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Impact of community and individual social capital during early childhood on oral health-related quality of life: a 10-year prospective cohort study

Jessica Klöckner Knorst a, Mario Vianna Vettore b, Bruna Brondani c, Bruno Emmanuelli a, Saul Martins Paiva d, Thiago Machado Ardenghi a,*

a *Department of Stomatology, School of Dentistry, Universidade Federal de Santa Maria, Santa Maria, RS, Brazil*

b *Department of Health and Nursing Sciences, University of Agder, Kristiansand, Norway*

c *Department of Pediatric Dentistry and Orthodontics, School of Dentistry, Universidade de São Paulo, São Paulo, SP, Brazil*

d *Department of Pediatric Dentistry, School of Dentistry, Universidade Federal de Minas Gerais, Minas Gerais, MG, Brazil*

Abstract

Aim: To evaluate the impact of community and individual social capital during early childhood on oral health-related quality of life (OHRQoL) over a 10-year follow-up period.

Methods: A prospective cohort study was conducted in the southern Brazil. Baseline (T1) data collection occurred in 2010 with preschool children aged 1-5 years. Participants were assessed in 2012 (T2), 2017 (T3), and 2020 (T4). OHRQoL was assessed using the B-ECOHIS at T1 and T2 and through CPQ8-10 at T3 and CPQ11-14 at T4. Community social capital was evaluated through the presence of formal institutions in the neighbourhood and individual social capital by social networks, both at T1. Demographic and socioeconomic characteristics were also evaluated. Multilevel Poisson regression analysis was performed to estimate the impact of social capital measures on OHRQoL.

Results: Of the 639 children assessed at T1, 469 were followed at T2 (73.3% response rate), 449 at T3 (70.3% response rate), and 429 at T4 (67.1% response rate). Individuals living in neighbourhoods with the presence of social class associations at T1 had higher OHRQoL at T3 and T4. Individuals whose families visit friends and neighbours less than once a month or never at T1 had lower OHRQoL at T1, T3 and T4. Attending religious meetings less than once a month or never at T1 was associated with lower OHRQoL at T2 and T4.

Conclusion: Individual social capital levels in early childhood impacted on OHRQoL across the assessments, while social capital at the community level had a long-term effect, impacting especially during adolescence.

Clinical Significance: The findings indicate that psychosocial variables can impact OHRQoL, a fundamental aspect of clinical practice.

Key-words: Child. Longitudinal study. Quality of life. Oral health. Social capital.

1. Introduction

Social capital came into evidence in scientific research, mainly by Pierre Bordieu (1986), James Coleman (1988), and Robert Putnam (1993) [1-3]. However, the definition and measurement of social capital remains in debate [1-3]. In general, social capital has been described as social resources contained on accessible social networks or social structures characterized by mutual trust, which can evolve and facilitate access to various returns, benefiting the individual and the community [4]. The concept of social capital is based on the positive consequences of sociability and places these consequences in the broader discussion of capital [1-4]. Despite the controversies regarding its definition and numerous criticisms [5], a growing body of evidence suggests that high levels of social capital benefit health [6].

High levels of social capital have been linked to lower mortality rates, better self-rated general health, and better mental health [7,8]. Social capital has also been related to clinical oral health outcomes, such as less occurrence of dental caries and gingivitis [9,10]. The literature has also shown that social capital assessed through social networks and community social support was associated with subjective oral health [11]. Previous studies have shown that the social network in which the individual is embedded was associated to self-perceived oral health since healthy behaviours were associated with more social networks [12]. Furthermore, it has been shown that the presence of formal institutions in the community, such as community cultural centres, social class associations and churches, was related to greater involvement of individuals in social activities, which increases social cohesion and trust in the neighbourhood, as well as oral health and quality of life of the residents [12,13].

It has been shown that the amount and quality of different sources of social networks can influence patient-reported outcomes [6], such as oral health-related quality of life (OHRQoL), which is an essential component in the current concept of oral health [14]. Although recent evidence suggests the link between social networks and social support and oral health outcomes [11,13,15,16], most of these studies are of cross-sectional study design. There is a dearth of studies evaluating these associations over time as well as the role of social conditions throughout life on oral health [17], especially during the transition from childhood to adolescence, a period characterized by numerous biological and psychosocial changes [13,15]. Thus, longitudinal studies are needed to verify the impact of different social factors on oral conditions during this period of transition, since they are usually cumulative and may negatively influence general and oral health in adulthood [17].

Understanding the longitudinal associations of community and individual social capital with OHRQoL throughout childhood to adolescence, as well as identifying in which period

these factors exert the highest impact on OHRQoL, can provide useful information on the importance of community and social relationships. Thus, this study aimed to assess the impact of community and individual levels of social capital in early childhood on the OHRQoL over 10 years of follow-up. We hypothesized that high levels of community and individual social capital may positively impact OHRQoL over time.

2. Materials and Methods

2.1 Study design and population

This is a 10-year prospective cohort study involving preschool children from Santa Maria, a southern city in Brazil. The baseline (T1) was an oral health survey, carried out in 2010. The participants were assessed in 2012 (T2), 2017 (T3), and 2020 (T4) (Figure S1). Further information about the population, sampling process and methodological aspects of the cohort study is described elsewhere [15,18,19].

Sample size calculation considered a standard error of 5%, a statistical power of 80%, and a prevalence ratio of 1.45 of OHRQoL impact in children in the exposed group (high social vulnerability) and unexposed group (low social vulnerability) [20]. Considering a ratio of unexposed to exposed of 2:1, a design effect of 1.2 (used to improve precision due to cluster sampling), and added 30% for possible losses, the minimum sample size required was 472 children. Since this study also considered other outcomes, a larger sample size was evaluated. In addition, the sample size was also measured by a post hoc power calculation considering the difference in overall OHRQoL scores in each time for the non-exposed group (high social capital) and exposed group (low social capital) according to all social capital variables. The study power ranged from 80 to 100% considering an alpha error probability of 0.05 and a 95% confidence interval. Children presenting any cognitive impairment or systemic diseases were excluded from the study.

2.2 Baseline evaluation (T1)

The baseline of the study (T1) included children aged from 1 to 5 years in the city of Santa Maria in 2010. During this period, the estimated population of the city was 263,403 inhabitants, which included 27,520 children under the age of 6 years. A systematic probabilistic sample was selected from all children who attend healthcare centres in the city on the National Children's Vaccination Day. The primary sampling units included 15 healthcare centres that had a dental office, located in different neighbourhoods of the city. These healthcare centres encompassed

about 90% of the children vaccinated in the municipally. Every fifth child in line for vaccination was invited to participate in the study. If their caregivers did not authorize their participation, the next child in line was invited. A total of 639 children aged 1 to 5 years was examined.

2.3 Follow-up evaluations (T2, T3 e T4)

The second evaluation (T2) occurred in 2012, approximately two years after the baseline data collection. All children assessed at T1 were invited to participate. The participants were evaluated from May 2012 to February 2013 when they were aged between 3 and 7 years [20]. A total of 469 individuals were re-evaluated. The reasons for the losses at follow-up were due to not locate of the individuals (n = 157) and refusals (n = 61).

The third stage of assessments (T3) was conducted at seven years of follow-up from January 2017 to March 2018 [15]. The sampling plan was also based on all children assessed at T1 who were aged between 8 and 12 years at T3. A total of 449 individuals were re-evaluated. The reasons for the losses at follow-up were due to not locate of the individuals (n = 81) and refusals (n = 9).

All children who participated in the initial survey (T1) were invited to participate in the fourth assessment (T4), corresponding to 10 years follow up when the participant's age ranged from 11 to 15 years old. The T4 data collection period started in November 2019, which was interrupted in March 2020 due to the COVID-19 pandemic [21]. The completion of T4 data collection was between October 2020 and January 2021 with all appropriate procedures.

The participants were assessed in their homes or in their respective schools. The following strategies were adopted to contact the participants across all stages of the study in order to minimize losses to follow-up. Firstly, the list of all students enrolled in public schools in the city of Santa Maria was obtained from the city's Enrolment Centre. Secondly, children's parents were contacted through telephone calls to schedule home visits. Thirdly, participants and their caregivers who were not reached using the first two approaches were contacted through social networks, such as WhatsApp or Facebook. A total of 429 individuals were re-evaluated. The reasons for the losses at follow-up were due to not locate of the individuals (n = 184), refusals (n = 7) and move to another city (n = 19).

2.4 Data collection and variables

Data were collected through interviews using structured questionnaires [22], and oral clinical examinations in all assessments of this cohort. All data collection procedures were founded in international criteria standardized for oral health surveys [23-30].

Due to the long follow-up period, children's OHRQoL was evaluated using an appropriate instrument according to their age. Children's OHRQoL was assessed at T1 and T2 using the Brazilian version of the Early Childhood Oral Health Impact Scale (B-ECOHIS), completed by their parents or guardians, since children aged from 1 to 5 years do not have adequate cognitive skills to understand and respond the questions [24]. ECOHIS consists of 13 items grouped into 2 sections: 9 items corresponding to the child impact section (symptoms, function, psychology, self-image, and social interaction domains) and 4 items related to the family impact section (parental anxiety and family function). The responses were obtained using a six-point Likert scale with scoring options ranging from 0 to 5 points: (0) never; (1) hardly ever; (2) occasionally; (3) often; (4) very often; and (5) don't know. The responses coded "don't know" were considered missing data. For those with up to two missing responses in the child section or one missing answer in the family section, the average of the scores of each section was used to input the score of the missing item [24]. Participants with missing responses in more than two child items and one family item were excluded. The sum of overall ECOHIS scores can range from 0 to 52. Higher scores indicate worse OHRQoL.

OHRQoL was measured at T3 and T4 using the Child Perceptions Questionnaire (CPQ8-10) [25] and the short version of the Child Perceptions Questionnaire 11-14 (CPQ11-14 ISF:16) [26], respectively, which were answered by the children. The questionnaires are composed of 25 and 16 questions, respectively, grouped into 4 domains: oral symptoms, functional limitation, emotional well-being, and social well-being. The questions were answered using a grading scale with scores options ranging from 0 to 4 points: (0) never; (1) once or twice; (2) sometimes; (3) often; and (4) every day/almost every day. The final score is obtained by summing the scores of all items. The total scores of CPQ8-10 and CPQ11-14 can range from 0 to 100 and 0 to 64 points, respectively. The higher the score, the higher the impact of the oral health condition on quality of life.

Individual and community social capital characteristics were assessed at T1. Community-level social capital was measured according to the presence of community cultural centres, workers associations, and social class associations in the neighbourhood. These indicators have previously been used as proxy measures of community social support and social network and are theoretically related to social capital and social cohesion constructs [4,11,12]. Community-level variables were obtained from the local council according to the geographic areas of the neighbourhoods where the children live at T1, totalling 15 neighbourhoods. All the 15 included neighbourhoods belonged to the same municipality. Thus, the neighbourhoods

were classified according to the presence or absence of these institutions (cultural centres, workers associations, and social class associations).

Individual social capital was assessed according to the social networks through the following questions: "How often do you attend group religious activities?" and "In the last 12 months, how often have you visited or received visits from friends and neighbours?" with the following response options: (0) at least once a month; and (1) less than once a month or never. In addition, information about the parent's participation in the child's school activities was also obtained. These questions are commonly used in the literature on social capital [15,27].

Data regarding sex, skin colour, and socioeconomic status were evaluated at T1, T2, T3 and T4 as possible confounding factors. Participant's skin colour was assessed according to the criteria proposed by the Brazilian Institute of Geography and Statistics (IBGE) used in population-based surveys in Brazil [28], using the following question: "What is your child skin colour?" (0) white; (1) brown; (2) black; (3) yellow or (4) indigenous? For data analysis, individuals were classified as "white" (0) and "non-white" (1, 2, 3, and 4). Monthly family income and maternal education were used to assess socioeconomic status. Monthly family income was registered according to the income of the family members in the last month in Brazilian Reais. One US$1.00 corresponded to R$5.4 when the data was collected. Family income was a continuous variable. Maternal education was assessed according to the number of years of formal education completed with approval and categorized as < 8 or ≥ 8 years of education.

Dental caries was measured in all stages using the diagnostic criteria of the International Caries Detection and Assessment System (ICDAS) [29], in which all dental surfaces were evaluated. The examiners were previously trained and calibrated, with inter-and intra-examiner Kappa coefficients ranged from 0.70 to 0.96 in all evaluations. Participants were individually examined with the aid of gauze, CPI probe ("ballpoint"), and dental mirror [23]. Schoolchildren were examined in dental chairs in the health centres using artificial lighting (reflector) at T1. In the follow-up assessments (T2, T3, and T4), they were examined in their homes or schools using natural light. ICDAS considers the presence of white spot lesions (score 1 and 2), cavitated enamel lesions (score 3), shadow lesions (score 4), and cavitated dentin lesions (scores 5 and 6). Sound surfaces are coded with a score of 0 [29]. For data analysis, the presence (ICDAS scores 3, 5, and 6) or absence (ICDAS scores 0, 2, and 4) of untreated dental caries was considered. Non-cavitated caries lesions were recorded but not included in this analysis due to low impact on OHRQoL over time, as suggested by previous literature [18].

2.5 Ethical aspects

This project was approved by the Research Ethics Committee (CEP) of the Federal University of Santa Maria (protocol CAAE 11765419.1.0000.5346) and is in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans. All parents signed a written informed consent agreeing with their children's participation before data collection.

2.6 Data analysis

Data analyses were conducted considering the sample weight ('svy' command) for complex data samples on STATA 14 (Stata Corporation, College Station, TX, USA). Demographics, socioeconomic characteristics, psychosocial factors, and clinical characteristics at T1, T2, T3, and T4 were described through proportions, means and standard errors. The comparison between individuals followed and lost at follow-up and among those assessed before and during the COVID-19 pandemic was evaluated using the Chi-square test and the *t*-test. Individuals were compared for demographic, socioeconomic, clinical, and social capital variables. Descriptive analysis of OHRQoL according to social capital variables at baseline and follow-up intervals was also performed using means and standard errors.

The study outcome was the standardized overall OHRQoL scores over time. The final scores of OHRQoL questionnaires were standardized from 0- to 100-point scale for analytical purposes, as described elsewhere [30]. Multilevel Poisson regression analysis was performed to estimate the impact of different community and individual social capital variables measured at T1 on OHRQoL in each follow-up period. Demographics, socioeconomic and clinical variables (presence of dental caries) were included in the adjusted model as possible confounders (variables with $p \leq 0.20$ in the unadjusted analysis were considered in the adjusted model). The multilevel structure of analysis considered individuals (level 1) nested into 15 neighbourhoods (level 2), using the fixed effect with random intercept method. The results are presented as Incidence Rate Ratio (IRR) and 95% confidence intervals (95% CI).

3. Results

Of the 639 children assessed at baseline, 469 (73.3% response rate), 449 (70.3% response rate), and 429 (67.1% response rate) were assessed at T2, T3, and T4, respectively. The reasons for the losses at follow-up were mainly due to not locate of the individuals (Figure S1). There was no difference among participants and dropouts regarding most of the sample characteristics (p<0.05). However, individuals followed in T3 were significantly poorer than dropouts' ones.

Bootstrap sensitivity analysis was performed and showed that these differences did not affect the results. No significant missing values were observed for the main variables considered in the study. In addition, there was no difference among the individuals assessed before and during the COVID-19 pandemic at T4 data survey.

Table 1 presents the sample characteristics at baseline for individuals followed throughout 10 years. The sample was evenly distributed between girls and boys and most of the participants had white skin colour. Mean income at T1 was 1,204 Reais (standard error [SE] 42.1), approximately U$223. Most of the neighbourhoods did not present formal institutions at baseline. Regarding individual social capital, most families attended religious meetings (56.0%) and visited friends and neighbours at least once a month (67.0%) at T1. Most parents did not attend their children's school activities (60.9%). Overall OHRQoL scores increased throughout the cohort assessments. About 38.4% of individuals presented untreated dental caries at T1.

The distribution of the OHRQoL scores according to social capital variables is shown in Figure 1 and in Table S1. At baseline, OHRQoL scores were similar according to the presence or absence of formal institutions in the neighbourhood. However, along the follow-up, in general, the OHRQoL scores worsened for those individuals who lived in neighbourhoods with low social capital. OHRQoL was lower among those with low individual social capital, including low social networks, especially in relation to the frequency of visits to friends and neighbours, being higher for individuals whose family members did not visit friends and neighbours frequently. Unadjusted analysis of the social capital predictors at baseline on OHRQoL over time are presented in Table S2.

Table 2 shows the adjusted analysis of the association between social capital variables and OHRQoL at baseline and at T2, T3 and T4. Individuals who lived in neighbourhoods with social class associations at T1 had a lower impact on OHRQoL at T3 (IRR 0.79; 95%CI 0.66-0.96) and at T4 (IRR 0.77; 95%CI 0.67-0.89), respectively. Attending religious meetings less than once a month or never at T1 was associated with a higher impact on OHRQoL at T2 and T4. Individuals whose families visit friends and neighbours less than once a month or never at T1 had 14%, 16%, and 27% higher impact on OHRQoL at T1, T3, and T4, respectively. Considering the school involvement, individuals whose parents were not involved at T1 presented overall OHRQoL scores 25% higher than their counterparts with school-active parents at T3 (IRR 1.25; 95%CI 1.17-1.33).

4. Discussion

This study evaluated the impact of community and individual social capital in childhood on OHRQoL over time. The findings confirm the conceptual hypothesis, demonstrating that over the assessments OHRQoL was higher for those individuals who presented high social capital. However, while individual social capital levels in early childhood affected OHRQoL over the assessments, social capital in the community level impacted especially during adolescence. Although previous studies have evaluated the association between social capital and OHRQoL [11,13,15,16], there is a dearth of investigations looking into this relationship across different age periods using a cohort study design.

The results showed that individuals presenting high community and individual social capital at baseline presented higher OHRQoL over periods of evaluation for most of the social capital variables considered (social class associations, attending group religious meetings, visit to friends/neighbours, school involvement) (Table 2). This result is in agreement with previous studies in children and adolescents, showing that the impact of oral health on quality of life was lower among individuals with high levels of social capital [11,13,15,16]. Thus, living in a neighbourhood with greater social support and social cohesion, or having some kind of social networks, has been strongly linked to better oral health behaviours, greater access to services, and less psychosocial stress [4,6], which may be related to lower impacts on OHRQoL.

Individuals who lived in neighbourhoods that presented social class associations at baseline presented higher OHRQoL after 7 and 10 years of follow up (Table 2), showing that high community social capital in early childhood positively impacted on OHRQoL during the adolescence. This variable was used as a proxy for community social support since they are theoretically related to social capital and social cohesion at community level [4,11,12]. Previous studies have longitudinally reported an association between low levels of community social capital and worse oral health outcomes, such as Koyama et al. (2016) for tooth loss [31], Emmanuelli et al. (2021) for dental caries [32] and Knorst et al. (2019) for low OHRQoL [15]. One explanation for this finding is that neighbourhoods that present high levels of social capital are places where healthy behaviours and positive social norms are more easily disseminated and have better health services, which may impact oral health [6]. In addition, people living in areas with high social capital tend to experience less psychosocial stress and are more resilient, which has a positive effect on perceived health, such as OHRQoL [6].

The fact that neighbourhood-level social capital had a long-term impact on OHRQoL can be explained by the risk accumulation model of life course epidemiology [33,34]. Neighbourhood-level characteristics tend to be more structured and stable in the short term, as

they are dependent on public policies and organizational aspects of the community or municipality [33,35]. The accumulation of contextual conditions where the individuals were exposed in early childhood tends to perpetuate over time, which may explain the impact of community social capital on OHRQoL over 7 and 10 years. Furthermore, only social class associations in the neighbourhood were associated with OHRQoL at community level, while cultural community centres and workers' associations were not. A social class association can be defined as a union of people with common interests who come together to gain strength to achieve some objective, and can be linked to economic, professional, religious interests or social causes in the community [3]. Thus, since this entity can refer to different aspects of a community, it is believed that it could weigh more on health outcomes. A possible explanation for the non-association of the community cultural centres and workers association in the OHRQoL may be due to the fact that they are not so embracing variables [3,12]. However, it is noteworthy that different variables at the community level can impact general and oral health and should be investigated.

Individual social capital variables in early childhood were associated with OHRQoL throughout all assessments (Table 2). Attending religious meetings less than once a month or never at T1 was also associated with lower OHRQoL after two (T2) and 10 years (T4). Previous studies, such as Ismail et al. (2018) and Tomazoni et al. (2017), have shown that attending religious meetings acts as a source of social capital through the expansion of social networks, as well as through feelings of trust and belonging, which can positively impact oral health outcomes [36,37]. In addition, the results demonstrated that visiting friends and neighbours infrequently are related to low OHRQoL at T1, T3, and T4, in agreement with previous cross-sectional studies of Guedes et al. (2014) and Varenne et al. (2011) [13,38]. It has been shown that frequent contact with friends or neighbours may reduce social isolation, which plays an important role in maintaining oral health through social support [1,6]. Furthermore, individual's social networks may exert social control and influence their peers which can also impact health behaviours and oral conditions [1,2,6]. Parents' school involvement was associated with participant's OHRQoL at T3. It has been acknowledged that parental school involvement refers to social connection consisting of vertical bonds between people from different formal hierarchies [4], which is considered an important source of social ties, impacting the well-being and health of children, as well as their subjective perceptions [15,39].

Despite individual social capital variables impacted on OHRQoL throughout all assessments, this relationship did not follow a pattern. Some social capital variables impacted at baseline, others at 2 years follow up or 7 years follow up, and others after 10 years of follow-

up. These inconsistencies may be due to the fact that individual level social capital may change over time, as it may vary according to age, gender, and personal experiences [40]. In addition, baseline social capital was assessed through the parents, which may not reflect the adolescent's social capital over time. Notwithstanding, it is worth mentioning that the individual variable that impacted on OHRQoL for the longest time and in more evaluations was the frequency of visits to friends and neighbours. This can be explained because this type of tie is normally the most common, accessible, strong, and long-lasting that can occur between individuals, resulting in strong mutual trust [1,2,4]. In this sense, as previously described, this variable can be considered a proxy measure of individual social networks and can have a very positive impact on oral health and OHRQoL, as demonstrated in the findings of this study.

This study has some limitations. Firstly, were used different instruments to measure OHRQoL over the cohort assessments. However, valid and cross-culturally adapted instruments were used according to each age group, and the scores were later standardized according to previous literature [30]. Secondly, OHRQoL measures were assessed in each period and multilevel analysis for repeated measures were not conducted. However, the purpose of this study was to assess OHRQoL outcomes in each time period according to the baseline social capital variables. Thirdly, social capital was assessed through proxy measures, which may result in incompleteness assessment of this construct. However, different social capital measures were used in this study allowing the examination of distinct indicators that can affect OHRQoL. Finally, social capital variables were measured at baseline only, and possible variations of social capital over time were not assessed. In addition, our objective was to verify whether social capital in early childhood would impact OHRQoL over each follow-up period of this 10-year cohort.

This study also has some strengths that deserve to be highlighted. This is a cohort study with a 10-year follow-up that encompassed a high response rate of at least 67.1% across 10-years of follow-ups. Thus, this study managed to maintain the minimum sample required throughout all follow-up evaluations, which is extremely important and difficult to achieve in a 10-year longitudinal study [41], strengthening the validity of our findings. In addition, this study covered an important transition period in the lives of individuals, which is subject to changes and impacts that can last throughout life [17]. Thus, acting on social capital in this period can be very favourable to promote oral health in adult life. Finally, different levels and types of social capital were considered, which may impact OHRQoL indicators on this population, encouraging future interventions and public health policies.

5. Conclusions

Overall, the findings showed that individuals who had high social capital in early childhood presented higher OHRQoL over follow-up periods. Individual social capital levels affected OHRQoL over the three follow-up assessments (T2, T3 and T4), while social capital at the community level had a long-term effect on OHRQoL, especially during adolescence.

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CRediT authorship contribution statement

Jessica Klöckner Knorst: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing. Mario Vianna Vettore: Conceptualization, Investigation, Writing – review & editing. Bruna Brondani: Conceptualization, Data curation, Investigation, Methodology, Project administration, Writing – review & editing. Bruno Emmanuelli: Conceptualization, Investigation, Methodology, Project administration, Writing – review & editing. Saul Martins Paiva: Investigation, Methodology, Writing – review & editing. Thiago Machado Ardenghi: Conceptualization, Funding acquisition, Investigation, Methodology, Resources, Software, Supervision, Writing – review & editing.

Declaration of Competing Interest

The authors have no conflicts of interest in relation to the products or methods mentioned herein.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jdent.2022.104281.

Table 1. Demographic, socioeconomic, social capital, and oral health variables of the sample at baseline for individuals followed throughout 10 years

Variables	2010 (T1) (n=639)	2012 (T2) (n=469)	2017 (T3) (n=449)	2020 (T4) (n=429)
Sociodemographic variables				
Sex [n (%)]				
Boys	322 (49.0)	238 (50.7)	220 (47.5)	209 (49.8)
Girls	317 (51.0)	229 (49.3)	229 (52.5)	220 (50.2)
Skin colour				
White	501 (80.5)	363 (48.5)	347 (79.6)	330 (76.9)
No-white	137 (19.5)	103 (51.5)	102 (20.4)	99 (23.1)
Household income* [mean SE)]	1,204 (42.1)	1,105 (48.2)	2,174 (135.6)	1,116 (52.8)
Maternal education [n (%)]				
≥ 8 years	357 (54.3)	256 (54.1)	246 (54.6)	237 (55.2)
< 8 years	275 (45.7)	204 (45.9)	199 (45.4)	187 (44.8)
Community social capital				
Social class associations [n (%)]				
Absent	393 (68.8)	288 (61.4)	277 (62.8)	271 (63.2)
Present	245 (31.2)	178 (38.6)	172 (37.2)	158 (36.8)
Cultural community centres [n (%)]				
Absent	365 (64.4)	265 (56.5)	265 (56.5)	255 (59.4)
Present	273 (35.6)	201 (43.5)	184 (43.5)	174 (40.5)
Workers' associations [n (%)]				
Absent	413 (44.7)	298 (63.5)	284 (60.6)	272 (63.4)
Present	225 (55.3)	168 (36.5)	165 (39.4)	157 (36.5)
Individual social capital				
Attending religious meeting [n (%)]				
At least once a month	362 (56.0)	270 (57.6)	262 (58.4)	248 (58.7)
Less than once a month/never	276 (44.0)	196 (42.4)	187 (41.6)	181 (41.3)
Visit to friends/neighbours [n (%)]				
At least once a month	415 (67.0)	310 (66.1)	294 (62.7)	274 (63.8)
Less than once a month/ never	222 (33.0)	156 (33.9)	155 (37.3)	155 (36.1)
School involvement [n (%)]				
Yes	248 (39.1)	196 (41.8)	78 (16.3)	172 (40.6)
No	383 (60.9)	267 (58.2)	369 (83.7)	252 (59.4)
Oral health measures				
Untreated dental caries [n (%)]				
Absent	408 (61.6)	296 (63.1)	283 (60.3)	300 (69.4)
Present	231 (38.4)	171 (36.8)	166 (39.7)	128 (30.6)
Outcome				
OHRQoL [mean (SE)]	4.7 (0.5)	6.9 (0.9)	10.6 (0.7)	21.5 (1.2)

Taking into account the sampling weight; Values lower than general sample are due to missing data. SE, standard error; OHRQoL, oral health-related quality of life. *In Reais, R$ (US$1.00 is equivalent to R$5.4 approximately). *Measures of each cohort period.

Table 2. Multilevel Poisson Regression Adjusted analysis of the social capital predictors at baseline on OHRQoL over time

Variables	Oral health-related quality of life			
	2010 (T1)	**2012 (T2)**	**2017 (T3)**	**2020 (T4)**
	IRR (95%CI)†	**IRR (95%CI) †**	**IRR (95%CI)†**	**IRR (95%CI) †**
Community social capital				
Social class associations				
Absent	1.00	1.00	1.00	1.00
Present	1.10 (0.84-1.45)	0.98 (0.61-1.74)	0.79 (0.66-0.96)*	0.77 (0.67-0.89)*
Cultural community centres				
Absent	1.00	1.00	1.00	1.00
Present	1.04 (0.78-1.38)	1.21 (0.71-2.02)	1.10 (0.91-1.33)	1.04 (0.90-1.20)
Workers' associations				
Absent	1.00	1.00	1.00	1.00
Present	0.81 (0.62-1.06)	1.29 (0.78-2.13)	0.90 (0.72-1.07)	0.92 (0.80-1.05)
Individual social capital				
Attending group religious meetings				
At least once a month	1.00	1.00	1.00	1.00
Less than once a month/ never	0.90 (0.82-1.01)	1.28 (1.17-1.39)*	0.96 (0.90-1.03)	1.05 (1.01-1.10)*
Visit to friends/neighbours				
At least once a month	1.00	1.00	1.00	1.00
Less than once a month/ never	1.14 (1.04-1.26)*	0.93 (0.85-1.02)	1.16 (1.08-1.24)*	1.27 (1.21-1.33)*
School involvement				
Yes	1.00	1.00	1.00	1.00
No	0.89 (0.78-1.01)	0.96 (0.85-1.09)	1.25 (1.17-1.33)*	0.97 (0.91-1.03)

IRR, incidence rate ratio; CI, confidence interval; *p-value <0.05; †Adjusted by sex, skin colour, household income, maternal education and untreated dental caries; OHRQoL, oral health-related quality of life.
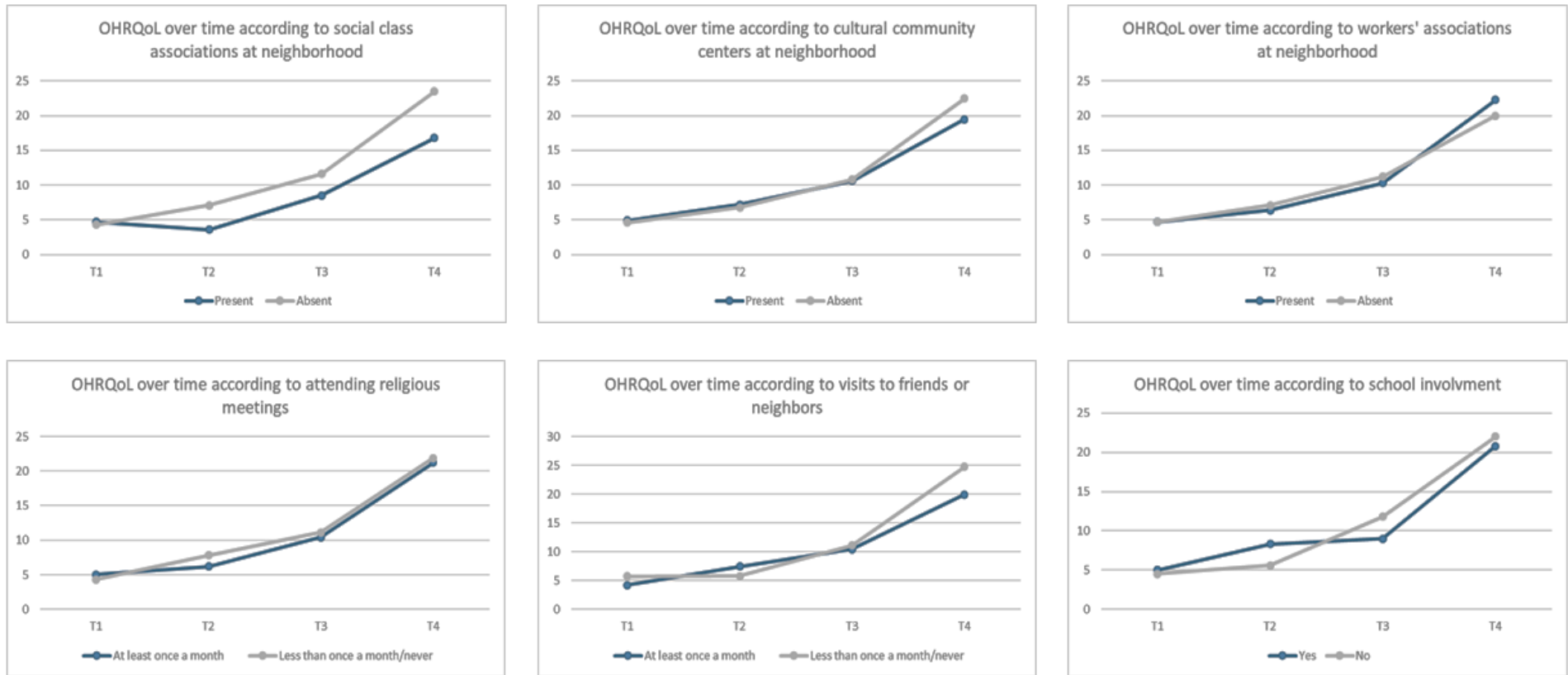
Figure 1. Overall OHRQoL scores according to social capital variables