
143. O(a) Sr(a) se sente uma pessoa inútil, sem préstimo?	(0) Não	(1) Sim	(9) IGN	SRQ16
144. Tem tido idéias de acabar com a vida?	(0) Não	(1) Sim	(9) IGN	SRQ17
145. Sente-se cansado o tempo todo?	(0) Não	(1) Sim	(9) IGN	SRQ18
146. Tem sensações desagradáveis no estômago?	(0) Não	(1) Sim	(9) IGN	SRQ19
147. O(a) Sr.(a) se cansa com facilidade?	(0) Não	(1) Sim	(9) IGN	SRQ20

AGORA EU VOU FAZER ALGUMAS PERGUNTAS SOBRE O USO DE BEBIDAS ALCOÓLICAS DURANTE O ÚLTIMO ANO: LEVE EM CONSIDERAÇÃO BEBIDAS COMO CERVEJA, CACHAÇA, VODKA, WISKY E VINHO.

148. Com que freqüência o(a) Sr.(a) toma bebidas alcoólicas? (0) **Nunca ➔ pule para *questão 156*** (1) **Mensalmente ou menos** (2) **De 2 a 4 vezes por mês** (3) **De 2 a 3 vezes por semana** (4) **4 ou mais vezes por semana** (8) NSA (9) IGN	AUDIT1
149. Quantas doses de álcool o(a) Sr.(a) toma normalmente ao beber? *(ver quadro de equivalência de dose padrão abaixo)* (0) **0 ou 1** (1) **2 ou 3** (2) **4 ou 5** (3) **6 ou 7** (4) **8 ou mais**	AUDIT2

(8) NSA (9) IGN	
150. Com que freqüência o(a) Sr.(a) toma cinco ou mais doses de uma vez? *(ver quadro de equivalência de dose padrão abaixo)* (0) **Nunca** ➔ ***se a soma das questões 149 e 150 for 0, pule para questão 156*** (1) **Menos do que uma vez ao mês** (2) **Mensalmente** (3) **Semanalmente** (4) **Todos ou quase todos os dias** (8) NSA (9) IGN	AUDIT3
151. Quantas vezes, desde, *<dia/ mês>* **do ano passado, o(a) Sr.(a) achou que não conseguiria parar de beber depois que começou?** (0) **Nunca** (1) **Menos do que uma vez ao mês** (2) **Mensalmente** (3) **Semanalmente** (4) **Todos ou quase todos os dias** (8) NSA (9) IGN	AUDIT4
152. Quantas vezes, desde *<dia/ mês>* **do ano passado, o(a) Sr.(a), por causa do álcool, não conseguiu fazer o que o que deveria ter feito?** (0) **Nunca** (1) **Menos do que uma vez ao mês** (2) **Mensalmente** (3) **Semanalmente** (4) **Todos ou quase todos os dias** (8) NSA (9) IGN	AUDIT5
153. Quantas vezes, desde *<dia/ mês>* **do ano passado, o(a) Sr.(a) precisou beber pela manhã para poder se sentir bem ao longo do dia após ter bebido bastante no dia anterior?** (0) **Nunca** (1) **Menos do que uma vez ao mês** (2) **Mensalmente** (3) **Semanalmente** (4) **Todos ou quase todos os dias** (8) NSA (9) IGN	AUDIT6
154. Quantas vezes, desde *<dia/ mês>* **do ano passado, o(a) Sr.(a) se sentiu culpado ou com remorso depois de ter bebido?** (0) **Nunca** (1) **Menos do que uma vez ao mês** (2) **Mensalmente** (3) **Semanalmente** (4) **Todos ou quase todos os dias** (8) NSA (9) IGN	AUDIT7

155. Quantas vezes, desde *<dia/ mês>* **do ano passado, o(a) Sr.(a) não conseguiu lembrar o que aconteceu devido à bebida?** (0) **Nunca** (1) **Menos do que uma vez ao mês** (2) **Mensalmente** (3) **Semanalmente** (4) **Todos ou quase todos os dias** (8) NSA (9) IGN	AUDIT8
156. O(a) Sr.(a) já causou ferimentos ou prejuízos ao Sr(a) mesmo ou a outra pessoa depois de beber? **(0) Não** **(2) Sim, mas não nos últimos 12 meses** **(4) Sim, nos últimos 12 meses** (8) NSA (9) IGN	AUDIT9
157. Algum parente, amigo ou médico já se preocupou com o fato de o(a) Sr.(a) beber ou pediu que o(a) Sr.(a) parasse? **(0) Não** **(2) Sim, mas não nos últimos 12 meses** **(4) Sim, nos últimos 12 meses** (8) NSA (9) IGN	AUDIT10
AGORA VOU FAZER ALGUMAS PERGUNTAS RELACIONADAS AO USO DE FUMO. PARA RESPONDÊ-LAS, CONSIDERE APENAS CIGARRO, CIGARRO DE PALHA, CHARUTO OU CACHIMBO. NÃO CONSIDERE OUTRAS FORMAS DE USO DE FUMO. CASO O(A) SR(A) FUME MAIS DE UM TIPO, RESPONDA AS QUESTÕES LEVANDO EM CONSIDERAÇÃO O TIPO QUE MAIS UTILIZA.	
158. O(A) Sr.(a) já fumou? (0) Nunca ➔ **pule para *questão 173*** (1) Sim (9) IGN	FUMO1
159. O(A) Sr(a) fuma atualmente? (0) Não ➔ ***pule para questão 167*** (1) Sim (8) NSA (9) IGN	FUMO2
160. Quanto tempo depois de acordar o(a) Sr.(a) fuma o primeiro cigarro? **(0) Após 60 min** **(1) 31-60 min** **(2) 6 – 30 min** **(3) Primeiros 5 min** (8) NSA (9) IGN	FUMO3
161. Tem dificuldade para não fumar em lugares onde é proibido, tais como igrejas, lojas, shoppings, mercados, aviões, ônibus? (0) Não	FUMO4

(1) Sim (8) NSA (9) IGN	
162. Qual é o cigarro mais difícil de largar ou de não fumar? **(0) Qualquer um** **(1) O 1º da manhã** (8) NSA (9) IGN	FUMO5
163. Quantos cigarros em média o(a) Sr.(a) fuma por dia? (0) Até 10 (1) 11-20 (2) 21-30 (3) 31 ou mais (8) NSA (9) IGN	FUMO6
164. O(a) Sr.(a) fuma mais nas primeiras horas do dia? (0) Não (1) Sim (8) NSA (9) IGN	FUMO7
165. O(a) Sr.(a) fuma mesmo estando doente, necessitando ficar acamado na maior parte do dia? (0) Não (1) Sim (8) NSA (9) IGN	FUMO8
166. O(a) Sr.(a) já tentou parar de fumar? (0) Não (1) Sim (8) NSA (9) IGN	FUMO9
167. O(a) Sr.(a) é ex-fumante? (0) Não ➔ ***pule para questão173*** (1) Sim (8) NSA (9) IGN	FUMO10
168. Por que o(a) Sr.(a) decidiu parar de fumar? (0) Não se lembra (1) Crença de que cigarro faz mal a saúde (2) Problema/condição de saúde que obrigou a parar (3) Influência de familiares e/ou amigos (4) Orientação de profissionais de saúde (5) Outros (8) NSA (9) IGN	FUMO11
169. Como foi que parou?	FUMO12

(0) De uma vez **(1) Foi diminuindo gradativamente** (8) NSA (9) IGN	
170. Há quanto tempo parou de fumar? (0) Seis meses à um ano (1) Um a dois anos (2) Três a quatro anos (3) Cinco ou mais anos (8) NSA (9) IGN	FUMO13
171. Desde que parou de fumar, teve recaídas? (0) Não (1) Sim (8) NSA (9) IGN	FUMO14
172. O que provocou a(s) recaída(s)? (1) Vício (2) Não Sabe (3) Nervosismo (4) Consumo de bebidas alcoólicas (5) Sintomas de abstinência (6) Alimentação (7) Convívio com outros fumantes (8) NSA (9) IGN	FUMO15
VAMOS CONVERSAR AGORA SOBRE OS REMÉDIOS QUE O(A) SR.(A) USOU NOS ÚLTIMOS 30 DIAS **PENSE EM TODOS OS MEDICAMENTOS QUE O(A) SR.(A) USOU NOS ÚLTIMOS 30 DIAS. PODE SER QUALQUER MEDICAMENTO/REMÉDIO, COMO PÍLULAS, COMPRIMIDOS, XAROPES, GOTAS, POMADAS, COLÍRIOS, INJEÇÕES, XAMPUS E SABONETES MEDICINAIS, PRODUTOS NATURAIS OU QUALQUER OUTRO, INCLUSIVE AQUELES UTILIZADOS PARA TRATAR MACHUCADOS, QUE USE SEMPRE OU SÓ DE VEZ EM QUANDO.**	
173. Nos últimos 30 dias, o(a) Sr.(a) usou algum remédio? (0) Sim (1) Não ➔ ***pule para questão 181*** (9) IGN ➔ ***pule para questão 181***	USO MED
O (A) SR.(A) PODERIA ME MOSTRAR TODAS AS EMBALAGENS E RECEITAS QUE TEM DOS REMÉDIOS UTILIZADOS NOS ÚLTIMOS 30 DIAS?	
REMÉDIO 1	
174. Qual o nome do medicamento? REM1_____Dosagem_____ Apresentação_____ (8) NSA (9) IGN	MED 1

175. De que forma o(a) Sr.(a) está usando este remédio? **(1) Usa para resolver um problema de saúde momentâneo** **(2) Usa regularmente sem data para parar** (77) Outro *(especificar*)_____ (8) NSA (9) IGN	TIPO 1
176. Para qual doença ou problema de saúde o(a) Sr.(a) usa este remédio? **DOE1_____** (8) NSA (9) IGN	DOE1
177. Quem indicou este remédio? **(1) O (a) Sr.(a) repetiu uma receita antiga** **(2) O (a) Sr.(a) mesmo decidiu tomar o remédio** **(3) Médico ou dentista do SUS→ *Pule para questão 179*** **(4) Médico ou dentista particular ou do plano de saúde → *Pule para questão 179*** **(5) Farmacêutico ou o balconista da farmácia** **(6) Enfermeiro, Fisioterapeuta ou outro profissional da saúde** **(7) Parentes, vizinhos ou amigos** (77) Outro *(especificar*)_____ (88) NSA (99) IGN	IND1
178. Qual o principal motivo do(a) Sr.(a) ter usado o remédio sem indicação médica? (1) Não tinha dinheiro para ir ao médico (2) Achou que não havia necessidade de consultar médico/dentista (3) Já tinha usado o medicamento antes para o mesmo problema (4) Insatisfação com atendimento do SUS (5) Insatisfação com atendimento particular/convênio (77) Outro *(especificar*)_____ (8) NSA (9) IGN	AUT1
179. Como conseguiu este remédio? (1) Farmácia do Posto/Policlínica/Hospital SUS→ ***Pule para questão 181*** (2) Comprou (3) Comprou e ganhou uma parte (4) Outro_____ (8) NSA (9) IGN	CON SEG1
180. O(a) Sr.(a) tentou conseguir o remédio pelo Sistema Único de Saúde, ou seja, no posto de saúde, policlínica ou no hospital de graça? (0) Sim (1) Não (8) NSA (9) IGN	TENT 1
AGORA VAMOS CONVERSAR SOBRE OS MEDICAMENTOS QUE O(A) SR.(A) PRECISAVA MAS NÃO USOU NOS ÚLTIMOS 30 DIAS	

181. Neste período de 30 dias o(a) Sr.(a) deixou de tomar algum remédio que precisava? (0) Sim (1) Não ➔ ***Pule para questão 189*** (9) IGN ➔ ***Pule para questão 189***	NAOUSOM1
182. Qual o nome do remédio? REM1_____Dosagem_____ ____Apresentação_____ (8) NSA (9) IGN	NMED1
183. De que forma o(a) Sr.(a) precisava usar este remédio? **(1) Usa para resolver um problema de saúde momentâneo** **(2) Usa regularmente sem data para parar** (77) Outro *(especificar*)_____ (8) NSA (9) IGN	NTIPO1
184. Para que doença ou problema de saúde o(a) Sr.(a) precisava usar este remédio? DOE1_____ (8) NSA (9) IGN	NDOE1
185. Quem indicou este remédio? **(1) O (a) Sr.(a) repetiu uma receita antiga** **(2) O (a) Sr.(a) mesmo decidiu tomar o remédio** **(3) Médico ou dentista do SUS** **(4) Médico ou dentista particular ou do plano de saúde** **(5) Farmacêutico ou o balconista da farmácia** **(6) Enfermeiro, fisioterapeuta ou outro profissional da saúde** **(7) Parentes, vizinhos ou amigos** (77) Outro (e*specificar*)_____ (88) NSA (99) IGN	NIND1
186. Qual o principal motivo de não ter conseguido este remédio? (1) Não tinha na Farmácia do posto/policlínica/hospital do SUS (2) Receita vencida ou falta de receita (3) Não tinha dinheiro (77) Outro (*especificar)* _____ (8) NSA (9) IGN	PQNU1
187. O que o (a) Sr.(a) fez quando não conseguiu o remédio? (1) Nada ➔ ***pule para questão 189*** (2) Procurou o médico/dentista (3) Procurou outro Posto de Saúde ➔ ***pule para questão 189*** (4) Procurou um advogado ➔ ***pule para questão 189***	NCONSE1

(77) Outro *(especificar)*_____ ➔ ***pule para questão 189*** (8) NSA (9) IGN ➔ ***pule para questão 189***	
188. O que o médico/dentista fez? (1) Nada (2) Trocou o remédio por outro mais barato/acessível (3) Deu alguns remédios para um período curto do tratamento (amostra grátis) (4) Disse para procurar um advogado (77) Outra (e*specificar*)_____ (8) NSA (9) IGN	AP1
AGORA VOU CONVERSAR SOBRE OS SEUS GASTOS COM SAÚDE NOS ÚLTIMOS 30 DIAS ATENÇÃO, OS GASTOS SÃO REFERENTES AOS ÚLTIMOS 30 DIAS	
189. Nós últimos 30 dias quantos REAIS forma gastos para sua saúde, independente do pagamento ter sido realizado pelo(a) Sr.(a), em: Gasto 1- Próteses|_____| Gasto 2 - Internação|_____| Gasto 3 - Cirurgia|_____| Gasto 4 - Exames RX, imagem (ex. ultrasonografia, ressonância)|_____| Gasto 5 - Exames laboratoriais|_____| Gasto 6 - Consulta com outros profissionais de saúde|_____| Gasto 7 - Consulta médica/odontológica|_____| Gasto 8 – Remédios|_____| Gasto 9 - Plano de saúde|_____| Gasto 10 - Outros|_____| (Especificar)_____ (8) NSA (9999) IGN	G1 G2 G3 G4 G5 G6 G7 G8 G9 G10 GT
9. No mês passado, quanto receberam EM REAIS as pessoas que moram na sua casa? *(lembrar que inclui salários, pensões, mesada (recebida de pessoas que não moram na sua casa), aluguéis, salário desemprego, ticket alimentação, bolsa família, etc). Renda 1 faz referência à renda do entrevistado. Renda T é a soma da renda do entrevistado adicionada da soma da renda das outras pessoas)* renda1-Entrevistado|_____| renda2|_____| renda3|_____| renda4|_____| renda5|_____| renda6|_____| renda7|_____| renda8|_____| renda9|_____| (9) IGN	Renda1 RendaT
AGORA VAMOS CONVERSAR SOBRE OS GASTOS COM SAÚDE DA SUA FAMÍLIA NO ÚLTIMO ANO ATENÇÃO, OS GASTOS SÃO REFERENTES À FAMÍLIA NO ÚLTIMO ANO	
190. No último ano, o(a) Sr.(a) ou alguém da sua família deixou de comprar algo importante para o seu dia a dia, precisou pedir dinheiro	GASTOE

emprestado, ou teve que vender algo para pagar gastos com algum problema de saúde? (0) Sim (1) Não ➔ ***pule para questão 194*** (9) IGN ➔ ***pule para questão 194***	
191. Que problema foi este? O (a) Sr.(a) pode escolher mais de uma alternativa nesta questão. **(1) Remédio** **(2) Consulta médica** **(3) Exame Laboratório/Imagem** **(4) Internação** **(5) Cirurgia** (**77) Outro *(especificar*)_____** (8) NSA (9) IGN	PB
192. Como foi que a família resolveu este problema? O (a) Sr.(a) pode escolher mais de uma alternativa nesta questão. (1) Deixou de comprar alimento (2) Deixou de pagar contas (3) Fez empréstimo com amigos e/ou familiares (4) Fez empréstimo de banco e/ou financiadora (5) Vendeu algum bem (6) Outro (*especificar*)_____ (8) NSA (9) IGN	COPE
193. E este problema aconteceu nos últimos 30 dias? (0) Não (1) Sim (8) NSA (9) IGN	AC
AGORA EU PRECISO FAZER MAIS UMA MEDIDA DA SUA PRESSSÃO	
194. Pressão arterial sistólica (2º medida): PAS2 |__ __ __| (999) IGN	PAS2
195. Pressão arterial diastólica (2º medida): PAD2|__ __ __| (999) IGN	PAD2
A ENTREVISTA ESTÁ NO FIM. AGRADEÇO A SUA COLABORAÇÃO E PACIÊNCIA!	
AGORA VOU CONVERSAR SOBRE OS RELACIONAMENTOS QUE O(A) SR(A) JÁ TEVE	
Quando duas pessoas casam, vivem juntas ou namoram, elas geralmente compartilham bons e maus momentos. Gostaria de lhe fazer algumas perguntas sobre seus relacionamentos anteriores e atual e sobre como seu (sua) marido/companheiro (esposa/companheira) a(o) trata ou a (o) tratou. Se alguém nos interromper eu mudarei o assunto de nossa conversa. Gostaria de lhe assegurar, novamente, que suas respostas serão mantidas em segredo, e que o(a) Sr(a) não precisa responder a nada que não queira. Posso continuar? O(a) Sr(a) pode responder as questões com SIM ou NÃO. Alguma vez, o(a) seu(sua) atual marido/companheiro (esposa/companheira), ou qualquer outro(a) companheiro(a) que o(a) Sr(a) já tenha tido, tratou o(a) Sr(a) da seguinte forma:	

196. Deu-lhe um tapa ou jogou algo no(a) Sr.(a) que poderia machucá-la(o)? (1) Sim (2) Não (8) NSA (9) IGN	VIO1
197. Empurrou-a(o) ou deu-lhe um tranco/chacoalhão? (1) Sim (2) Não (8) NSA (9) IGN	VIO2
198. Machucou-a(o) com um soco ou com algum objeto? (1) Sim (2) Não (8) NSA (9) IGN	VIO3
199. Deu-lhe um chute, arrastou ou surrou o(a) Sr.(a)? (1) Sim (2) Não (8) NSA (9) IGN	VIO4
200. Estrangulou ou queimou o(a) Sr.(a) de propósito? (1) Sim (2) Não (8) NSA (9) IGN	VIO5
201. Ameaçou usar ou realmente usou arma de fogo, faca ou outro tipo de arma contra o(a) Sr.(a)? (1) Sim (2) Não (8) NSA (9) IGN	VIO6
CASO VOCÊ ESTEJA ENTREVISTANDO UM HOMEM ENCERRE A ENTREVISTA DIZENDO: **TERMINEI A ENTREVISTA. O NOSSO TRABALHO É SUPERVISIONADO PELA UNIVERSIDADE, ASSIM, PODE SER QUE OUTRO PESQUISADOR ENTRE EM CONTATO COM O(A) SR(A) PARA CONFIRMAR APENAS ALGUNS DADOS. AGRADEÇO A SUA PARTICIPAÇÃO, COLABORAÇÃO E PACIÊNCIA.**	
PARA TERMINAR EU VOU FAZER ALGUMAS PERGUNTAS ESPECÍFICAS SOBRE EXAMES PREVENTIVOS E CÂNCER. (*Somente para o sexo feminino. Para o sexo masculino marcar 8 nas questões 202 a 216, 88 na questão 217, e 8 na questões 218 a233)*	
202. A Sra. já teve ou tem câncer de mama? (0)Sim ➔ ***pule para questão 210***	MAM1

(1)Não (8) NSA					
203. Qual dos itens que vou ler, a Sra. considera que é a principal forma de diagnóstico do câncer de mama? (1) **Auto exame das mamas** (2) **Exame clínico das mamas** (3) **Mamografia** (8) NSA (9) IGN					MAM2
204. A Sra. já ouviu falar no exame de mamografia? (0) Sim (1) Não ➔ ***pule para questão 223*** (3) Não Sabe (8) NSA					MAM3
VOU LER ALGUMAS FRASES SOBRE MAMOGRAFIA E GOSTARIA QUE A SENHORA ME DISSESSE SE ACHA QUE ESTÃO CERTAS, ERRADAS OU A SRA. NÃO SABE. O EXAME DE MAMOGRAFIA:					
205. é uma maneira de saber se há ou não algum problema nos seios ou mamas.	(1) Certo	(2) Errado	(3) Não Sabe	(8) NSA	MAM4
206. fazendo esse exame a mulher vai evitar o câncer de mama.	(1) Certo	(2) Errado	(3) Não Sabe	(8) NSA	MAM5
207. só é importante para mulheres com mais de 50 anos.	(1) Certo	(2) Errado	(3) Não Sabe	(8) NSA	MAM6
208. só é importante para quem já tem algum caso de câncer de mama na família.	(1) Certo	(2) Errado	(3) Não Sabe	(8) NSA	MAM7
209. é um exame importante que deve ser feito além do exame realizado pelo médico e do exame feito pela própria mulher.	(1) Certo	(2) Errado	(3) Não Sabe	(8) NSA	MAM8
VOU LER ALGUMAS FRASES SOBRE O EXAME DE MAMOGRAFIA E GOSTARIA QUE A SENHORA DISSESSE SE CONCORDA, DISCORDA OU NÃO SABE SE O EXAME ESTÁ DESCRITO CORRETAMENTE. O EXAME DE MAMOGRAFIA OU RADIOGRAFIA DOS SEIOS É FEITO DA SEGUINTE MANEIRA:					
210. O profissional de saúde coloca a mama da mulher em um aparelho de raio X onde o seio é apertado e então o médico tira uma chapa	(1)Concordo	(2) Discordo	(3) Não Sei	(8) NSA	MAM9

211. O médico passa uma geléia na mama e depois com um aparelho sobre o seio o médico fica acompanhando as imagens numa tela de televisão pequena	(1) Concordo	(2) Discordo	(3) Não Sei	(8) NSA	MAM10
212. O médico examina o seio da mulher e marca um determinado local onde ele enfia uma agulha fina e tenta tirar algum líquido de dentro da mama	(1) Concordo	(2) Discordo	(3) Não Sei	(8) NSA	MAM11
213. Algum médico já pediu o exame de mamografia alguma vez para a Sra.? (0) Sim (1) Não (8) NSA N (9) IGN					MAM12
214. A Sra. já fez mamografia alguma vez na vida? (0) Sim ➔ ***pule para a questão 216*** (1) Não (8) NSA (9) IGN					MAM13
215. Qual o principal motivo que a Sra. não fez o exame de mamografia até hoje? (1) Dificuldade em conseguir marcar esse exame ➔ ***pule para a questão 223*** (2) Medo/vergonha do exame ➔ ***pule para a questão 223*** (3) Acha desnecessário ➔ ***pule para a questão 223*** (4) Medo de descobrir câncer de mama ou outro problema/doença ➔ ***pule para a questão 223*** (5) Porque o médico nunca pediu ➔ ***pule para a questão 223*** (6) Falta de tempo ➔ ***pule para a questão 223*** (7) Falta de dinheiro ➔ ***pule para a questão 223*** (8) NSA (9) IGN					MAM14
216. Com quantos anos a Sra. fez a sua primeira mamografia? *(aproximadamente)* _ _ anos (88) NSA (99) IGN					MAMID
217. De quanto em quanto tempo a Sra. tem feito os exames de mamografia? (1) só fez uma vez na vida (2) a cada 6 meses (3) a cada ano (4) a cada 2 anos (5) a cada 3 anos (6) mais de 3 anos (7) intervalo variável					MAM15

(8) NSA (9) IGN	
218. Qual o principal motivo que levou a Sra. fazer a última mamografia ? (1) Notei um caroço/nódulo na mama (2) O médico solicitou porque tinha suspeita de nódulo (3) O médico solicitou porque na minha família tinha casos de câncer (4) Alguma conhecida fez o exame e descobriu um câncer ou nódulo (5) Tenho medo de ter câncer de mama (6) Toda mulher acima de 40 anos deve fazer (7) Faço o exame para o acompanhamento/controle de problemas/rotina (8) NSA (9) IGN	MAM16
219. Quanto tempo faz que a Sra. fez a última mamografia? (1) Menos de um ano (2) Entre 1 ano e menos 3 anos (3) 3 anos ou mais (8) NSA (9) IGN	MAM17
220. Onde a Sra. fez sua última mamografia? (1) **Posto de saúde, hospital, ambulatório do SUS ou hospital universitário** (2) **Clínica particular através do SUS** (3) **Clínica ou consultório por convênio/plano de saúde** (4) **Clínica ou consultório particular** (77) Outro _____ (8) NSA (9) IGN	MAM18
222. O resultado do exame de mamografia demora alguns dias para ficar pronto. A Sra retornou ao médico para saber (ser informada) do resultado do seu último exame? (0) Sim (1) Não (8) NSA (9) IGN	MAM20
223. A Sra. já teve ou tem câncer de colo do útero? (0) Sim (1) Não (8) NSA (9) IGN	CAUTERO
224. Existe um exame preventivo do câncer do colo do útero, também conhecido como Papanicolau. A Sra. já ouviu falar deste exame? (0) Sim (1) Não ➔ ***termina o questionário*** (8) NSA (9) IGN	PAPC
225. A Sra. alguma vez já fez o exame preventivo do câncer do colo do útero (Papanicolau)?	PAPFEZ

(0) Sim (1) Não ➔ ***pule para 233*** (8) NSA (9) IGN	
226. Com quantos anos a Sra fez este exame pela primeira vez? ***(aproximadamente)*** _ _ anos (88) NSA (98) IGN	PAXXA
227. De quanto em quanto tempo a Sra. tem feito o preventivo ou Papanicolau ? (1) só fez uma vez na vida (2) a cada 6 meses (3) a cada ano (4) a cada 2 anos (5) a cada 3 anos (6) mais de 3 anos (7) intervalo variável (8) NSA (9) IGN	PAPXXB
228. Qual o principal motivo que levou a Sra. a fazer o último preventivo do câncer de colo de útero *(ou Papanicolau)?* (1) Estava com corrimento ou outro problema ginecológico (2) O médico solicitou o exame porque suspeitou/encontrou uma alteração (3) O médico solicitou porque na minha família tem casos de câncer. (4) Como exame de acompanhamento/controle de problemas que existiam antes do último exame. (5) Faço o exame para o acompanhamento/controle de problemas/rotina (6) Tenho medo de ter câncer de útero. (7) Toda mulher acima de 25 anos deve fazer (8) NSA (9) IGN	PAPTUX
229. Quanto tempo faz que a Sra. fez seu último preventivo? (1) Menos de um ano (2) De 1 ano a 2 anos (3) de 2 a 3 anos (4) mais de 3 anos (8) NSA (9) IGN	PAPTPX

230. Onde a Sra. fez seu último exame preventivo do câncer do colo do útero (Papanicolau)? (1) Posto de saúde, hospital, ambulatório do SUS ou Hospital Universitário (2) Clinica particular através do SUS (3) Clínica ou consultório por convênio/plano de saúde (4) Clínica ou consultório particular (77) Outro _____ (8) NSA (9) IGN	PAPMOT
232. O resultado do Exame Preventivo de colo do útero demora alguns dias para ficar pronto. A Sra. retornou ao médico (ou serviço de saúde) para saber (ser informada) do resultado do seu último exame? (0) Sim (1) Não (8) NSA (9) IGN	PAPRE
233.Qual o principal motivo para a Sra. nunca ter feito o exame preventivo do câncer de colo do útero? *(se responder esta questão, finaliza o questionário. Esta questão deverá ser respondida, apenas por aquelas que escolherem a opção (0) Sim, na questão 225)* (1) É difícil conseguir marcar esse exame (2) Acho/falaram que o exame doía e não tenho nenhum problema ginecológico (3) Não posso faltar ao trabalho para fazer o exame ou deixar meus filhos sozinhos (4) Tenho medo de descobrir câncer no útero e precisar operar (5) Porque o médico nunca pediu (6) Tenho vergonha (7) Nunca tive relação sexual (8) Tenho dificuldade de chegar até o local onde o exame é feito, pois é longe ou não sei onde é (9) Não tenho dinheiro ou como ir até o local onde o exame é feito (10) Não tenho dinheiro para pagar pelo exame (11) Outros (88) NSA (99) IGN	PAPNF
234. Peça e anote um e-mail do entrevistado para que possamos dar um retorno da pesquisa, quando concluída. Caso o entrevistado não tenha e-mail peça o de um amigo ou parente. _____	EMAIL
TERMINEI A ENTREVISTA. O NOSSO TRABALHO É SUPERVISIONADO PELA UNIVERSIDADE, ASSIM, PODE SER QUE OUTRO PESQUISADOR ENTRE EM CONTATO COM O(A) SR(A) PARA CONFIRMAR APENAS ALGUNS DADOS. AGRADEÇO A SUA PARTICIPAÇÃO, COLABORAÇÃO E PACIÊNCIA.	

Appendix II Questionnaire 2012

Estudo das condições de saúde dos adultos de Florianópolis – EpiFloripa Fase II 2012

Meu nome é <…> . Sou pesquisador(a) da UFSC e, como o Sr(a) já foi informado(a), estamos realizando uma nova pesquisa sobre a saúde dos adultos de Florianópolis, com os mesmos participantes de 2009/2010. Agradeço sua colaboração e lembro que sua participação é muito importante. Como na primeira vez, o questionário não possui respostas certas ou erradas. E nada do que o(a) Sr(a) disser será divulgado para outras pessoas. *Neste momento deve ser lido e assinado o termo de consentimento.*

BLOCO DE IDENTIFICAÇÃO **Número de identificação:** | __| __| | __|

Nome do(a) entrevistado(a) _____ _____ **Nome completo da mãe do(a) entrevistado(a)** _____ _____ _____ **Telefone residencial (fixo)**_____ **Telefone celular do(a) entrevistado(a)** _____ **Telefone (celular ou fixo) do trabalho** _____ _____ **Telefone celular de outro membro da família:** _____ **Nome do outro membro da família (registrar grau de parentesco entre parênteses):** _____	bnome_en bnome_ma btel_fixo btel_cel btel_trab boutro_c boutrono bprox_te bprox_n o bemail bemail_ o
Telefone de um parente/amigo próximo (registrar grau de parentesco entre parênteses)_____ **Nome do parente/amigo próximo** _____ _____ **Email do entrevistado** _____ **Email de outra pessoa próxima** _____	

A PERGUNTA 1 DEVE SER APENAS OBSERVADA PELO(A) ENTREVISTADOR(A)

1. Cor/raça do (a) entrevistado (a), assinale uma das opções abaixo: (0) Branca (1) Parda (2) Preta (3) Amarela (4) Indígena (9) IGN	bACORPEL|__|

AGORA, VOU FAZER ALGUMAS PERGUNTAS SOBRE O (A) SR.(A), SUA FAMÍLIA E SUA CASA	
2. Neste momento o (a) Sr.(a) está? **(0) casado(a) ou morando com companheiro(a)** **(1) solteiro(a)** **(2) divorciado(a) ou separado(a)** **(3) viúvo(a)** (9) IGN	bECIVIL|__|
3. O Censo Brasileiro usa as palavras branca, parda, preta, amarela e indígena para classificar a cor ou raça das pessoas. Se você tivesse que responder ao Censo, hoje, como se classificaria a respeito de sua cor ou raça? **(0) Branca** **(1) Parda** **(2) Preta** **(3) Amarela** **(4) Indígena** (9) IGN	bCORPEL|__|

BLOCO QUALIDADE DE VIDA							
AGORA, VOU PERGUNTAR SOBRE A SUA QUALIDADE DE VIDA, SAÚDE E OUTRAS ÁREAS DE SUA VIDA. POR FAVOR, RESPONDA A TODAS AS QUESTÕES. CASO O(A) SR.(A) ESTEJA INSEGURO COMO RESPONDER, POR FAVOR, TENTE RESPONDER O MELHOR QUE PUDER.							
Tenha em mente seus valores, aspirações, prazeres e preocupações. Nós estamos perguntando o que o(a) Sr.(a) acha da sua vida, tomando como referência as duas últimas semanas.							
4. Como o(a) Sr.(a) avalia sua qualidade de vida?	**(0) Muito ruim**	**(1) Ruim**	**(2) Nem ruim nem boa**	**(3) Boa**	**(4) Muito boa**	(9) IGN	bQV1QV|__|
5. O quanto o(a) Sr.(a) está satisfeito(a) com sua saúde?	**(0) Muito insatisfeito**	**(1) Insatisfeito**	**(2) Nem satisfeito nem insatisfeito**	**(3) Satisfeito**	**(4) Muito satisfeito**	(9) IGN	bQV2SAU|__|
As questões seguintes são sobre o quanto o(a) Sr.(a) tem sentido algumas coisas nas últimas duas semanas. Por favor, escolha uma das opções do cartão de resposta 1.							
6. Em que medida o(a) Sr.(a) sente alguma dor física que o(a) impede de fazer o que o(a) Sr.(a) precisa?	(0) Nada	(1) Muito pouco	(2) Mais ou menos	(3) Bastante	(4) Extremamente	(9) IGN	bQV3DOR|__|
7. O quanto o(a) Sr.(a) precisa de algum tratamento médico para levar sua vida diária?	(0) Nada	(1) Muito pouco	(2) Mais ou menos	(3) Bastante	(4) Extremamente	(9) IGN	bQV4MED|__|
8. O quanto o(a) Sr.(a) aproveita a vida?	(0) Nada	(1) Muito pouco	(2) Mais ou menos	(3) Bastante	(4) Extremamente	(9) IGN	bQV5APR|__|
9. Em que medida o(a) Sr.(a) acha que a sua vida tem sentido?	(0) Nada	(1) Muito pouco	(2) Mais ou menos	(3) Bastante	(4) Extremamente	(9) IGN	bQV6SEN|__|
10. O quanto o(a) Sr.(a) consegue se concentrar?	(0) Nada	(1) Muito pouco	(2) Mais ou menos	(3) Bastante	(4) Extremamente	(9) IGN	bQV7CON|__|
11. O quanto o(a) Sr.(a) se sente seguro(a) em sua vida diária?	(0) Nada	(1) Muito pouco	(2) Mais ou menos	(3) Bastante	(4) Extremamente	(9) IGN	bQV8SEG|__|
12. O quanto o seu ambiente físico é saudável (clima, barulho, poluição, atrativos)?	(0) Nada	(1) Muito pouco	(2) Mais ou menos	(3) Bastante	(4) Extremamente	(9) IGN	bQV9AMB|__|
As questões seguintes perguntam sobre o quanto o (a) Sr.(a) foi capaz de fazer certas coisas nestas últimas duas semanas. Por favor, escolha uma das opções do cartão de resposta 2.							

13. O(a) Sr.(a) tem energia suficiente para seu dia-a-dia?	(0) Nada	(1) Muito pouco	(2) Médio	(3) Muito	(4) Completamente	(9) IGN	bQV10DIA|__|
14. O(a) Sr.(a) é capaz de aceitar sua aparência física?	(0) Nada	(1) Muito pouco	(2) Médio	(3) Muito	(4) Completamente	(9) IGN	bQV11APA|__|
15. O(a) Sr.(a) tem dinheiro suficiente para satisfazer suas necessidades?	(0) Nada	(1) Muito pouco	(2) Médio	(3) Muito	(4) Completamente	(9) IGN	bQV12DIN|__|
16. O quanto as informações que precisa no seu dia-a-dia estão disponíveis para o(a) Sr.(a)?	(0) Nada	(1) Muito pouco	(2) Médio	(3) Muito	(4) Completamente	(9) IGN	bQV13INF|__|
17. Em que medida o(a) Sr.(a) tem oportunidades de atividade de lazer?	(0) Nada	(1) Muito pouco	(2) Médio	(3) Muito	(4) Completamente	(9) IGN	bQV14LAZ|__|

As questões seguintes perguntam sobre o quanto o(a) Sr.(a) se sentiu satisfeito a respeito de vários aspectos de sua vida nas últimas duas semanas.							
18. O quanto o(a) Sr.(a) é capaz de se locomover, isto é, caminhar com as próprias pernas ou deslocar-se com a ajuda de aparelhos ou cadeira de rodas?	**(0) Muito mal**	**(1) Mal**	**(2) Nem mal nem bem**	**(3) Bem**	**(4) Muito bem**	(9) IGN	bQV15LOC|__|
Para as próximas perguntas, por favor, escolha uma das opções do cartão de resposta 3.							
19. O quanto o(a) Sr.(a) está satisfeito(a) com o seu sono?	(0) Muito insatisfeito	(1) Insatisfeito	(2) Nem satisfeito nem insatisfeito	(3) Satisfeito	(4) Muito satisfeito	(9) IGN	bQV16SON|__|

20. O quanto o(a) Sr.(a) está satisfeito(a) com sua capacidade de desempenhar as atividades do seu dia-a-dia?	(0) Muito insatisfeito	(1) Insatisfeito	(2) Nem satisfeito nem insatisfeito	(3) Satisfeito	(4) Muito satisfeito	(9) IGN	bQV17DES|__|
21. O quanto o(a) Sr.(a) está satisfeito(a) com sua capacidade para o trabalho?	(0) Muito insatisfeito	(1) Insatisfeito	(2) Nem satisfeito nem insatisfeito	(3) Satisfeito	(4) Muito satisfeito	(9) IGN	bQV18TRA|__|
22. O quanto o(a) Sr.(a) está satisfeito(a) consigo mesmo?	(0) Muito insatisfeito	(1) Insatisfeito	(2) Nem satisfeito nem insatisfeito	(3) Satisfeito	(4) Muito satisfeito	(9) IGN	bQV19CVC|__|
23. O quanto o(a) Sr.(a) está satisfeito(a) com suas relações pessoais (amigos, parentes, conhecidos, colegas)?	(0) Muito insatisfeito	(1) Insatisfeito	(2) Nem satisfeito nem insatisfeito	(3) Satisfeito	(4) Muito satisfeito	(9) IGN	bQV20PES|__|
24. O quanto o(a) Sr.(a) está satisfeito(a) com sua vida sexual?	(0) Muito insatisfeito	(1) Insatisfeito	(2) Nem satisfeito nem insatisfeito	(3) Satisfeito	(4) Muito satisfeito	(9) IGN	bQV21SEX|__|
25. O quanto o(a) Sr.(a) está satisfeito(a)	(0) Muito insatisfe	(1) Insatisfeito	(2) Nem satisfeito nem insatisfeit	(3) Satisfeito	(4) Muito satisfeito	(9) IGN	bQV22SON|__|

com o apoio que o(a) Sr.(a) recebe de seus amigos?	ito		o				
26. O quanto o(a) Sr.(a) está satisfeito(a) com as condições do local onde mora?	(0) Muito insatisfeito	(1) Insatisfeito	(2) Nem satisfeito nem insatisfeito	(3) Satisfeito	(4) Muito satisfeito	(9) IGN	bQV23SON|__|
27. O quanto o(a) Sr.(a) está satisfeito(a) com o seu acesso aos serviços de saúde?	(0) Muito insatisfeito	(1) Insatisfeito	(2) Nem satisfeito nem insatisfeito	(3) Satisfeito	(4) Muito satisfeito	(9) IGN	bQV24SON|__|
28. O quanto o(a) Sr.(a) está satisfeito(a) com o seu meio de transporte?	(0) Muito insatisfeito	(1) Insatisfeito	(2) Nem satisfeito nem insatisfeito	(3) Satisfeito	(4) Muito satisfeito	(9) IGN	bQV25TRA|__|
A questão seguinte refere-se a com que freqüência o(a) Sr.(a) sentiu ou experimentou certas coisas nas últimas duas semanas.							
29. Com que freqüência o(a) Sr.(a) tem sentimentos negativos tais como mau humor, desespero, ansiedade, depressão?	**(0) Nunca**	**(1) Algumas vezes**	**(2) Frequentemente**	**(3) Muito frequentemente**	**(4) Sempre**	(9) IGN	bQV26NEG|__|

BLOCO CONDIÇÃO SOCIOECONÔMICA	
AGORA, VAMOS CONVERSAR UM POUCO SOBRE A SUA FAMILIA E SOBRE POSIÇAO SOCIAL. LEMBRE QUE OS DADOS SÃO CONFIDENCIAIS E NÃO SERÃO DIVULGADOS.	
30. Seu pai estudou na escola? (0) sim (1) não -> *pule para a questão 32*. (9) IGN	bESTPAI|__|
31. Até que série/ano seu pai completou na escola? |___| | colocar em anos ou escrever (se não souber quantos anos foram) _____ (88) NSA (99) IGN	bANOESTP|__|__|
32. Sua mãe estudou na escola? (0) sim (1) não -> *pule para a questão 34*. (9) IGN	bESTMAE|__|
33. Até que série/ano sua mãe completou na escola? |___| | colocar em anos ou escrever (se não souber quantos anos foram) _____ (88) NSA (99) IGN	bANOESTM| __|__|
34. Como o(a) Sr.(a) classifica a situação econômica da sua família quando o(a) Sr.(a) nasceu, ou quando era criança, isto é, o padrão de vida de sua família naquela época. **(0) rica** **(1) média** **(2) pobre** **(3) muito pobre** (9) IGN	bSITEC|___|
35. Comparado ao padrão de vida que o(a) Sr.(a) tem agora, como era o padrão de vida da sua família quando o(a) Sr.(a) nasceu? **(0) era melhor do que o seu padrão de vida agora** **(1) era igual ao seu padrão de vida agora** **(2) era pior que o seu padrão de vida agora** (9) IGN	bPV|___|
36. Agora, observe a escada desenhada neste cartão. No degrau mais alto desta escada estão as pessoas que possuem mais dinheiro, maior escolaridade e os melhores empregos. No degrau mais baixo estão as pessoas que possuem menos dinheiro, menor escolaridade e piores empregos ou estão desempregadas. Onde o(a) Sr.(a) se colocaria nesta escada hoje? |___| __| (9) IGN	bESC |___|__|

37. As figuras a seguir representam a estrutura corporal de diversas crianças. De acordo com estas figuras, qual diria que representa melhor o corpo que você tinha quando era criança? ı__ ı (9) IGN	bPERCORP ı___ı__ı

AGORA, PERGUNTAREI SOBRE O QUE O(A) SR.(A) COMEU E BEBEU NO DIA DE ONTEM. **Primeiramente, vamos fazer uma lista dos alimentos e bebidas que o(a) Sr.(a) ingeriu desde a meia-noite de anteontem <diga o dia da semana> até as 24h de ontem à noite <diga o dia da semana>. Isto inclui todas as refeições, petiscos, lanches, bebidas, como sucos e refrigerantes, água mineral ou da torneira, bebidas alcoólicas, como também alimentos que o(a) Sr.(a) tenha degustado ou beliscado.** Aplique o recordatório no papel.	
AGORA VAMOS MEDIR A SUA PRESSAO ARTERIAL	
38. PAS1	**bPAS1** ı__ı__ı__ı
39. PAD1	**bPAD1** ı__ı__ı__ı
E, AGORA, VAMOS PESÁ-LO E MEDIR A CIRCUNFERÊNCIA DA SUA CINTURA	
40. Peso corporal	**bKG** ı__ı__ı__ı**,** ı__ı
41. Circunferência da cintura	**bCC** ı__ı__ı__ı**,** ı__ı
BLOCO DISCRIMINAÇÃO	
AGORA, VOU LHE PERGUNTAR SOBRE SITUAÇÕES EM QUE O(A) SR.(A) PODE TER SIDO DISCRIMINADO POR OUTRAS PESSOAS, POR DIFERENTES MOTIVOS E EM DIFERENTES LUGARES. NÃO HÁ RESPOSTAS CERTAS OU ERRADAS, QUERO SABER APENAS O QUE OCORREU COM O(A) SR.(A).	
42. O(A) Sr.(a) já foi confundido com um funcionário de um estabelecimento, quando, na verdade, o(a) Sr.(a) era um cliente? Por exemplo, confundido com um vendedor, balconista ou garçom? ***(0)*** **Não** ➔ *pule para a questão 55* **(1) Sim, uma ou poucas vezes** **(2) Sim, várias vezes** **(3) Sim, sempre** (9) IGN	bDIS1ı__ı

Quando isto aconteceu, qual ou quais foram os motivos para o(a) Sr.(a) ter sido tratado assim? Por favor, responda sempre conforme as opções indicadas no cartão de respostas 4. O(a) Sr.(a) pode escolher uma ou mais das opções contidas no cartão.

43. Classe social	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS1CSı__ı
44. Cor da pele ou raça	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS1CPı__ı
45. Forma de vestir	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS1FVı__ı
46. Peso	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS1PE ı__ı
47. Idade	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS1IDı__ı
48. Local de moradia	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS1LMı__ı
49. Ser homem ou mulher	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS1SEı__ı

50. Orientação sexual	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS1OS|__|
51. Outro motivo _____(*especificar*)	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS1OM|__|
52. Ainda nestas ocasiões, o(a) Sr.(a) se sentiu discriminado? (0) Não (1) Sim (8) NSA (9) IGN					bDIS1D|__|

53. Ao freqüentar lojas, restaurantes ou lanchonetes, o(a) Sr.(a) já foi tratado de maneira inferior em relação a outros clientes? ***(0)* Não ➔** *pule para a questão 66* **(1) Sim, uma ou poucas vezes** **(2) Sim, várias vezes** **(3) Sim, sempre** (8) NSA (9) IGN					bDIS2|__|
Quando isto aconteceu, qual ou quais foram os motivos para o(a) Sr.(a) ter sido tratado assim? Por favor, me responda sempre conforme as opções indicadas no cartão de respostas 4. O(A) Sr.(a) pode escolher uma ou mais das opções contidas no cartão.					
54. Classe social	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS2CS|__|
55. Cor da pele ou raça	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS2CP|__|
56. Forma de vestir	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS2FV|__|
57. Peso	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS2PE|__|
58. Idade	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS2ID|__|
59. Local de moradia	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS2LM|__|
60. Ser homem ou mulher	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS2SE| |
61. Orientação sexual	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS2OS|__|
62. Outro motivo _____(*especificar*)	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS2OM|__|
63. Ainda nestas ocasiões, o(a) Sr.(a) se sentiu discriminado? (0) Não (1) Sim (8) NSA (9) IGN					bDIS2D|__|

64. O(a) Sr.(a) já foi vigiado, perseguido ou detido por seguranças ou policiais sem que tenha dado motivos para isso? Pense que isso pode ter acontecido em lojas, bancos, na rua, festas, locais públicos, entre outros. ***(0)*** **Não** ➔ *pule para a questão 77* **(1) Sim, uma ou poucas vezes** **(2) Sim, várias vezes** **(3) Sim, sempre** (9) IGN	bDIS3|__|

Quando isto aconteceu, qual ou quais foram os motivos para o(a) Sr.(a) ter sido tratado assim?
Por favor, me responda sempre conforme as opções indicadas no cartão de respostas 4. O(A) Sr.(a) pode escolher uma ou mais das opções contidas no cartão.

65. Classe social	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS3CS|__|
66. Cor da pele ou raça	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS3CP|__|
67. Forma de vestir	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS3FV|__|
68. Peso	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS3PE|__|
69. Idade	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS3ID|__|
70. Local de moradia	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS3LM|__|
71. Ser homem ou mulher	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS3SE|__|
72. Orientação sexual	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS3OS|__|
73. Outro motivo _____*(especificar)*	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS3OM|__|

74. Ainda nestas ocasiões, o(a) Sr.(a) se sentiu discriminado? (0) Não (1) Sim (8) NSA (9) IGN					bDIS3D|__|
75. Ao freqüentar repartições públicas, como cartório, companhia de água, luz ou outras, o(a) Sr.(a) já foi tratado de maneira inferior em relação às outras pessoas lá presentes? ***(0)* Não** ➔ *pule para a questão 88* **(1) Sim, uma ou poucas vezes** **(2) Sim, várias vezes** **(3) Sim, sempre** (9) IGN					bDIS4|__|
Quando isto aconteceu, qual ou quais foram os motivos para o(a) Sr.(a) ter sido tratado assim? Por favor, responda sempre conforme as opções indicadas no cartão de respostas 4. O(A) Sr.(a) pode escolher uma ou mais das opções contidas no cartão.					
76. Classe social	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS4CS|__|
77. Cor da pele ou raça	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS4CP|__|
78. Forma de vestir	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS4FV|__|
79. Peso	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS4PE|__|
80. Idade	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS4ID|__|
81. Local de moradia	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS4LM|__|
82. Ser homem ou mulher	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS4SE|__|
83. Orientação sexual	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS4OS|__|
84. Outro motivo _____(*especificar*)	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS4OM|__|
85. Ainda nestas ocasiões, o(a) Sr.(a) se sentiu discriminado? (0) Não (1) Sim (8) NSA (9) IGN					bDIS4D|__|
86. O(a) Sr.(a) já foi agredido fisicamente por policiais, seguranças, desconhecidos ou até por conhecidos, sem que tenha dado motivos para isso? ***(0)* Não** ➔ *pule para a questão 99* **(1) Sim, uma ou poucas vezes** **(2) Sim, várias vezes** **(3) Sim, sempre** (9) IGN					bDIS5|__|
Quando isto aconteceu, qual ou quais foram os motivos para o(a) Sr.(a) ter sido tratado assim? Por favor, responda sempre conforme as opções indicadas no cartão de respostas 4. O(A) Sr.(a) pode escolher uma ou mais das opções contidas no cartão.					
87. Classe social	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS5CS|__|
88. Cor da pele ou raça	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS5CP|__|
89. Forma de vestir	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS5FV|__|

90. Peso	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS5PE|__|
91. Idade	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS5ID|__|
92. Local de moradia	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS5LM|__|
93. Ser homem ou mulher	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS5SE|__|
94. Orientação sexual	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS5OS|__|
95. Outro motivo _____(*especificar*)	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS5OM|__|
96. Ainda nestas ocasiões, o(a) Sr.(a) se sentiu discriminado? (0) Não (1) Sim (8) NSA IGN	bDIS5D||				
97. O(a) Sr.(a) já participou de um processo seletivo para conseguir emprego ou estágio e foi recusado, mesmo tendo os melhores pré-requisitos dentre todos os candidatos? ***(0)* Não ➔** *pule para a questão 110* **(1) Sim, uma ou poucas vezes** **(2) Sim, várias vezes** **(3) Sim, sempre** (9) IGN	bDIS6||				
Quando isto aconteceu, qual ou quais foram os motivos para o(a) Sr.(a) ter sido tratado assim? Por favor, responda sempre conforme as opções indicadas no cartão de respostas 4. O(A) Sr.(a) pode escolher uma ou mais das opções contidas no cartão.					
98. Classe social	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS6CS|__|
99. Cor da pele ou raça	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS6CP|__|
100. Forma de vestir	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS6FV|__|
101. Peso	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS6PE|__|
102. Idade	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS6ID|__|
103. Local de moradia	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS6LM|__|
104. Ser homem ou mulher	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS6SE| |
105. Orientação sexual	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS6OS|__|
106. Outro motivo _____(*especificar*)	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS6OM|__|

107. Ainda nestas ocasiões, o(a) Sr.(a) se sentiu discriminado? (0) Não (1) Sim (8) NSA (9) IGN					bDIS6D|__|
108. Ao freqüentar postos de saúde, hospitais, prontos-socorros ou outros serviços de saúde, o(a) Sr.(a) já foi tratado de maneira inferior em relação às outras pessoas lá presentes? ***(0)* Não** ➔ *pule para a questão 121* **(1) Sim, uma ou poucas vezes** **(2) Sim, várias vezes** **(3) Sim, sempre** (9) IGN					bDIS7|__|
Quando isto aconteceu, qual ou quais foram os motivos para o(a) Sr.(a) ter sido tratado assim? **Por favor, me responda sempre conforme as opções indicadas no cartão de respostas 4. O(A) Sr.(a) pode escolher uma ou mais das opções contidas no cartão.**					
109. Classe social	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS7CS|__|
110. Cor da pele ou raça	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS7CP|__|
111. Forma de vestir	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS7FV|__|
112. Peso	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS7PE|__|
113. Idade	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS7ID|__|
114. Local de moradia	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS7LM|__|
115. Ser homem ou mulher	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS7SE|__|
116. Orientação sexual	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS7OS|__|
117. Outro motivo _____(*especificar*)	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS7OM|__|

118. Ainda nestas ocasiões, o(a) Sr.(a) se sentiu discriminado? (0) Não (1) Sim (8) NSA (9) IGN					bDIS7D|__|
119. O(a) Sr.(a) já foi tratado como se fosse pouco inteligente ou incapaz de realizar alguma atividade no trabalho ou em um estágio profissional? Considere as situações em que o(a) Sr.(a) foi tratado assim por alguém da sua equipe ou algum cliente, mesmo achando que tinha todas as condições de realizar as atividades. ***(0)* Não ➔** *pule para a questão 132* **(1) Sim, uma ou poucas vezes** **(2) Sim, várias vezes** **(3) Sim, sempre** (9) IGN					bDIS8|__|
Quando isto aconteceu, qual ou quais foram os motivos para o(a) Sr.(a) ter sido tratado assim? Por favor, responda sempre conforme as opções indicadas no cartão de respostas 4. O(A) Sr.(a) pode escolher uma ou mais das opções contidas no cartão.					
120. Classe social	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS8CS|__|
121. Cor da pele ou raça	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS8CP|__|
122. Forma de vestir	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS8FV|__|
123. Peso	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS8PE|__|
124. Idade	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS8ID|__|
125. Local de moradia	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS8LM|__|
126. Ser homem ou mulher	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS8SE|__|
127. Orientação sexual	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS8OS|__|
128. Outro motivo _____(*especificar*)	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS8OM|__|
129. Ainda nestas ocasiões, o(a) Sr.(a) se sentiu discriminado? (0) Não (1) Sim (8) NSA (9) IGN					bDIS8D|__|
130. O(a) Sr.(a) já foi avaliado de forma diferente, negativamente injusta em relação a seus colegas em algum estágio ou trabalho profissional? ***(0)* Não ➔** *pule para a questão 143* **(1) Sim, uma ou poucas vezes** **(2) Sim, várias vezes** **(3) Sim, sempre** (9) IGN					bDIS9|__|

Quando isto aconteceu, qual ou quais foram os motivos para o(a) Sr.(a) ter sido tratado assim? Por favor, responda sempre conforme as opções indicadas no cartão de respostas 4. O(A) Sr.(a) pode escolher uma ou mais das opções contidas no cartão.					
131. Classe social	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS9CS|__|
132. Cor da pele ou raça	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS9CP| |
133. Forma de vestir	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS9FV|__|
134. Peso	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS9PE|__|
135. Idade	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS9ID|__|
136. Local de moradia	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS9LM|__|
137. Ser homem ou mulher	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS9SE|__|
138. Orientação sexual	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS9OS|__|
139. Outro motivo *(especificar*)	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS9OM|__|

140. Ainda nestas ocasiões, o(a) Sr.(a) se sentiu discriminado? (0) Não (1) Sim (8) NSA (9) IGN					bDIS9D|__|
141. Ao tentar ficar ou namorar com alguém, o(a) Sr.(a) já foi tratado com desprezo pela outra pessoa, sem ter dado motivos para isso? Considere apenas as situações em que o(a) Sr.(a) foi tratado pior em relação aos outros que também tentaram ficar ou namorar com esta ou estas pessoas. ***(0)* Não ➔** *pule para a questão 154* **(1) Sim, uma ou poucas vezes** **(2) Sim, várias vezes** **(3) Sim, sempre** (9) IGN					bDIS10|__|
Quando isto aconteceu, qual ou quais foram os motivos para o(a) Sr.(a) ter sido tratado assim? Por favor, responda sempre conforme as opções indicadas no cartão de respostas 4. O(A) Sr.(a) pode escolher uma ou mais das opções contidas no cartão.					
142. Classe social	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS10CS|__|
143. Cor da pele ou raça	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS10CP|__|
144. Forma de vestir	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS10FV|__|
145. Peso	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS10PE|__|
146. Idade	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS10ID|__|
147. Local de moradia	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS10LM|__|
148. Ser homem ou mulher	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS10SE|__|
149. Orientação sexual	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS10OS|__|
150. Outro motivo _____*(especifi car)*	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS10OM|__|
151. Ainda nestas ocasiões, o(a) Sr.(a) se sentiu discriminado? (0) Não (1) Sim (8) NSA (9) IGN					bDIS10D|__|
152. A família de alguma pessoa com quem o(a) Sr.(a) se relacionou afetivamente, ficou, namorou ou casou rejeitou o(a) Sr.(a) ou tentou impedir sua relação com ele(a)? ***(0)* Não ➔** *pule para a questão 165* **(1) Sim, uma ou poucas vezes** **(2) Sim, várias vezes** **(3) Sim, sempre** (9) IGN					bDIS11|__|
Quando isto aconteceu, qual ou quais foram os motivos para o(a) Sr.(a) ter sido tratado assim? Por favor, responda sempre conforme as opções indicadas no cartão de respostas 4. O(A) Sr.(a) pode escolher uma ou mais das opções contidas no cartão.					
153. Classe social	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS11CS|__|
154. Cor da pele ou raça	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS11CP|__|

155. Forma de vestir	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS11FV|__|
156. Peso	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS11PE|__|
157. Idade	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS11ID|__|
158. Local de moradia	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS11LM|__|
159. Ser homem ou mulher	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS11SE|__|
160. Orientação sexual	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS11OS|__|
161. Outro motivo _____(*especificar*)	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS11OM|__|
162. Ainda nestas ocasiões, o(a) Sr.(a) se sentiu discriminado? (0) Não (1) Sim (8) NSA IGN	bDIS11D||				
163. O(a) Sr.(a) já foi tratado de modo inferior por algum de seus pais, tios, primos ou avós em relação aos outros familiares? ***(0)* Não ➔** *pule para a questão 176* **(1) Sim, uma ou poucas vezes** **(2) Sim, várias vezes** **(3) Sim, sempre** (9) IGN	bDIS12||				

Quando isto aconteceu, qual ou quais foram os motivos para o(a) Sr.(a) ter sido tratado assim? Por favor, responda sempre conforme as opções indicadas no cartão de respostas 4. O(A) Sr.(a) pode escolher uma ou mais das opções contidas no cartão.					
164. Classe social	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS12CS|__|
165. Cor da pele ou raça	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS12CP|__|
166. Forma de vestir	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS12FV|__|
167. Peso	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS12PE|__|
168. Idade	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS12ID|__|
169. Local de moradia	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS12LM|__|
170. Ser homem ou mulher	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS12SE|__|
171. Orientação sexual	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS12OS|__|
172. Outro motivo _____(*especificar*)	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS12OM|__|
173. Ainda nestas ocasiões, o(a) Sr.(a) se sentiu discriminado? (0) Não (1) Sim (8) NSA (9) IGN					bDIS12D|__|
174. O(a) Sr.(a) já foi excluído ou deixado de lado por um grupo de colegas de estágio ou trabalho? Pense que isto pode ter acontecido durante a realização de trabalhos em equipe, reuniões de trabalho, congressos, eventos ou festas e reuniões informais. ***(0)* Não ➔** *pule para a questão 187* **(1) Sim, uma ou poucas vezes** **(2) Sim, várias vezes** **(3) Sim, sempre** (9) IGN					bDIS13|__|
Quando isto aconteceu, qual ou quais foram os motivos para o(a) Sr.(a) ter sido tratado assim? Por favor, responda sempre conforme as opções indicadas no cartão de respostas 4. O(A) Sr.(a) pode escolher uma ou mais das opções contidas no cartão.					
175. Classe social	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS13CS|__|
176. Cor da pele ou raça	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS13CP|__|
177. Forma de vestir	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS13FV|__|
178. Peso	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS13PE|__|
179. Idade	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS13ID| |
180. Local de moradia	(0)	(1) Sim	(8) NSA	(9) IGN	bDIS13LM| |

	Não				
181. Ser homem ou mulher	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS13SE|__|
182. Orientação sexual	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS13OS|__|
183. Outro motivo _____(*especificar*)	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS13OM|__|

184. Ainda nestas ocasiões, o(a) Sr.(a) se sentiu discriminado? (0) Não (1) Sim (8) NSA (9) IGN					bDIS13D|__|
185. O(a) Sr.(a) já foi excluído ou deixado de lado por um grupo de colegas da escola ou da universidade? Pense que isto pode ter acontecido recentemente ou no passado, durante a prática de esportes, aulas, realização de trabalhos em grupo, festas, reuniões importantes ou outros encontros com os colegas. ***(0)* Não ➔** *pule para a questão 198* **(1) Sim, uma ou poucas vezes** **(2) Sim, várias vezes** **(3) Sim, sempre** (9) IGN					bDIS14|__|
Quando isto aconteceu, qual ou quais foram os motivos para o(a) Sr.(a) ter sido tratado assim? Por favor, responda sempre conforme as opções indicadas no cartão de respostas 4. O(A) Sr.(a) pode escolher uma ou mais das opções contidas no cartão.					
186. Classe social	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS14CS|__|
187. Cor da pele ou raça	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS14CP|__|
188. Forma de vestir	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS14FV| |
189. Peso	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS14PE|__|
190. Idade	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS14ID|__|
191. Local de moradia	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS14LM| |
192. Ser homem ou mulher	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS14SE| |
193. Orientação sexual	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS14OS| |
194. Outro motivo _____(*especifi car*)	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS14OM| |
195. Ainda nestas ocasiões, o(a) Sr.(a) se sentiu discriminado? (0) Não (1) Sim (8) NSA (9) IGN					bDIS14D|__|
196. O(a) Sr.(a) já foi chamado por nomes, palavras das quais não gostou ou termos pejorativos? Pense que isto pode ter acontecido em ruas, ônibus, shoppings, bancos, lojas, festas, escola, local de trabalho ou outros locais públicos. ***(0)* Não ➔** *pule para a questão 209* **(1) Sim, uma ou poucas vezes** **(2) Sim, várias vezes** **(3) Sim, sempre** (9) IGN					bDIS15|__|
Quando isto aconteceu, qual ou quais foram os motivos para o(a) Sr.(a) ter sido tratado assim? Por favor, responda sempre conforme as opções indicadas no cartão de respostas 4. O(A) Sr.(a) pode escolher uma ou mais das opções contidas no cartão.					
197. Classe social	(0)	(1) Sim	(8) NSA	(9) IGN	bDIS15CS|__|

	Não				
198. Cor da pele ou raça	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS15CP|__|
199. Forma de vestir	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS15FV||
200. Peso	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS15PE|__|
201. Idade	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS15ID|__|
202. Local de moradia	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS15LM||
203. Ser homem ou mulher	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS15SE|__|
204. Orientação sexual	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS15OS||
205. Outro motivo _____(*especificar*)	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS15OM||

206. Ainda nestas ocasiões, o(a) Sr.(a) se sentiu discriminado? (0) Não (1) Sim (8) NSA (9) IGN	bDIS15D||
207. O(a) Sr.(a) já foi excluído ou deixado de lado por um grupo de amigos do bairro, de pessoas de sua vizinhança ou de seu condomínio? Pense que isto pode ter acontecido em encontros da vizinhança, reuniões de condomínio, festas e outras datas de comemorações. ***(0)* Não ➔** *pule para a questão 220* **(1) Sim, uma ou poucas vezes** **(2) Sim, várias vezes** **(3) Sim, sempre** (9) IGN	bDIS16|__|

Quando isto aconteceu, qual ou quais foram os motivos para o(a) Sr.(a) ter sido tratado assim? Por favor, responda sempre conforme as opções indicadas no cartão de respostas 4. O(A) Sr.(a) pode escolher uma ou mais das opções contidas no cartão.

208. Classe social	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS16CS||
209. Cor da pele ou raça	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS16CP||
210. Forma de vestir	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS16FV||
211. Peso	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS16PE||
212. Idade	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS16ID||
213. Local de moradia	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS16LM||
214. Ser homem ou mulher	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS16SE||
215. Orientação sexual	(0)	(1) Sim	(8) NSA	(9) IGN	bDIS16OS|

	Não				ı
216. Outro motivo _____(*especificar*)	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS16OMı ı
217. Ainda nestas ocasiões, o(a) Sr.(a) se sentiu discriminado? (0) Não (1) Sim (8) NSA (9) IGN					bDIS16Dı ı
218. O(a) Sr.(a) já foi tratado como se fosse pouco inteligente ou incapaz de realizar alguma atividade na escola ou na universidade? Considere situações em que o(a) Sr.(a) foi tratado assim por professores ou colegas, mesmo achando que tinha todas as condições de realizar as atividades. ***(0)* Não ➔** *pule para a questão 231* **(1) Sim, uma ou poucas vezes** **(2) Sim, várias vezes** **(3) Sim, sempre** (9) IGN					bDIS17ı__ı
Quando isto aconteceu, qual ou quais foram os motivos para o(a) Sr.(a) ter sido tratado assim? Por favor, responda sempre conforme as opções indicadas no cartão de respostas 4. O(A) Sr.(a) pode escolher uma ou mais das opções contidas no cartão.					
219. Classe social	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS17CSı ı
220. Cor da pele ou raça	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS17CPı ı
221. Forma de vestir	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS17FVı ı
222. Peso	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS17PEı ı
223. Idade	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS17IDı ı
224. Local de moradia	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS17LMı ı
225. Ser homem ou mulher	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS17SEı ı
226. Orientação sexual	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS17OSı ı
227. Outro motivo _____(*e specificar*)	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS17OMı ı
228. Ainda nestas ocasiões, o(a) Sr.(a) se sentiu discriminado? (1) Não (2) Sim (8) NSA (9) IGN					bDIS17Dı ı

229. O(a) Sr.(a) já foi avaliado em provas ou outros trabalhos da escola ou da universidade de forma diferente, negativamente injusta em relação a seus colegas? ***(0)* Não** -> *Pule para a questão 242* **(1) Sim, uma ou poucas vezes** **(2) Sim, várias vezes** **(3) Sim, sempre** (9) IGN					bDIS18|__|
Quando isto aconteceu, qual ou quais foram os motivos para o(a) Sr.(a) ter sido tratado assim? Por favor, responda sempre conforme as opções indicadas no cartão de respostas 4. O(A) Sr.(a) pode escolher uma ou mais das opções contidas no cartão.					
230. Classe social	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS18CS||
231. Cor da pele ou raça	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS18CP||
232. Forma de vestir	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS18FV||
233. Peso	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS18PE||
234. Idade	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS18ID||
235. Local de moradia	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS18LM||
236. Ser homem ou mulher	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS18SE||
237. Orientação sexual	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS18OS||
238. Outro motivo _____(*especificar*)	(0) Não	(1) Sim	(8) NSA	(9) IGN	bDIS18OM||
239. Ainda nestas ocasiões, o(a) Sr.(a) se sentiu discriminado? (0) Não (1) Sim (8) NSA (9) IGN					bDIS18D||
AGORA, VAMOS CONVERSAR MAIS UM POUCO SOBRE A SUA FAMILIA. LEMBRE QUE OS DADOS SÃO CONFIDENCIAIS E NÃO SERÃO DIVULGADOS.					
240. No MÊS PASSADO, qual foi aproximadamente sua renda familiar em reais, isto é, a soma de todos os rendimentos (salários, bolsa família, soldo, pensão, aposentadoria, aluguel etc), já com descontos, de todas as pessoas que sempre contribuem com as despesas de sua casa?					bRENDAT |__| |_____| _____| |_____| __|,|___|__|

241. Quantas pessoas (idosos, adultos e crianças), INCLUINDO O(A) SR(A), dependem dessa renda para viver? Se for o caso, inclua dependentes que recebem pensão alimentícia, mas NÃO INCLUA empregados domésticos para os quais o(a) Sr.(a) paga salário. ı__ ı_ ı (9) IGN	bNPESS ı__ı__ı
AGORA, VAMOS CONVERSAR SOBRE A SAÚDE DA SUA BOCA	
242. Como o(a) Sr.(a) considera a saúde dos seus dentes e de sua boca? **(0) Ótima** **(1) Boa** **(2) Regular** **(3) Ruim** **(4) Péssima** (9) IGN	bAVALBOCı__ı
243. Pensando nos seus dentes de cima, o(a) Sr.(a) já perdeu, já teve algum dente extraído? Excluir extração do siso e extração de dente para colocação de aparelho dental. **(0) Não** **(1) Sim, de 1 a 4 dentes** **(2) Sim, de 5 ou mais dentes** **(3) Sim, todos os dentes** (9) IGN	bSUPDENTı__ı
244. Pensando nos seus dentes de baixo, o(a) Sr.(a) já perdeu, já teve algum dente extraído? Excluir extração do siso e extração de dente para colocação de aparelho dental. **(0) Não** **(1) Sim, de 1 a 4 dentes** **(2) Sim, de 5 ou mais dentes** **(3) Sim, todos os dentes** (9) IGN	bINFDENTı__ı
245. Algum dos seus dentes está mole? (0) Não (1) Sim *(8)* NSA *-> Se ambas as questões 243 e 244 forem marcadas com a resposta (3)* (9) IGN	bDENTMOLı__ı
246. Nos últimos 6 meses, isto é <desde MÊS>, o(a) Sr.(a) teve dor de dente? **(0) Não** **(1) Sim** *(8)* NSA *-> Se as ambas as questões 243 e 244 forem marcadas com a resposta (3)* (9) IGN	bDDENı__ı

247. O(a) Sr.(a) acha que precisa de algum tratamento dentário? (0) Não (1) Sim (9) IGN	bTRATDEN|__|
248. Sua gengiva costuma sangrar? **(0) Não** **(1) Sim, às vezes quando escovo ou uso fio dental** **(2) Sim, sempre quando escovo** **(3) Sim, sempre quando uso fio dental** **(4) Sim, sempre** (9) IGN	bSANGRA|__|
249. O(a) Sr.(a) usa chapa (dentadura, prótese total)? (0) Não (1) Sim (9) IGN	bUSOCHAP|__|
250. O(a) Sr.(a) acha que precisa de chapa (dentadura, prótese total)? **(0) Não** **(1) Sim, em cima** **(2) Sim, embaixo** **(3) Em cima e embaixo** (9) IGN	bNECHAPA|__|
251. Com que frequência o(a) Sr.(a) sente sua boca seca? **(0) Nunca** **(1) De vez em quando** **(2) Freqüentemente** **(3) Sempre** (9) IGN	bBOCASEC|__|
252. Com que frequência o(a) Sr.(a) tem dificuldade em se alimentar por causa de problemas com seus dentes ou dentadura? **(0) Nunca** **(1) Raramente** **(2) De vez em quando** **(3) Freqüentemente** **(4) Sempre** (9) IGN	bDIFICOM|__|
253. O(a) Sr.(a) consultou o dentista alguma vez na vida? (0) Sim *(1)* Não *-> Pule para a questão 258* (9) IGN	bCONDEN1|__|
254. Quando consultou o dentista pela última vez? **(0) Menos de 1 ano** **(1) 1 a 2 anos** **(2) 3 anos ou mais** (8) NSA (9) IGN	bCONDEN2|__|

255. Onde consultou o dentista na última vez? **(0) Consultório odontológico particular** **(1) Consultório odontológico do convênio** **(2) Posto/centro de saúde** **(3) Outros serviços de saúde** **(4) UFSC** (8) NSA (9) IGN	bLOCADEN|__|
256. Qual o principal motivo da sua última consulta com o dentista? **(0) Prevenção/Rotina/Revisão** **(1) Tratamento** **(2) Extração** **(3) Urgência/Dor** **(4) Problema na gengiva** **(5) Tratamento de ferida na boca** **(6) Outros** **(8)** NSA **(9)** IGN	bMOTDENT|__|
257. O dentista já disse que o(a) Sr.(a) tem problemas na gengiva? (0) Não (1) Sim (8) NSA (9) IGN	bPROBGEN|__|
AGORA VAMOS MEDIR NOVAMENTE A SUA PRESSAO ARTERIAL	
258. PAS2	bPAS2 |__|__|__|
259. PAD2	bPAD2 |__|__|__|
O entrevistado estava sozinho durante a entrevista? (0) Sim (1) Não	bCOMPA |__|
AGRADEÇA A ATENÇÃO, INFORME SOBRE NOSSO SITE (www.epifloripa.ufsc.br) E TELEFONES (informar o celular do plantão) CASO O PARTICIPANTE QUEIRA NOS CONTATAR, E OFEREÇA O BRINDE.	

English version of the WHOQOL-BREF

		Very poor	Poor	Neither poor nor good	Good	Very good
1	How would you rate your quality of life?	1	2	3	4	5
		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
2	How satisfied are you with your health?	1	2	3	4	5

The following questions ask about **how much** you have experienced certain things in the last two weeks.

		Not at all	A little	A moderate amount	Very much	An extreme amount
3	To what extent do you feel that physical pain prevents you from doing what you need to do?	5	4	3	2	1
4	How much do you need any medical treatment to function in your daily life?	5	4	3	2	1
5	How much do you enjoy life?	1	2	3	4	5
6	To what extent do you feel your life to be meaningful?	1	2	3	4	5
7	How well are you able to concentrate?	1	2	3	4	5
8	How safe do you feel in your daily life?	1	2	3	4	5
9	How healthy is your physical environment?	1	2	3	4	5

The following questions ask about how completely you experience or were able to do certain things in the last two weeks.

		Not at all	A little	Moderately	Mostly	Completely
10	Do you have enough energy for everyday life?	1	2	3	4	5
11	Are you able to accept your bodily appearance?	1	2	3	4	5
12	Have you enough money to meet your needs?	1	2	3	4	5
13	How available to you is the information that you need in your day-to-day life?					
14	To what extent do you have the opportunity for leisure activities?					
		Very poor	Poor	Neither poor nor good	Good	Very good
15	How well are you able to get around?	1	2	3	4	5
		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
16	How satisfied are you with your sleep?	1	2	3	4	5
17	How satisfied are you with your ability to perform your daily living activities?	1	2	3	4	5
18	How satisfied are you with your capacity for work?	1	2	3	4	5
19	How satisfied are you with yourself?	1	2	3	4	5
20	How satisfied are you with your personal relationships?	1	2	3	4	5
21	How satisfied are you with your sex life?	1	2	3	4	5
22	How satisfied are you with the support you get from your friends?	1	2	3	4	5
23	How satisfied are you with the conditions of your living place?	1	2	3	4	5
24	How satisfied are you with your access to health services?	1	2	3	4	5
25	How satisfied are you with your transport?	1	2	3	4	5

The following question refers to **how often** you have felt or experienced certain things in the last two weeks.

		Never	Seldom	Quite often	Very often	Always
26	How often do you have negative feelings such as blue mood, despair, anxiety, depression?	1	2	3	4	5

Appendix III Ethical Approvals

UNIVERSIDADE FEDERAL DE SANTA CATARINA
Pró- Reitoria de Pesquisa e Extensão
Comitê de Ética na Pesquisa em Seres Humanos

CERTIFICADO Nº 317

O Comitê de Ética na Pesquisa em Seres Humanos (CEPSH) da Pró-Reitoria de Pesquisa e Extensão da Universidade Federal de Santa Catarina, instituído pela PORTARIA N.°0584/GR/99 de 04 de novembro de 1999, com base nas normas para a constituição e funcionamento do CEPSH, considerando o contido no Regimento Interno do CEPSH, **CERTIFICA** que os procedimentos que envolvem seres humanos no projeto de pesquisa abaixo especificado estão de acordo com os princípios éticos estabelecidos pela Comissão Nacional de Ética em Pesquisa - CONEP

APROVADO

PROCESSO: 351/08 FR- 229872
TÍTULO: Condições de saúde da população adulta do Município de Florianópolis, Santa Catarina: estudo de base populacional.
AUTOR: Marco Aurélio de Anselmo Peres.
DPTO.: Saúde Pública/CCS/UFSC

FLORIANÓPOLIS, 15 de dezembro de 2008.

Coordenador do CEPSH/UFSC - Prof.° Washington Portela de Souza

UNIVERSIDADE FEDERAL DE SANTA CATARINA
Pró-Reitoria de Pesquisa e Extensão
Comitê de Ética em Pesquisa com Seres Humanos

CERTIFICADO Nº 1772

O Comitê de Ética em Pesquisa com Seres Humanos (CEPSH) da Pró-Reitoria de Pesquisa e Extensão da Universidade Federal de Santa Catarina, instituído pela PORTARIA N.º0584/GR/99 de 04 de novembro de 1999, com base nas normas para a constituição e funcionamento do CEPSH, considerando o contido no Regimento Interno do CEPSH, **CERTIFICA** que os procedimentos que envolvem seres humanos no projeto de pesquisa abaixo especificado estão de acordo com os princípios éticos estabelecidos pela Comissão Nacional de Ética em Pesquisa – CONEP.

APROVADO

PROCESSO: 1772 **FR:** 402177

TÍTULO: Condições de saúde bucal e condições de saúde geral em adultos: estudo de base populacional em Florianópolis, SC, EpiFloripa

AUTOR: Marco Aurélio de Anselmo Peres, Karen Glazer de Anselmo Peres Antonio Fernando Boing João Luiz Dornelles Bastos Eleonora D'Orsi David Alejandro Gonzalez Chica

FLORIANÓPOLIS, 28 **de** Fevereiro **de** 2011.

Coordenador do CEPSH/UFSC