Development of Oral Health Impacts on Daily Living Questionnaire Items – a Qualitative Study

Jian LIU[1,2], May Chun Mei WONG[2], Edward Chin Man LO[2]

Objective: *To develop an instrument to measure Oral Health-related Quality of Life (OHQoL) and the changes after dental treatment among older adults in Hong Kong, in order to understand their views on the influences of oral health problems and generate relevant items to design the instrument.*
Methods: *A qualitative study was conducted among adults aged 55 and over. Information on their perceived oral health impacts was collected during semi-structured interviews. A framework approach was used to identify the oral health impacts and to understand the meaning of those impacts on the perception of life satisfaction.*
Results: *A total of 39 participants (average age 72 years) underwent the semi-structured interviews; 20 were seeking dental treatment and 19 had already received dental treatment for 1 to 3 months. In total, 308 statements on oral health impacts were drawn from the participants' descriptions. After four steps of item reduction and refinement, a list of 20 items was generated before being classified into eight domains: Cleansing, Eating, Speaking, Appearance, Social, Psychological, Awareness, and Health and Finance.*
Conclusion: *Older adults in Hong Kong perceive that oral health impacts on different aspects of life. The face validity and content validity of the developed Oral Health Impact on Daily Living (OHIDL) was proved through qualitative study.*
Key words: *elderly people, framework approach, oral health related quality of life, qualitative study, questionnaire development, semi-structured interview*
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Over the past three decades, many instruments have been widely used to measure Oral Health related Quality of Life (OHQoL), some of which were initially developed as socio-dental indicators or oral health status measures. Despite the prevalent application of measurement tools in OHQoL research, the validity and reliability of these instruments has been challenged[1]. OHQoL has been defined as "the impact of oral disorders on aspects of everyday life that are important to patients, with those impacts being of sufficient magnitude, whether in terms of severity, frequency or duration, to affect an individual's perception of their life overall"[2]. Recognising the subjective and individualised features of OHQoL, a measurement claiming to assess OHQoL needs to meet at least two criteria, which are patient-centred and embrace subjects' values of importance.

However, some of the instruments currently being used are considered expert-centred measurements, because the comprised items were generated either from experts' opinion or literature, without a qualitative study being performed. Although researchers took account of the importance of subjects and tried to include the subjective value into the OHQoL measurements through weighting, the complex scoring method and the resulting multiplicative score has been criticised

1 Department of Preventive Dentistry, Peking University School and Hospital of Stomatology, National Engineering Laboratory for Digital and Material Technology of Stomatology, Beijing Key Laboratory of Digital Stomatology, Beijing, P.R. China.
2 Faculty of Dentistry, The University of Hong Kong, Hong Kong SAR, P.R. China.

Corresponding author: Prof May Chun Mei WONG, Faculty of Dentistry, The University of Hong Kong, 34 Hospital Road, Hong Kong SAR, P.R. China. Tel: 852-28590422; Fax: 852-28587874. Email: mcmwong@hku.hk.

as being unreliable and unsuitable for most statistical analysis[3]. A more appropriate approach is needed for OHQoL measurements to capture the subjects' value of importance.

Oral diseases are commonly observed among elderly people in Hong Kong. Results of the 2011 Oral Health Survey showed that for non-institutionalised older adults aged 65 to 74, 99.3% had caries experience, with mean DMFT score of 16.2, and 90.5% of older adults had a loss of periodontal attachment over 4 mm[4]. However, the oral health impacts on daily life among the elderly people in Hong Kong was found to be low[5-7]. Some negative findings have also been reported in studies measuring OHQoL among Hong Kong's elderly population[8]. After dental treatment the OHQoL, as measured by the instruments, has sometimes not been any different from that before the treatment, even though clinical evidence indicates an improvement in the status of oral health[9]. The negative findings highlight the research question of how the older people perceive how oral health impacts on daily life.

Evidence shows that culture influences a person's OHQoL rating, health appraisals, coping process and health/illness behaviours[10-14]. All of the instruments currently being used have been developed for an English-speaking population and intend to measure OHQoL for the western culture. However, people from the Chinese culture may have different ways of formulating and evaluating OHQoL. As a result, the instruments in current use may not capture some OHQoL dimensions that matter to older people in Hong Kong. So far, no study has been conducted to explore the way older adults in Hong Kong perceive OHQoL. The influences of oral health problems and dental treatment on the perception of change in oral health impacts among older adults remain unknown.

Based on the above considerations, this study aimed to develop an instrument to measure OHQoL and the changes after dental treatment among Hong Kong's older adults through both qualitative and quantitative study. The first phase of qualitative study was conducted among older adults to understand their views on the influences of oral health problems on daily life. With that information, the dimensions for oral health impacts and relevant items were identified and used to construct the preliminary questionnaire of Oral Health Impact on Daily Living (OHIDL). In the second phase of quantitative study, OHIDL was further refined through a series of psychometric tests. This will be reported in another paper.

Materials and methods

Sampling method

Qualitative samples are usually based on purposive logic and are intended to be rich in information. This determined that the sample size should be small to facilitate the in-depth exploration[15]. In this study, a purposive sampling was carried out to include older adults aged 55 years and above with different self-reported oral health problems. Subjects were recruited both from Prince Philip Dental Hospital (PPDH, the teaching hospital of the Faculty of Dentistry, the University of Hong Kong) and different community centres for the elderly in Hong Kong during October 2010 and April 2011. Demographic characteristics including age, gender, education level and socio-economic status were considered during the sample selection process. Subjects who were about to seek dental treatments for their problems or who had already received treatment for at least 1 month were recruited. Considering the available resources and the research time limitation, the tentative total sample size of this study was controlled to be 20, for both the group seeking treatment and the group who had received treatment, and evenly made up of men and women to achieve a balance in the gender distribution. To increase the sample variety in terms of treatment effect, subjects were selected who had received different types of treatment. The inclusion and exclusion criteria were specified as below:

- *Inclusion criteria:* Adults aged 55 years and above who were about to seek dental treatments, or adults aged 55 years and above who have received dental treatment for at least 1 month.
- *Exclusion criteria:* Communication difficulties; having serious systemic diseases; non-Cantonese speaking, non-Chinese people

Data Collection

Semi-structured interview was used to collect the qualitative data. Subjects were asked which life aspects have been affected by oral health problems and whether they expected (for subjects seeking treatment) or perceived (for subjects who have already received the treatment) those impacts to change after treatment. Issues relating to the subjects' general health were also explored during the interview, as it was hypothesised that the perception of oral health impacts on daily living could be affected by other health experiences. Effort was also made to clarify the ambiguous term "oral health-related quality of life" by asking the question, "What contributes to quality of life?" and, "How oral health problems can impact

Table 1 Themes and subthemes covered in the semi-structured interview.

		Seeking treatment group	Received treatment group
Oral health impacts	Self-reported oral health problems	√	√
	Oral health impacts on daily life	√	√
	Self-perception of the impacts	√	√
	Remained oral health problems after dental treatments		√
	Oral health impacts on daily life after dental treatments		√
	Self-perception of the impacts after dental treatments		√
	Further treatment need after dental treatments		√
Dental treatment	Regularity of dental attendance	√	
	Treatment motivation	√	
	Expected treatment outcomes	√	
	Experiences of the treatment		√
	Treatment outcomes		√
General health impacts	Self-reported general health problems	√	√
	Health impacts on daily life	√	√
	Self-perception of the impacts	√	√
	Health management	√	√
Overall life satisfaction	Life aspects contribute to overall life satisfaction	√	√
	The association of oral health and overall life satisfaction	√	√
	The association of general health and overall life satisfaction	√	√

on quality of life?" All the interviews were recorded. The main topics included impacts on oral health before and after the dental treatment, dental treatment, general health impacts and overall life satisfaction. Under each main topic, several sub-topics were developed to further explore the relevant issues, as shown in Table 1. The same investigator interviewed all subjects using the local Cantonese dialect and the investigator also transcribed the audio records into verbatim transcripts. This process continued until data saturation.

Data analysis

The main purpose of data analysis was to gather a pool of potential items to build an instrument to evaluate oral health-related quality of life and how it changes after dental treatments. A framework approach developed by Ritchie and Spencer[16] was used to identify the oral health impacts and to understand the meaning of those impacts on the perception of life satisfaction. The framework approach involves five stages of data analysis: familiarisation, identifying a thematic framework, indexing, charting, and mapping and interpretation. During this stage, the dimensions of oral health impacts were identified. The whole qualitative data analysis process was carried out with the aid of NVivo 9 (QSR International, www.qsrinternational.com) – computer software that supports both qualitative and mixed-method research.

The study protocol was approved by the University of Hong Kong/Hospital Authority Hong Kong West

Table 2 Background information of the interviewed participants.

Background information	Seeking treatment (n = 20)	Received treatment (n = 19)	Total
Place of recruitment			
Elderly centres	10	8	18
Prince Philip Dental Hospital	10	11	21
Gender			
Male	5	12	17
Female	15	7	22
Age group			
55-64 years	7	2	9
65-74 years	9	3	12
75 years and above	4	14	18
Marital status			
Single	2	0	2
Married	9	14	23
Widowed	9	5	14
Level of education			
No formal education	5	5	10
Primary school	8	9	17
Secondary school or above	7	5	12

Cluster Institutional Review Board (HKU/HA HKW IRB UW 10-385). The investigator explained the information sheet and a signed consent form was collected from each subject. All information collected about the subjects during the course of the research was kept strictly confidential. Any personal information about the participant, i.e name or address, was removed after the interview, so identities could not be recognised from the data.

Results

Forty participants were recruited from the Prince Philip Dental Hospital (PPDH) and eight centres for the elderly and only one subject did not complete the interview. In total, 39 participants (17 male, 22 female) underwent the semi-structured interviews; 20 were seeking dental treatment and 19 had already received dental treatment for between 1 and 3 months. Their ages ranged from 56 to 83, with an average age of 72 years. Sample diversity was achieved in terms of age, gender, marital status and level of education (Table 2). The interviews varied in length from 17 to 63 min. The responses were coded under three main nodes – oral health, general health and overall quality of life – to portray the experiences and subjective perceptions of the individuals on these topics. A detailed hierarchy of the nodes is shown in Figure 1.

Respondents reported a total of 26 oral health problems, among which missing teeth, pain, and denture-related symptoms were the most frequent. For the group seeking treatment, subjects had usually lived with chronic oral health problems such as mobile, missing or fractured teeth, retained roots, trapped food or tooth-wear for several years. Dental visits, however, were often driven by the experience of pain-related symptoms, e.g. painful or swollen gums, toothache or dull pain.

- **Oral health**
  - Dental attendance
    - Regular dental check-up
      - *Reasons for undergoing a regular dental check-up*
      - *Reasons for not undergoing a regular dental check-up*
    - Dental treatment
      - *Reasons for seeking dental treatment for oral health problems*
      - *Reasons for not seeking dental treatment for oral health problems*
  - Comparison of oral health status with others
  - Oral health expectation and belief
  - Dental history/past oral health experience
  - Oral health problems before treatment (for everyone)
    - Oral health problems
      - *Chief complaints*
      - *Duration of the problems*
    - Satisfaction with oral health status
    - Impacts on daily life
    - Subjective perception of oral health effects
  - Self-management of oral health problems
  - Expectation of the treatment to be received
  - Treatment received (for the post-treatment group only)
    - Time since the treatment
    - Satisfaction with the treatment
    - Dental treatment
      - *Type of treatment*
      - *Difficulty in seeking dental treatment*
      - *Expenditure on the treatment*
    - Changes in daily life resulted from the treatment
  - Oral health problems after treatment (for the post-treatment group only)
    - Oral health problems after treatment
      - *Untreated*
      - *Unresolved*
      - *Related to the treatment*
    - Impacts on daily life
    - Subjective perception of oral health impacts
    - Further treatment needs
    - Satisfaction with oral health status
- **General health**
  - Health experience
  - Comparison of health status with others
  - Impacts of health on daily life
  - Subjective perception of health impacts
  - Satisfaction with health status
  - Treatment received for health problems
  - Health expectation and belief
- **Overall quality of life**
  - Daily activities
  - Comparison of overall quality of life status with others
  - Overall life expectation and belief
  - Satisfaction with overall quality of life
  - Aspects that contribute to satisfaction with the overall quality of life
    - Affected by oral health status
    - Affected by health status

Fig 1 Detailed hierarchy of nodes.

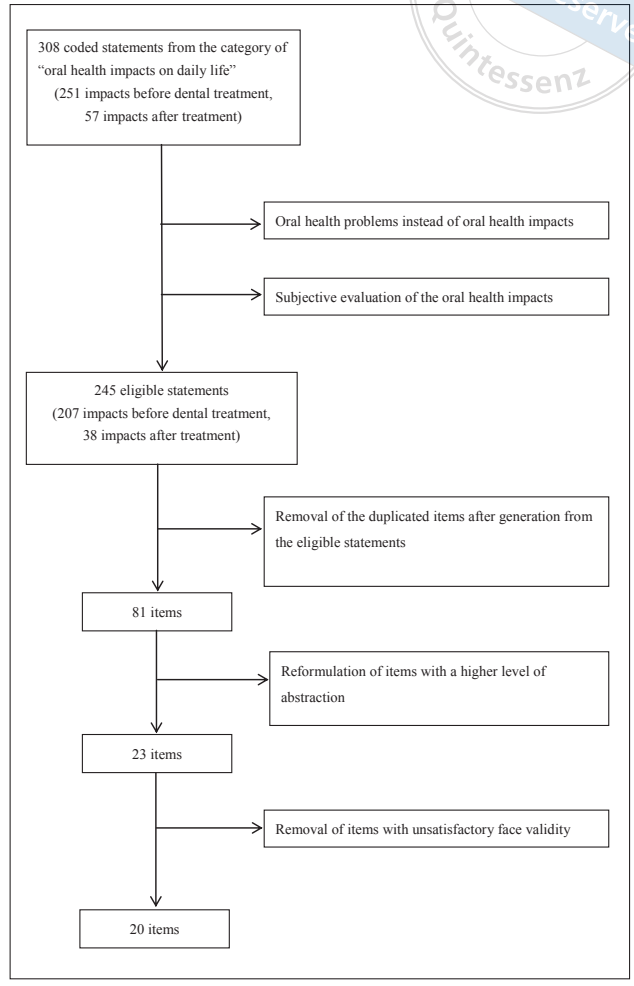

Fig 2 Flow chart of item generation.

Based on the reported oral health problems, the subjects were able to describe their perceived oral health impacts on daily life. A node for "oral health impacts" was established to store the codes and the comments, memos and field notes made by the interviewers. It comprised explicit descriptions of impacts in the subjects' own words and the implicit explanations made by the researcher to explore the deeper meaning of the perceived impacts. The potential items considered during the development of the semi-structured interview were generated through four steps (Fig 2).

- 1: *Generating initial statements about oral health impacts on daily life:* In total, 308 statements on oral health impacts were drawn from the participants' descriptions of their perceptions, of which 251 were coded in relation to those before dental treatment and 57 to after treatment. Table 3 gives examples of item generation from two subjects in the group seeking treatment.
- 2: *Identified eligible statements with direct descriptions of impacts:* All initially coded statements on oral health impacts were examined to select eligible statements, which needed to (a) specifically refer to the consequences of oral health problems on daily life; and (b) describe the impacts explicitly rather than implicitly. Statements were excluded if they were considered to be oral health problems rather than oral health impacts, or the subjective evaluation of the perceived oral health impacts on daily life (Table 3). After reviewing the initial statements in the node of "oral health impacts", 44 statements were excluded from the "before dental treatment" group and 19 excluded from the "after dental treatment" group.
- 3: *Item generation:* The eligible statements were transformed into items using phrases with fewer words to depict oral health impacts on daily life. The generated items did not include double negative forms and each item described only one aspect of the

Table 3 Examples of item generation for two subjects in the seeking treatment group.

Subjects	Step 1 Initial statements	Step 2 Eligible statements	Step 3 Initial list of items
1	• Soft tissue of the mouth hurt during eating[1] • Worried about the side-impacts of the treatment[2] • Fear of pain • Need to be cautious while eating[2] • Need longer time to eat[2] • Have to eat soft food[2] • Food limitation[2] • Need to rinse mouth immediately after a meal because of trapped food[2] • Slight impact on daily life perceived, because food could still be eaten with the other side of the teeth[3] • Did not note an impact on social activities, because she was seldom involved in them and only communicated with people with whom she was familiar[3] • Did not note an impact on mood, because she had already accepted the situation[3]	• Worried about the side-effects of the treatment • Fear of pain • Need to be cautious while eating • Need longer time to eat[a] • Have to eat soft food[b] • Food limitation[b] • Need to rinse mouth immediately after a meal because of trapped food	• Worried about the side-effects of the treatment • Fear of pain • Need to be cautious while eating • Need longer time to eat • Food limitation • Need to rinse mouth immediately after a meal because of trapped food
2	• Soft tissue in the mouth hurt during eating[1] • Bothered by oral health problems[2] • Felt unhappy for 1 week, and then became used to the problem[2] • Felt discomfort when eating food, because it dropped out of the spaces caused by missing teeth[2] • Also felt discomfort when chewing food[2] • Felt self-conscious[2] • Eating time prolonged[2] • Food limitation[2] • Impact on daily life perceived as a problem, because she was not used to the missing teeth (lost denture), which limited food intake[3]	• Bothered by oral health problems • Felt unhappy for 1 week, then became used to the problem • Felt discomfort when eating food because it dropped out of the spaces caused by missing teeth • Also felt discomfort when chewing food • Felt self-conscious • Eating time prolonged[a] • Food limitation[b]	• Bothered by oral health problems • Felt unhappy • Felt discomfort when eating food • Felt discomfort when chewing food • Felt self-conscious

[1] Considered to be oral health problems instead of oral health impacts
[2] Eligible statements with direct description of the oral health impacts
[3] Subjective evaluations of the oral health impacts
[a,b] Items duplicated or with similar meaning

impact. After removing the redundant and duplicated items, an initial list of 81 items was identified.

- 4: *Item reduction and refinement:* The initial list was reviewed word by word to ensure that the meaning of each item was fully understandable and appropriate. During this step, items with ambiguous meanings were rephrased or eliminated. Also, any items with overlapping content were revised for the purpose of better discrimination, and were combined to reformulate a new item with a higher level of abstraction. After this reduction, a list of 23 items was generated and classified into eight domains: Cleansing, Eating, Speaking, Appearance, Social, Psychological, Awareness and Health and Finance. The items and the domains to which they belong are listed in Table 4. The items were then presented to other researchers for further review. According to expert opinion, three items were considered to have less face validity in measuring the impacts of oral health on daily life and were removed (Table 4). As a result, a final list of 20 items of OHIDL was generated.

Discussion

Questionnaire items in the currently used OHQoL measures were usually generated from literature, the opinions of a professional panel and qualitative study. For the first two methods, content validity may be achieved, while the face validity may be violated, unless there is evidence to prove patients' value has been incorporated[17]. Conducting a qualitative interview to develop related issues of the study concept is the most important method

Table 4 Generated items and their underlying domains.

Domains	Items
Cleansing	Have difficulty in or feel troubled when cleaning teeth or dentures
Eating	Limitation of the types or amounts of food Feel discomfort during eating Have difficulty in biting or chewing some types of food, such as firm meat or apples Unable to swallow comfortably Have to eat slowly, which results in a prolonged eating time Meal interruption Less flavour in food *Family meal type being affected
Speaking	Unable to speak the way you want
***Awareness**	*Aware of oral health problems
Appearance	Appearance being affected Avoid smiling in front of people
Social	Uncomfortable to eat in front of people Limitation of contacts with people and friends Feel nervous or self-conscious in front of people
Psychological	Worried or concerned about the problems of teeth, gums, or dentures Mood being affected, e.g., feel unhappy
Health & Finance	Digestion being affected Headache Sleeping being affected *Take medicine to relieve pain Financial burden

* Items that were considered to have less face validity, and were therefore removed.

to ensure a high level of face validity, through which subjects' value is directly added. In this study, the items of OHIDL (Oral Health Impact on Daily Living) were generated through semi-structured interviews, through which the older adults' perception of oral health impacts were explored in depth.

Before starting the qualitative phase study, it was decided to control the sample size to 40; 20 for the group seeking treatment and 20 for the group who had received treatment, when considering the available resources and the research time limitation. It was found that limited new information emerged when the sample size was getting close to 20 for each group. Despite this, more interviews for each group were conducted until 20 interviews were completed to confirm the research findings. Therefore, it can be considered that data saturation had been achieved. This may be taken to indicate that a comprehensive content relating to the concept of interest had been covered, enhancing the content validity[18,19].

According to a clear documentation of the development and the modification process of the instrument can increase the face validity and content validity[17]. In this study, the audio recordings of the raw data were transcribed into written transcripts, containing a large amount of text work and which was rich in detail. With the use of the NVivo software, the raw data was kept, labelled and sorted according to the identified themes and then synthesised into a higher level of abstraction. The detailed information was attached, along with the synthesised data as evidence. This could easily be checked back, so that each step of item generation was

Table 5 Comparison of the component items of OHIDL with that of OHIP-14 (Chinese version), GOHAI, OHQoL-UK (W) and OIDP.

	Oral health problems	Similar to OHIDL	Different from OHIDL
OHIP-14 (Chinese version)	Sore spots	Chewing difficulty Trouble in pronouncing words Uncomfortable to eat Worried Less flavour in food Meal interruption Avoid going out Trouble getting on with others	Miserable Unable to function Unable to work Embarrassed Upset
GOHAI	Sensitive pain	Food limitation Chewing difficulty Swallow discomfort Limiting contact with people Appearance Feel nervous or self-conscious Worried or concerned about the oral health problems Speaking Uncomfortable to eat in front of people Feel discomfort during eating	Using medication
OHQoL-UK(W)		Eating Appearance Speech Health Relax/sleep Social Smile/laugh Mood Finance Comfort	Romance Confidence Carefree Work Breath Personality
OIDP		Eating Speaking Cleaning Light physical activities Going out Sleeping Smiling Emotional stability	Relaxing

clearly documented. As a result, although part of the information was unavoidably lost during the data reduction process, the main contents were captured and kept by the generated items.

In order to increase the sample diversity in the qualitative study, the study subjects were recruited from different sites; the Prince Philip Dental Hospital (PPDH) and elderly centres. At PPDH, only selected patients with certain oral health conditions suitable for teaching and research purposes are accepted. Patients can receive comprehensive treatment from dental students at very low cost, although the time period for treatment is relatively longer than in private clinics. By contrast, subjects who were recruited from elderly centres would mainly have visited private dental clinics and paid their own fees. They were thought to have strong motivations to seek dental treatment, even though the type of treatment they received might be less comprehensive because of the expensive private clinic fees. It is believed that subjects recruited from PPDH were expected to have a different perception in terms of oral health impacts on daily living and the change after the dental treatments,

compared with those recruited from elderly centres who received treatment in private clinics.

Through the qualitative study, 20 items were generated from 308 original statements describing oral health impacts on daily life. Comparing these with the existing instruments widely used in measuring OHQoL, OHIDL included items that were similar to those in the Chinese version OHIP-14[5], GOHAI[6], OHQoL-UK(W)[20] and OIDP[21], as shown in Table 5. Some of the item differences have been observed. However, an item of "upset" contained in OHIP-14 was mentioned during the semi-structured interviews and recorded in the original statements of oral health impacts, while later synthesised into the "mood affected" item, together with statements describing other emotional disturbance impacts. The only exceptional item not mentioned in the existing instruments was "prolonged eating time". This may be explained by the different level of abstraction, for some of the existing questionnaires include items in a more abstract way, e.g. OHQoL-UK(W) and OIDP, which only group a series of impacts on eating function under "eating" without further sub-items. Some of the items in the current questionnaires are considered to measure oral health problems and symptoms rather than oral health impacts, e.g. sore spots in OHIP-14 (Chinese version) and sensitive pain in GOHAI, and they are not included in OHILD as items of oral health impacts.

Nevertheless, OHIDL contains fewer items related to social activities, psychological aspects, and handicap, i.e. embarrassment, confidence, work, romance, relaxation, being miserable, unable to function or unable to work. Social activities were valued components of both quality of life and health status[22], which can be affected by dental appearance[23]. However, compared with young people, older adults also considered social activities as less important. Those older people living in Hong Kong were found to be more likely to accept their oral health problems and reported less social impacts than respondents from the Western culture[6]. Such differences are consistent with what was reflected in the semi-structured interviews. During these interviews, it was found that even with noticeable broken, decayed or missing teeth, avoiding talking to other people, self-consciousness and avoiding going out with friends were only mentioned by some of the elderly subjects. One possible explanation for perceiving this as having less of a social impact is that most of the older adults were retired and less involved in social activities. They usually stay with family or old friends and are not as concerned about how their family and friends see their appearance[24].

Conclusion

Based on the findings of this research, it is concluded that older adults in Hong Kong perceive oral health impacts on different aspects of daily life, including cleansing, eating, speaking, appearance, social, psychological, health and finance. The face validity and content validity of the developed OHIDL items was proved through qualitative study.

Conflicts of interest

The authors reported no conflicts of interest relating to this study.

Author contribution

Dr Jian LIU acquired, analysed and interpreted the data, and prepared the manuscript; Prof May Chun Mei WONG and Prof Edward Chin Man LO, designed the study and revised the manuscript.

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