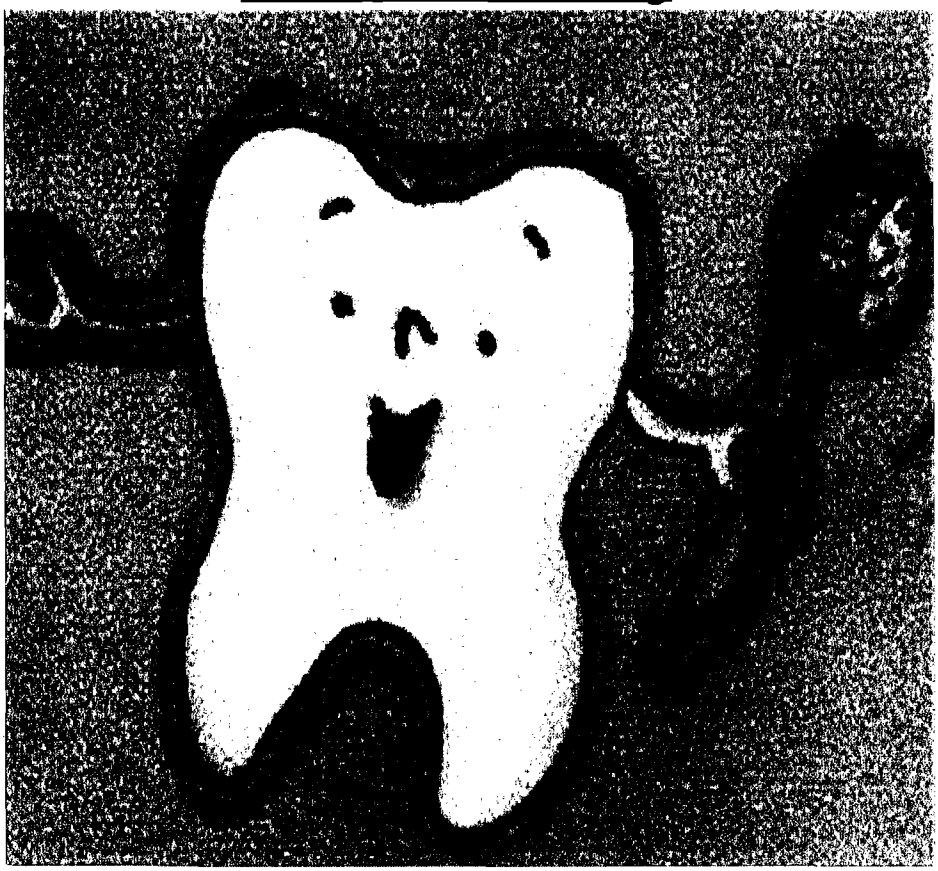
DEVELOPING AN AGE-APPROPRIATE DENTAL CARE PROGRAMME FOR PRESCHOOL CHILDREN

Marilize M. Kitching



Dissertation submitted in partial fulfillment of the requirements for the degree Magister Artium in Clinical Psychology as the North-West University (Potchefstroom Campus)

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Co-supervisors: Dr QM Temane

Ms M Watson

Potchefstroom

2007

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ACKNOWLEDGEMENTS

I would like to thank the following individuals and organisations for their assistance in completing this mini-dissertation.

- Prof Vera Roos for her guidance and encouragement.
- Prof Michael Temane for his continuous support and encouragement.
- Ms M Watson for her insight and guidance.
- The expert practitioners who evaluated the relevance of the programme.
- My family, friends and loved one for their support and prayers.
- The language editor, Ms Penny Kokot-Louw for her insight and assistance.

SUMMARY

DEVELOPING AN AGE-APPROPRIATE DENTAL CARE PROGRAMME FOR PRESCHOOL CHILDREN

Keywords: developmental psychology, cognitive development, experiential learning, Piaget, dental care

Children's oral health is an important but often overlooked component of overall health. Tooth decay therefore remains a common phenomenon among children. It is however entirely preventable through early and sustained intervention. The aim of this research was to develop an age-appropriate programme to enhance children's knowledge and awareness of proper dental care. Action research was applied in this research, which was characterized by various cyclical research phases, including planning, reflecting and implementing. The initial phase of the research included a thorough literature investigation and a baseline assessment, consisting of a questionnaire which assessed preschool children's basic knowledge and awareness of proper dental care. Purposive sampling was used to select 52 Afrikaans-speaking children, between the ages of five and seven years, of different preschools. This age group was chosen because children in this developmental phase are at an age where their activity, curiosity and ability to construct a better system for understanding the world, are key to the process of development. The data obtained indicated a moderate level of knowledge and awareness among the participating children. The initial literature study and the baseline data informed the development of an age-appropriate dental care programme, according to Piaget's theory of cognitive development. The different developmental tasks of the identified age group were considered to be very important in the development of an age-appropriate programme and to teach children the basic aspects of proper dental care by using information and activities that are stimulating, creative and challenging. The programme focuses on basic aspects of proper dental care, including the healthy tooth, loss of primary teeth, the importance of primary teeth and development of permanent teeth, the process of tooth decay, diet, different ways of caring for teeth, and visiting the dentist. Parent involvement was also emphasized in the presentation of the programme. Specialist practitioners in the fields of developmental psychology and dentistry were asked to evaluate the newly developed programme. They were asked to focus on four specific areas, namely, general feedback on the questionnaire that was used for the initial baseline assessment, the overall appearance and presentation of the dental care programme, the relevance and appropriateness of the programme and its activities for the specific age group, and suggestions for further adjustments and improvements. Programme evaluation is an important part of the developmental process and contributes to the eventual appropriate and relevance of the intervention. The specialists' evaluation indicated that the programme appears to be a well-designed intervention that could contribute to enhancing preschool children's knowledge and awareness of proper dental care. Suggestions were made to adjust the programme in

certain areas to make it more appealing to children and to enhance its appropriateness and relevance. For example it was suggested that the language used in the programme be more consistent. More structure should be added to the programme manual to assist facilitators in presenting it. These suggestions were considered to be valuable in improving the efficacy of the age-appropriate programme and the adjustments were made.

OPSOMMING

DIE ONTWIKKELING VAN 'N OUDERDOMSGEPASTE TANDSORGPROGRAM VIR VOORSKOOLSE KINDERS

Sleutelwoorde: ontwikkelingsielkunde, kognitiewe ontwikkeling, ervaringsleer, Piaget, tandsorg

Kinders se orale gesondheid is 'n belangrike, maar dikwels nagelate komponent van algehele gesondheid. Tandbederf bly daarom 'n algemene verskynsel by kinders, hoewel dit grootliks voorkombaar is deur vroeë en volgehoue intervensie. Die doel van hierdie navorsing was om 'n ouderdomsgepaste program vir voorskoolse kinders te ontwikkel om hul kennis en bewustheid van behoorlike tandsorg te verhoog. Aksienavorsing was in hierdie navorsing gebruik en was gekenmerk deur verskeie sikliese navorsingsfases soos beplanning, reflektering en implementering. Die aanvanklike fase van die navorsing het 'n deeglike literatuurstudie asook 'n basislynassessering, wat bestaan het uit 'n vraelys wat voorskoolse kinders se basiese kennis en hul bewustheid van behoorlike tandsorg, ingesluit. Doelgerigte steekproefneming is gebruik om 52 Afrikaanssprekende kinders, tussen die ouderdom van vyf en sewe jaar, van verskillende kleuterskole te kies. Hierdie ouderdomsgroep was gekies omdat kinders in hierdie ontwikkelingsfase op 'n ouderdom is waar hul aktiwiteite, nuuskierigheid en die wyse waarop hulle die wêreld begin verstaan, die sleutel is in die ontwikkelingsproses. Die data wat verkry is, het 'n gemiddelde vlak van kennis en bewustheid aangedui by die kinders wat deelgeneem het. Die aanvanklike literatuurstudie en die basislyndata was gebruik in die ontwikkeling van 'n ouderdomsgepaste program, volgens die kognitiewe ontwikkelingsteorie van Piaget. Die verskillende ontwikkelingstake van die geïdentifiseerde ouderdomsgroep is belangrik geag in die ontwikkeling van 'n ouderdomsgepaste program en om kinders die basiese aspekte van behoorlike tandsorg te leer deur inligting en aktiwiteite te gebruik wat stimulerend, kreatief en uitdagend is. Die program fokus op spesifieke aspekte van behoorlike tandsorg wat die gesonde tand, wisseling van melktande, die belangrikheid van melktande, die proses van tandbederf, dieet, verskillende wyses waarop tande versorg kan word en 'n besoek aan die tandarts, insluit. Ouerbetrokkenheid is ook in die aanbieding van die program beklemtoon. Kundige praktisyn in die veld van ontwikkelingsielkunde en tandheelkunde is gevra om die nuut-ontwikkelde program te evalueer. Hulle is gevra om spesifiek te fokus op vier aspekte, naamlik: algemene terugvoer oor die vraelys wat in die basislynassessering gebruik is, die algehele indruk en aanbieding van die tandsorgprogram en die relevansie en toepaslikheid van die program en aktiwiteite vir die spesifieke ouderdomsgroep, asook voorstelle vir verdere aanpassings en verbeterings. Programevaluering is 'n belangrike deel van die ontwikkelingsproses en dra by tot die uiteindelike gepastheid en relevansie van die intervensie. Die kundiges se evaluering het aangedui dat dit blyk of die program 'n goed-ontwerpte intervensie is wat kan bydra tot die verhoging van voorskoolse kinders se kennis en bewustheid van behoorlike tandsorg. Voorstelle is gemaak om die program in sekere opsigte meer aanloklik vir kinders te

maak om die gepastheid en toepaslikheid te verhoog. Byvoorbeeld was daar voorgestel dat die taal in die program meer konsekwent gebruik moet word. Meer struktuur behoort in die handleiding gegee te word om die aanbieders te help in die aanbieding daarvan. Hierdie voorstelle is as waardevol beskou om die doeltreffendheid van die ouderdomsgepaste program te verhoog en die aanpassings is gemaak.

PREFACE

The candidate chose to propose an article, with the support of her supervisor

Prof V Roos

INTENDED JOURNAL AND GUIDELINES FOR AUTHORS

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BBC ONLINE 2004: Radical autumn shake-up. Available from: http://www.bbc.co.uk/news10276.htm (Accessed 8 December 2004).
DE VOS, AS; STRYDOM, H; FOUCHE, CB; POGGENPOEL, M & SCHURINK, W 1998: Research at grass roots. A primer for the caring professions. Pretoria: Van Schaik Academic.
DURRHEIM, K 1997: Social constructionism, discourse and psychology. South African Journal of Psychology, 27(3):175-182.
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HOLMES, A 1998: Greenpeace wins media war. Available from: http://www.independent.co.uk/international/green25.htm (Accessed 25 November 1998).

Examples of text references:

The ethical measures adhered to during this research process are those set out by DENOSA (Democratic Nurses Association of South Africa, 1998:3-7).

Stein, Brailowsky and Will (1995:105), however, note that points of divergence are seen even within rodents of the same species. Yet sex differences do occur both in response to injury and in recovery of function, female rats in normal oestrus showing less oedema following frontal cortical contusions than males, and more severe oedema than females who are not in oestrus (Stein et al. 1995:105).

MANUSCRIPT FOR EXAMINATION

DEVELOPING AN AGE-APPROPRIATE DENTAL CARE PROGRAMME FOR PRESCHOOL CHILDREN

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ABSTRACT

Children's oral health is an important and overlooked component of overall health. Tooth decay therefore remains a common health problem among children. It is however entirely preventable through early intervention. The aim of this study was to develop an age-appropriate programme to enhance preschool children's knowledge and awareness of proper dental care. The initial phase of the study comprised a baseline analysis of preschool children's basic knowledge and awareness of proper dental care. The data obtained were contributed to the appropriateness and relevance of the intervention to the community. Suggestions from these specialists included possible areas of improvement. Implications for further development of the programme are discussed.

Keywords: developmental psychology, cognitive development, experiential learning, Piaget, dental care

INTRODUCTION

Tooth decay continues to be the single most common chronic health problem among children, despite the fact that it is highly preventable through early and sustained home care and regular professional preventive services (Crall, 2004; Tong, 2001; Werner, n.d.). Prevention in tooth decay is a challenge, as it is not only influenced by physiological processes, but also by an individual's cognitions, emotions and behaviours. Prevention "is a newly emerging multidisciplinary field of enquiry involving the behavioural and social sciences as well as public health, medical and other allied disciplines" (Ryff & Singer, 2000, p.173). Primary dentition is important to children's health as well as their psychological wellbeing, since it contributes to the development of children's appearance, healthy social skills and self-confidence (American Academy of Paediatric Dentistry (AAPD), 2007; Ontario Association of Public Health Dentistry (OAPHD), 2003). Good dental health improves overall wellbeing and, with early intervention, the need for complicated dental procedures can be avoided (Mohamed, 2007).

The future needs for the science of primary prevention are to stimulate early intervention studies in childhood (Ryff & Singer, 2000). Since children's oral health problems are entirely preventable, it is necessary to emphasise early prevention, detection and treatment for children and their parents. Awareness of and access to dental health services are the first steps in preventing tooth decay and other oral health problems. This could be encouraged by increasing children's access to regular dental care, subsidising dental clinics and private practitioners to increase the services available to children, but also by implementing age-appropriate programmes for children and their parents that emphasise preschool children's knowledge and awareness of proper dental care.

A lack of awareness and inadequate knowledge about oral hygiene can result in gross neglect of oral health and the eventual development of various dental health problems. According to Mohamed (2007), parents often do not realise that the prevention of dental problems is of cardinal importance, and that

commencing dental care at an early age is vital. Prevention is the key to avoiding future dental problems. In planning an appropriate preventative programme, it is important to take the biological, social and cognitive development of children into consideration (Huitt & Hummel, 2003; Piaget, 2000; Roos et al., 2005). Since children between the ages of two and six start to lose their primary teeth and develop permanent teeth (ADHA, 2002; Elementary and early childhood education, 1993; Izenberg, 1995), this is an ideal age to start the awareness raising process. Children in this particular age group are in the pre-operational phase of cognitive development (Ginsburg & Opper, 1969; Huitt & Hummel, 2003; Piaget, 2000; Piaget, 2003).

According to Piaget (Piaget, 1936; Vasta, Miller & Ellis, 2004), experience does not simply happen to the child, but must always be assimilated to current cognitive structures. Learning occurs through an inventive process of assimilating new information into pre-existing conceptual frameworks, and modifying understanding to incorporate new information (Brookes, 2004; Ginsburg & Opper, 1979; Piaget, 1936; Smith, 1996). A new experience will only be beneficial if the child can make sense of it. Therefore, education that is too far beyond the child's level is unlikely to have any impact. Rather, education should provide experiences similar enough to be assimilated, yet challenging enough to provide disequilibrium. Children in the pre-operational phase are not yet able to conceptualise abstractly and need concrete physical experiences in order to learn (Ginsburg & Opper, 1979; Brookes, 2004; Vasta, Miller & Ellis, 2004). Piaget distrusted educational methods that are too passive (Vasta, Miller & Ellis, 2004). Education should build on the child's natural curiosity and tendency to act on the world to understand it (Vasta, Miller & Ellis, 2004). Through assimilation (i.e. the active transformation of information to existing cognitive structures), the child's knowledge and awareness of dental care is ultimately enhanced.

Children spend their time in various settings; and it is through experiences between the children and their immediate environments that development and learning take place. The proximal experiences that children have with people and objects in their immediate environments are the primary mobilisers of development. The most important setting for young children is their family, where they spend most of their time. According to DeBord (2003), parents have the right and the responsibility to be involved in any aspect of their child's education or child care. Salisbury and Smith (1993) stress the value of parent involvement in contributing to an effective intervention, since parental involvement has a positive influence on the outcome of an intervention.

Although various factors, including nutrition, socio-demographic variables, and the availability of dental services, definitely impact on the dental health of children, the focus of this study is on developing a programme to enhance children's knowledge of proper dental care that could be applied by primary care givers. The aim of this study was therefore to develop an age-appropriate programme to enhance preschool children's knowledge and awareness of dental care.

METHODOLOGY

Research design

The design of the study is based on an action research approach, using both qualitative and quantitative research methods. Action research is research into practice, according to Zuber-Skerritt (1996). It aims to solve current practical problems while expanding scientific knowledge (Baskerville & Myers, 2004). It involves learning in and through action and reflection, and is conducted in a variety of contexts (McNiff, 2002). Action research is a combination of action and research that renders a form of disciplined inquiry in which an attempt is made to understand, improve and reform practice (Hopkins, 1985; Kemmis & McTaggart, 1988). According to Cohen and Manion (1994), action research entails small-scale interventions in the real world and a close examination of the effects of the interventions. It is to plan, act, observe and reflect carefully, systematically and rigorously, to not only solve problems, but also to involve problem-posing (Zuber-Skerrit, 1996). Action research is therefore motivated by a quest to improve and understand the world by changing it (Kemmis & McTaggart, 1988). The researcher studies a problem systematically and ensures that an intervention is informed by theoretical considerations. Initially a problem is identified and data are then collected for a more detailed diagnosis (O'Brien, 1998); and eventually a single plan of action emerges to solve this problem.

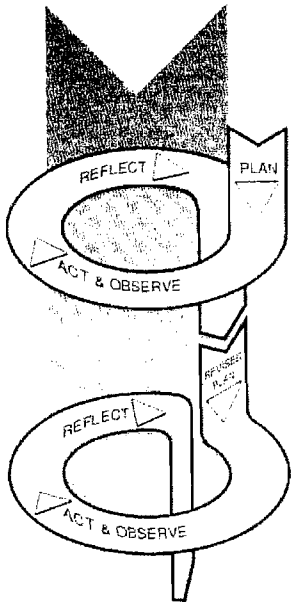


Figure 1: The action research spiral (Kemmis & McTaggart, 1988)

Programme development and evaluation

The programme development process involves ongoing evaluation of the content of the programme (Payne, 1994; Thomas & Rothman, 1980). Knowledge of programme evaluation provides one with the skills to judge the value of a potentially useful programme for health and other helping professions. The

aim of the study was to develop a plan of critically informed action to contribute to the improvement of a current situation. *Planning* is constructed action which, by definition, must be prospective to action; in other words it must be forward looking. It needs to be flexible enough to adapt to 'unforseen effects and previously unrecognized constraints' (Kemmis & McTaggart, 1988). During the planning phase a comprehensive literature study was done which indicated the possible need for an educational programme focused on dental care for children. *Action* is deliberate, controlled and critically informed, according to Kemmis & McTaggart (1988). It creates a platform for further action with a critically informed educational intent. Action is guided by planning. Action should always be critically informed so the researcher can act effectively over a greater range of circumstances (Kemmis & McTaggart, 1988). It should help practitioners to go beyond present constraints and to empower them to act more appropriately in the situation and more effectively as an "educator" (Kemmis & McTaggart, 1988). It should help a practitioner identify and realise new potential for health action. Through action, evidence is collected about the action in order to evaluate it thoroughly.

During the action phase researchers need to act to apply the plan. In this study, a questionnaire was developed to determine baseline knowledge and awareness of preschoolers concerning proper dental care. Data collected through the questionnaires informed the development of a dental care programme. Next it was necessary to observe the relevance of the critically informed action; in other words, to evaluate the newly developed programme as part of the programme development process. *Observation* entails documenting the effects of the critically informed action. It provides the basis for reflection (Kemmis & McTaggart, 1988). This process must be responsive and open-minded. It contributes to the improvement of practice through a greater understanding and more critically informed strategic action. The nature of action research embodies a multiplicity of views, commentaries and critiques, leading to multiple possible actions and interpretations. A range of options is thus presented to enhance an intervention. Knowledge is derived from practice and practice is informed by knowledge in an ongoing process. This forms the cornerstone of action research (O'Brien, 1998). The participating children as well as the experts approached to evaluate the programme all played an important role in the observation phase, since O'Brien (1998) considers each one's ideas to be equally significant as potential resources for creating interpretive categories of analysis. The aim of doing this was to avoid skewing of credibility stemming from the prior status of the 'idea-holder'. Lastly, the researcher has to reflect on the observations for further planning and improvement of the programme, for the cycle to start again. *Reflection* seeks to make sense of processes, problems, issues and constraints. It takes account of a variety of perspectives and provides the basis for the revised plan (Kemmis & McTaggart, 1988).

Context and sample

According to the University of Wisconsin – Cooperative Extension (2002), programmes exist in a situation or environment that is often complex and changing. This means that understanding the specific context in

which your intervention occurs is the first step in designing a new intervention. The more we know about the situation, the more solid the foundation of the intervention will be. Two preschools in the middle class areas of Potchefstroom were identified and approached for participation in the study. The preschools both consisted of a number of classrooms, each adequately supplied with educational games, art supplies, toys, posters on the walls, and so on. However, none of the games, posters, toys or books was designed to specifically educate the children about dental care. These particular schools were chosen as the researcher had access to the schools whilst assigned to them for practical training as part of her Masters programme in Psychology. Purposive sampling was used to select 52 Afrikaans-speaking children in the grade R group of the different preschools. To limit extraneous influences on the research it was decided to include a single language group in the study, and since most of the children in the preschools were Afrikaans-speaking, a larger sample was possible. The children were between the ages of five years and six years six months. This age group was chosen because children of this age are in the pre-operational stage of cognitive development, which means that they are now at an age where their activity, curiosity and ability to construct a better system for understanding the world are key to the process of development (Ginsburg & Opper, cited in Feldman, 2004). It was established prior to the baseline analysis that no programmes specifically aimed at dental care had ever been run at the participating preschools.

Procedure

The initial phase of the study comprised a thorough literature study that was done to determine the most important areas of proper dental care for children. It was necessary to identify these areas in order to later assess if these were in fact the relevant areas that needed to be addressed in the intervention programme. During the next phase of the study a questionnaire was developed to determine children's basic knowledge of dental care in these identified areas.

Permission to conduct the research at the preschools was granted by both the parents of the children, the children themselves, the heads of the preschools and the ethical Committee of the University (#05K14). Data collection was done early in the mornings, organised and a room slightly removed from distractions was made available for this purpose. Gathering the data was time consuming as each of the 52 children was individually assessed. Children in this age group are not yet able to read and the researcher therefore had to read each question slowly and carefully in order for the child to be able to respond to it. As the questions got progressively more difficult, they often had to be repeated. It was important for the researcher to adhere strictly to the questions and not lead the child to the answer in any way. It was also important to make the children feel comfortable and to motivate them to answer each question to the best of their ability. It took 15-20 minutes to administer the questionnaire to each child, and the data collection process took two weeks to complete. The guideline for assigning marks was followed strictly in order to accurately assess the level of knowledge and awareness of the sampled children. The results were used to determine if a need for an educational programme indeed existed.

Results from the baseline assessment and a comprehensive literature review were used to develop an age-appropriate dental care programme for preschool children. As part of the development process, the programme was presented to a number of specialists in developmental psychology and dentistry, who offered recommendations for amendments and additions to the programme. Evaluation research is, according to Babbie (1992), appropriate whenever a social intervention is planned. He defines a social action as an action taken within a social context for the purpose of producing some intended result, as was the case with developing this programme to enhance children's knowledge and awareness of proper dental care. Evaluation research is a process of determining whether the intended result could be achieved.

Data collection

A thorough literature investigation was conducted and a nine-question questionnaire was developed to determine children's basic knowledge and awareness of proper dental care. According to Boynton and Greenhalgh (2004), the aim of a questionnaire is to obtain accurate relevant information for the study, and to thereby extend and quantify the findings of the initial exploratory phase. The purpose of the questionnaire in this research was to assess children's knowledge on the basic aspects that should be included in dental care, such as healthy teeth, loss of primary teeth, the importance of primary teeth and development of permanent teeth, the process of tooth decay, the importance of diet, different ways of caring for teeth, and visiting the dentist.

The following principles were adhered to in developing the questionnaire (Boynton & Greenhalgh, 2004; McNamara, 1997): defining the objectives of the survey, determining the sample group, writing the questionnaire, administering the questionnaire and interpreting the questionnaire. In order to obtain relevant information and not overlook important information, it was important to have a clear, well-defined goal. Boynton and Greenhalgh (2004) and McNamara (1997) suggest that the questionnaire should flow logically to ensure that participants do not lose interest. Consequently, easier questions were placed at the beginning of the questionnaire and became progressively more difficult. Questions needed to be clear, direct and not leading in any way. Questions were open-ended so that the children could give a clear indication of their understanding of the particular aspect of dental care. A disadvantage of open-ended questions is that they must usually be read individually, which can be time-consuming; and according to Boynton and Greenhalgh (2004), there is no way to automatically tabulate or perform a statistical analysis with this type of question. In order to quantitatively assess the level of knowledge and awareness among the sample, the children's responses were categorised by the researcher according to a set guideline (2 marks, 1 mark, 0 marks – see Table 1) to eventually calculate a total score indicating each child's level of knowledge and awareness. The highest possible score based on the scale was 18 and the lowest possible score was 0. The table below shows how participants' knowledge was assessed.

Table 1: Questionnaire to assess baseline data

Question	2 marks	1 mark	0 marks
1. What is this? (show a picture of a tooth) 	It's a tooth	It's a picture	I don't know, or a wrong answer
2. What happens to your primary/milk teeth?	They fall out and permanent teeth grow	They fall out	I don't know, or a wrong answer
3. Why are primary/milk teeth important?	Makes it possible to chew properly, helps the permanent teeth by 'saving a space for them'	To have other teeth	I don't know, or a wrong answer
4. Why does this tooth look like this? (show a picture of a rotten tooth) 	Its rotten - because it wasn't taken care of	Something is wrong with it	I don't know, or a wrong answer
5. How can you take care of your teeth and protect them?	Brush regularly, floss, eat healthy, etc.	Describes two ways, or less	I don't know, or a wrong answer
6. Which foods should we eat to keep our teeth healthy and strong?	Names five or more healthy foods, like apples, milk, carrots, etc.	Only names two, or less	I don't know, or a wrong answer
7. Which foods are bad for our teeth?	Names five or more unhealthy foods/drinks, like cake, ice cream, sodas, sweets, etc.	Only names two, or less	I don't know, or a wrong answer
8. How should you brush your teeth?	With circular movements over the teeth	With a toothbrush	I don't know, or a wrong answer
9. Who is the dentist?	The person that looks at our teeth, and then helps us to look after our teeth to keep them healthy and strong	Gives a vague description	I don't know, or a wrong answer

Specialists in the fields of developmental psychology and dentistry were selected to give comprehensive feedback on the relevance and age-appropriateness of the programme. Royse, Thyer, Padgett and Logan (2006) suggest that recognised experts, or persons of some authority, be consulted for suggestions for improving the programme. The experts were asked to give feedback on different aspects

identified by the researcher during the development of the programme, including:

- The questionnaire used for the initial baseline analysis
- Overall appearance and presentation of the programme
- The relevance of the programme and its activities for the specific age group
- Suggestions for the adjustment and improvement of the programme

The researcher approached six experts, including four psychologists and two dentists. These experts come from different backgrounds, practise in different provinces of South Africa and have varying levels of knowledge and experience. All of the experts were selected for their good reputation in their field, but also to ensure a wide variety of contributions. When similar ideas were repeatedly voiced, the evaluations could be considered accurate. The researcher contacted the experts by telephone, and after explaining the study to them in detail, they all agreed to participate. The programme and its accompanying workbook were mailed to all of the experts and a deadline was given for feedback.

Table 2: A summary of the qualifications and experience of the expert practitioners

Profession	**Qualification**	**Suitability to give feedback**
Educational psychologist	M.Ed (Psychology) (UP) HOD (UNISA) BA (Hons) (UP)	Professional practitioner specialising in work with children. Has expert knowledge on developmental psychology. Currently in private practice.
Educational psychologist	D.Ed (Psychology) Qualified as a Counselling Psychologist in 1986.	Professional practitioner, and an expert in the field of developmental psychology, with 10 years' teaching experience. Worked for 8 years at the University of Johannesburg, was a mentor for intern and community service psychologists, acted as the director of MEISA and has 22 years of experience in private practice.
Educational psychologist	Ph.D M.Ed (Counselling) B.Ed (School Counselling) M.Ed (Socio-ped) B.Ed (Socio-ped)	Professional practitioner specialising in work with children, with expert knowledge on childhood development. Has been in practice for the last seven years.

	BA (Ed)	
Educational psychologist	M.Ed (Educational Psych) HOD (US 2000) BA (Hons: Philosophy)	Professional practitioner with expert knowledge and experience of child development. Currently in private practice.
Dentist	A M.Sc (Dent) B.Ch.D	A clinical dentist, specialising in the field of public health.
Dentist	NDT B.Ch.D (Pret) B.Sc (Stell)	Professional practitioner, with several years of experience in private practice.

Data analysis

The data were analysed to determine children's level of knowledge of proper dental care. Descriptive analysis was used to organise, describe and interpret data obtained from the completed questionnaires. Firstly, the SPSS software programme (version 15) was used to organise data as frequencies in a spreadsheet format in relation to variables such as gender, age and total score obtained by the participants. This was done in accordance with Huizingh's (2007) suggestion that when the goal is to describe data, frequencies must be used. Cross-tabulations were computed to indicate the relationship between age, gender and the score obtained by the participants. Descriptive analysis of the data provided the researcher with baseline data and insight into the situation. A literature control was used to verify the findings. A qualitative method of data analysis was used to describe the expert feedback received. Babbie and Mouton (2002) describe the primary goal of qualitative research as to rather describe and understand phenomenon than to merely explain it. The researcher aimed to understand the whole by reading through all the feedback received from the experts, then compiling a list of topics that emerged, finding the most descriptive wording for these topics and then grouping the different topics together to show how they are interrelated (De Vos, 1998).

Ethical aspects

Ethical aspects were adhered to, as stipulated by the American Psychological Association (2002). These included: obtaining institutional approval for conducting the research; only conducting research that was within the boundaries of the researcher's competence, based on education, training and supervised experience; minimising harm where it is foreseeable and unavoidable; obtaining informed consent after informing all of the participants about the purpose of the study, the expected duration and procedures involved; and lastly, not fabricating any data.

RESULTS

Baseline data of children's knowledge and awareness

Contextual understanding

A baseline assessment involves analysing needs and assets, identifying a problem and then examining relevant research, knowledge and experience. The findings of the baseline assessment are the following:

Table 3: Baseline assessment

Gender	**Age**		**Total**	**Score Categories (max: 18 points)**			**Total**
	5 years	6 years		5 to 9 points	10 to 14 points	15 to 18 points	
Girls (n)	21	12	**33**	8	21	4	**33**
Boys (n)	14	5	**19**	8	8	3	**19**
Total	35	17	**52**	16	29	7	**52**

Data analysis

Descriptive analysis was used to make sense of data received through the questionnaires. Overall, table 4 shows a moderately high level of knowledge regarding proper dental care based on the frequencies in the category 10-14. Table 4 shows that gender may be related to the score obtained by the children. For example, there is much wider variation in the spread of scores among the girls compared to the boys. Secondly, the score category 10-14 among girls has the highest frequency compared to the boys.

Table 4: Score categories and gender of respondents

	Score categories			
Gender	5 to 9	10 to 14	15 to 18	Total
Girls	8	21	4	33
Boys	8	8	3	19
Total	16	29	7	52

Age and gender were cross-tabulated to see whether a relationship existed between these two variables. Table 5 shows that there were more participants in the age group of five years than in the six years group. The table also shows that there were more females than males in these two age groups.

Table 5: Cross-tabulation of age and gender

	Age		
Gender	5	6	Total
Girls	21	12	33
Boys	14	5	19
Total	35	17	52

Overall, table 6 shows that both age groups obtained moderate scores, taking into account that there were more participants in the five year age group. Needless to say, the score category 10-14 had the highest frequency, indicating a moderate level of knowledge.

Table 6: Score categories by age

Score categories	Age		Total
	5	6	
5 to 9	11	5	16
10 to 14	20	9	29
15 to 18	4	3	7
Total	35	17	52

The data indicate a possible need for a programme focusing on the different aspects of proper dental care to facilitate increased knowledge and awareness of proper dental care. The majority of the participating children obtained moderate scores on the questionnaire indicating that they have had some exposure to basic dental care. Questions 1, 6 and 7 of the questionnaire were answered correctly by most of the participants, whereas questions 3, 4, 5 and 8 proved to be more of a challenge, as few of the children obtained a perfect score of two points on these questions.

Results also indicate that the girls on average scored higher on the questionnaire than did the boys; however, it needs to be taken into account that there were more female than male participants. There were also more children aged five years than children aged six years. However, both of these groups obtained moderate scores on average. The data suggest that although children are aware of the importance of proper dental care, a lack of knowledge is still evident, considering that the majority of the children scored moderately even though most of the questions focused on very basic aspects of dental care.

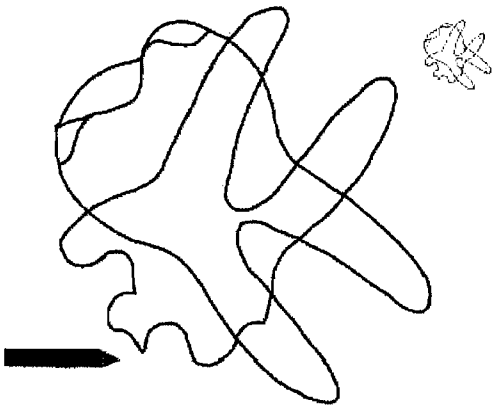
Development of the programme

According to Royse et al. (2006), a programme is an organised collection of activities designed to reach certain objectives and to solve an identified problem. Zuber-Skerritt (1996) suggests that programmes are designed to bring about practical improvements, innovation, or change in social practices, or the development of new practices. Reason and Bradbury (2006) add that research should contribute to wider practical knowledge and should improve wellbeing. The main objective of the baseline assessment was to identify the areas in which children demonstrate a lack of knowledge of the basic areas of dental care organise and to then these aspects into sessions that would ultimately constitute a dental care programme to promote children's knowledge and awareness of proper dental care.

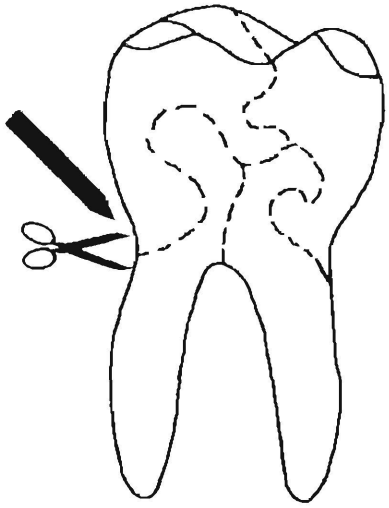
Rationale for the programme

The programme was based on Piaget's model of cognitive development and involves children on an experiential level. Several factors were taken into account in the programme's development. Firstly, all activities are focused on the individual child and involve the child on a personal level. The function of this is so that the child can better understand and relate to the information, since children are relatively egocentric during this developmental phase (Ginsburg & Opper, 1969). It is also important that the learning environment supports the activity of the child. It should be an active, discovery-oriented environment (Silverthorn, 1999). Discovery learning and supporting the developing interests of the child are two primary instructional techniques. Huitt and Hummel (2003) recommend challenging the child's abilities without presenting material or information that is too far beyond the child's level. Children in the pre-operational phase are not yet able to conceptualise abstractly and need to engage in concrete physical situations for effective learning to take place. Therefore, a wide variety of concrete experiences help the child learn better, as does learning through direct experience (Ginsburg & Opper, 1979; Vasta, Miller & Ellis, 2004).

The most important setting for young children is their family. It is therefore essential to take into account the value of parents' involvement in contributing to an effective intervention. The involvement of one or more of the child's primary caregivers is of crucial importance and is emphasised in the programme, since its activities may be most effective when caregivers participate in them with their children. Through the creative games and activities in the programme, children can learn effectively and enjoy themselves at the same time.



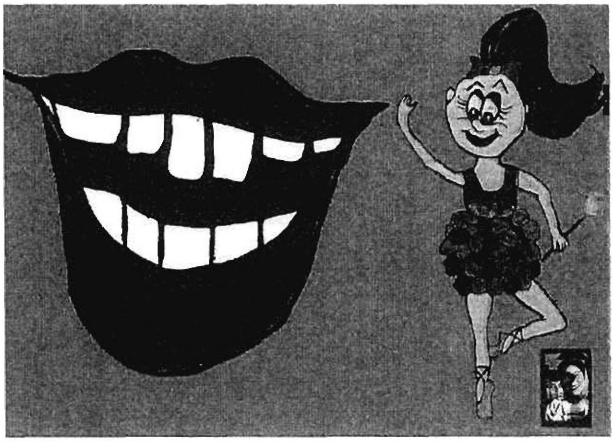
The child needs to identify the healthy tooth and colour it in as indicated by the icon (crayon). This activity draws on the child's ability to distinguish between foreground and background, an important ability learnt in this developmental phase.



This is one of the activities where fine motor skills are challenged, a skill children become more familiar with during this phase. The child is expected to color the tooth and then cut it into different pieces making his/her own puzzle, as again indicated by the icons.

Figure 2: Age-appropriate activities included in the first session of the programme

Since children believe in animation during this phase of their development, the use of animated characters allows children to relate more easily to the content of the session, and makes the learning process easier. As such, the programme incorporates the plaque monster, Olgar, who is portrayed as an evil character, and the friendly fluoride fairy, Flora (see figure 3).



In this activity the child needs to thread floss through each of the teeth in the top row. As indicated by the icon the help of a parent is needed. The child's fine motor abilities, as well as visuo-spatial abilities are challenged, abilities that need to be challenged in order to develop satisfyingly during this developmental phase. The use of a character (Flora Fluoride) makes it easier for the child to identify with information given in this particular session.

Figure 3: An age-appropriate activity in session 6 of the programme

Stories and songs are also used to introduce new concepts. These capture children's imagination and

help them to identify with the characters. Songs and rhymes are repetitive by nature and create a positive atmosphere for learning to take place, without the child even realising it. Attention was also given to perceptual experiences and fantasy. A new concept is first visually presented to the child (for example, showing them a model tooth, or a picture of a tooth) and is then followed by a physical activity or game to strengthen the new concepts learned (for example, they are given the opportunity to touch the instruments the dentist uses). Another activity involves describing the process of tooth decay to the child by making use of fantasy characters such as Olgar, the plaque monster, since the use of characters makes it more interesting and stimulating. The children learn how Olgar eats away at our teeth the moment he gets the chance, and are told that they have to stop him. The information is then made more concrete and relevant by playing a game where a few Olgar plaque monsters are made to stand upright in the room and the child has to knock them over by rolling the ball towards them. The programme can be used for an individual child at home or groups of children at school. The importance of social contact and interaction in groups is emphasised as it aids cognitive development in this developmental stage (Ginsburg & Opper, 1969).

All information, activities and games included in the programme had to be age-appropriate, since a new experience will only be beneficial if the child can make sense of it. Activities and information that is too far beyond the child's level is unlikely to have an impact. However, the activities had to be challenging enough to provide disequilibrium and thereby promote the process of learning (Vasta, Miller & Ellis, 2004).

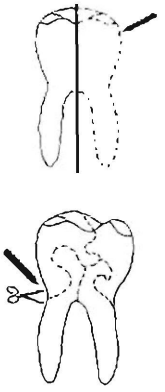
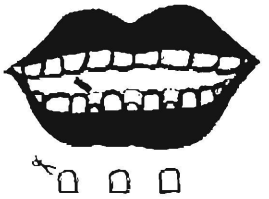
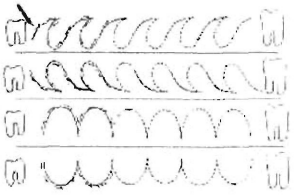
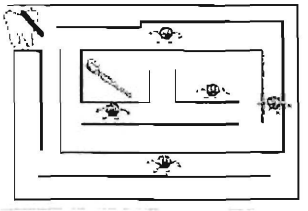
Organisational aspects of the programme

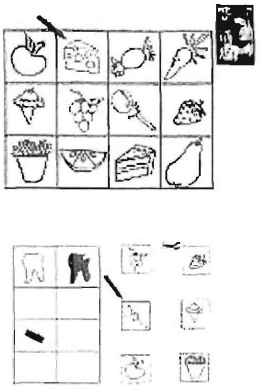
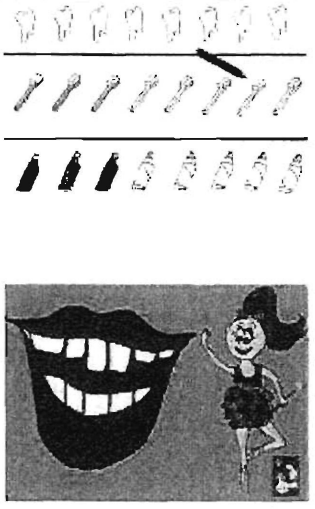
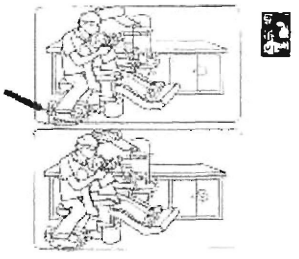
The dental care programme consists of seven sessions. The duration of each session does not exceed 25 minutes. This is appropriate for children within this age group, according to Piaget (cited in Brookes, 2004; Ginsburg & Opper, 1979; Vasta, Miller & Ellis, 2004), since children in this developmental phase cannot concentrate effectively for longer than this. When the programme is presented in groups, such as in a preschool setting, the presenter must adhere to certain criteria, including being flexible, approachable, always acting in the best interest of the child, being adequately informed on proper dental care, being able to adjust to the different needs expressed by the different age groups, being creative and entertaining in the presentation of the programme, and so on.

Content of the programme

Sessions focus on the healthy tooth, loss of primary teeth, the importance of primary teeth and development of permanent teeth, the process of tooth decay, diet, different ways of caring for teeth, and visiting the dentist. The programme consists of a number of activities that the children engaged in as part of learning about proper dental care. These activities are summarised in the table below.

Table 7: A summary of the content of the dental care programme

Session	Specific focus of the session	Goals of the Session	Examples of activities in the session
Session 1	The healthy tooth	- be familiar with the form and different parts of the healthy tooth - be familiar with the characteristics of the tooth - be introduced to Super Tooth	
Session 2	Loss of primary teeth	- be aware that primary teeth fall out and permanent teeth grow in their place	
Session 3	The importance of primary teeth and development of permanent teeth	- be aware of the importance of primary teeth for the development and growth of healthy permanent teeth	
Session 4	The process of tooth decay	- understand the basic process of tooth decay - be introduced to Olgar and Suurknol, the plaque monster and bacteria - be motivated to take care of his or her teeth	  OLGAR

Session 5	Your diet	- understand the role diet plays in taking care of teeth - understand why it is important to eat healthily to prevent tooth decay	
Session 6	Different ways of caring for your teeth	- be aware of the importance of brushing teeth - know how many times a day to brush teeth and the correct way of doing it - be introduced to Flora, the fluoride fairy who teaches the importance of fluoride, flossing and other ways of caring for teeth	 FLORA
Session 7	Visiting the dentist	- understand the helping role of the dentist - be familiar with the dentist's instruments their functions	

Programme evaluation

The purpose of evaluating a programme is to make judgments of merit or worth, to improve a programme or to generate knowledge, and is an essential part of programme development (Payne, 1994). Royse et al. (2006) discuss formative evaluations that serve as a guide to direct programmes, and particularly new ones. This means that the evaluations of the experts are used to 'form' the programme, because they

provide important information for the 'fine-tuning' and further development of a programme. Programme evaluation integrates research and practice skills, in other words, ideas-in-action.

Programme evaluation is needed whenever a new intervention is tried and when it is not yet known whether the intervention will be successful; or if certain aspects of the programme need to be adjusted or improved. It is therefore important to receive objective feedback concerning the relevance and worth of the programme (Royse et al., 2006). Programme evaluation formed a critical component of this study. Feedback received from the professional experts regarding the programme was the following:

Table 8: Summary of the feedback from the experts

Topic	Evaluation of professional experts
The questionnaire	According to all of the experts, the questionnaire used to obtain baseline data was accurate and adequate to obtain the relevant information from the children. Questions were judged to be appropriate for the specific age group [*Die vrae is relevant vir hierdie ouderdomsgroep*]. It covered all of the relevant areas to determine children's basic awareness and knowledge of proper dental care [*Die vrae dek al die basiese areas vir 'n navorser om die kind se algemene kennis oor tandversorging te kan peil*"]. The questions were found to be formulated in language that was simple enough for children in this age group to understand [*Dit is in eenvoudige taal en die illustrasies verhelder ook konsepte wat sommige jong leerders nog nie baasgeraak het nie*]. The experts felt that by giving three possible answers to a question, the researcher obtained greater insight into the level of the children's knowledge of dental care, and thereby has a clearer picture of what is lacking in their understanding [*Die drie opsies waarbinne 'n vraag beantwoord word, bied die navorser ook insig in die vlak van algemene kennis eerder as net 'n JA/NEE antwoord*]. However, some of the experts found that the level of vocabulary in the questionnaire was not always consistent [*Die vlak van woordeskat*

	gebruik in die vraelys is nie konsekwent nie. 'Kossies' kan m.i. nie op dieselfde vlak gereken word as 'versorg' nie].
Overall appearance and presentation of the programme	The appearance and presentation of the programme was considered impressive [*Die voorkoms en aanbieding van die program in geheel is baie goed*]. The content and overall presentation was found not only to be relevant, but also fitted with the experiential world of the child in the specific age group [*Dit is op die ontwikkelingsvlak van die kind en behoort die aandag van die kind vir 15 tot 20 minute te kan behou*]. The use of bright and friendly colours was found to be very inviting. The experts felt that it had just enough detail, not too much, to tickle the child's curiosity and interest [*Die aktiwiteitsboekie is baie effektief as gevolg van die eenvoud." "Die voorkoms in terme van die voorblad lyk kindervriendelik en die helder blou kleur is aantreklik." "Dit is kleurvol, het nie te veel detail nie en nooi die kind uit om deel te neem*]. Some of the experts felt that the presentation of the programme could be even more structured to make the presentation and implementation thereof even easier [*Ek hou van die formaat van die program met die spesifieke afdelings, maar die aanbieding daarvan kan verder vergemaklik word met groter struktuur*].
Relevance of the programme and its activities for the specific age group	The experts felt that the programme was well thought through and underpinned by a sound theoretical model [*The project is well thought out and is underpinned by a sound theoretical model*]. The programme was considered stimulating and relevant to the specific age group [*Die geskiktheid van die program en aktiwiteite vir die betrokke ouderdomsgroep is wel van toepassing." "Die aanbieding in terme van die illustrasies en teken/skryf aktiwiteite is ouderdomsgepas vir die vyf tot sewe jarige*].

The experts considered the activities included in the programme to be creative and stimulating in nature [*Die aktiwiteite wat die student aanbied is baie goed!" "Die aktiwiteite pas by die lewenswêreld van kinders*].

Some experts commented on the wide variety of activities focused on stimulating the various areas of development of a child in this age group, and how the varying degree of difficulty in the different activities accommodates children of the same age who may be at varying levels of development [*Die sessies bevat 'n goeie variasie van verskillende motoriese, visuele, en hand-oogkoördinasie aktiwiteite. Hierdie aktiwiteite dek die basiese vaardighede wat verwag word van 'n 7-jarige kind om te begin bemeester in sy gereedheid vir formele onderrig." "Die aktiwiteite varieer in moeilikheidsgraad, wat verskillende vlakke van ontwikkeling akkommodeer binne 'n groep van jong leerders*].

One expert felt that the use of characters in the programme (see figure 4) would make it easier for children to identify with the content of the programme, and would contribute to the overall process of learning, ultimately leading to increased knowledge and awareness of proper dental care [*I like the use of characters as well as the games to anchor the lessons*].

Figure 4: Olgar – one of the fantasy characters in the programme

The games and stories used were seen as "a way to anchor the lessons", but some of the experts advised using as simple language

	as possible in the stories and instructions to the games to fit with the development of a child within this age group [*Met die teikengroep in gedagte, is dit goed om so 'n eenvoudige sinskonstruksie moontlik te gebruik*]. Considering that it is important to not overstimulate children, the experts found that the content and activities of this programme were simple enough to hold the attention of children in this age group and not overwhelm them. Parents' involvement was considered crucial and was emphasised throughout the programme. Some activities had an icon suggesting that a grown-up was needed to complete an activity (see figure 5).  Figure 5: The "Ask your mommy" icon used in the programme The programme was distributed in electronic format, rendering it is made more attractive and convenient for the modern parent and child [*Die program se aanbieding op CD maak dit meer toeganklik vir die moderne ouer, eerder as nog 'n swaar boek wat iewers gebêre moet word*].
Suggestions for the adjustment and improvement of the programme	Children between the ages of five and seven years can lose their teeth at any time, even before the age of five years. Children need to identify with the information given, both to prepare them for loss of primary teeth and to explain the process of losing primary teeth and the importance thereof. In other words, the emphasis needs to shift according to the specific age. One expert suggested that sketches, rather than photos, of the dentist's instruments be used to help the child identify with them. This is because photos might look quite frightening, as they look as if they could hurt someone (see figure 6),

and the expert raised her concern that children might develop a fear for the dentist and dental instruments because of it [*Ek sal voorstel dat daar by die laaste sessie oor die instrumente, eerder gebruik gemaak word van sketse om die intsrumente voor te stel. Byvoorbeeld die JSAIS se boekies bestaan uit sketse sodat die kinders makliker met die leerstof kan identifiseer. Die instrumente lyk asof dit mens kan seer maak. Gedurende die intuïtiewe ontwikkelingsfase het baie kinders te doen met kindervrese wat meestal normaal is, maar ons wil tog nie vrese veroorsaak nie*].

Figure 6: Photos of the dentist's instruments

Certain activities are indicated as activities where the child can work independently as the icons are self-explanatory. However, some experts felt that a child of five years might miss out on a valuable learning experience if parents are not involved in the process [*Dit sê dat die kind onafhanklik kan werk. Dit is nie heeltemal my ondervinding met die deursnee vyfjarige nie. Ek dink dit kan juis bydra tot 'n leerervaring as die ouer 'n ogie hou*].

When the programme is presented to a group of children, for example in a school setting, it is important to take into account potentially damaging activities, such as where the children are asked to look at their own and each other's teeth (session one). Children with dental decay or halitosis may feel embarrassed or self-conscious, although these are the children who may need the most urgent intervention. A referral system needs to be in place for children with dental decay, so that it can be attended to by the necessary practitioners. This should preferably be a dentist known to the community and to the school.

The following suggestions were included to refine the programme. The language used in the programme was changed to be more consistent. Some of the words that were not as developmentally appropriate as

most other terms used were replaced. Examples include changing "versorg" *(tend)* to "vir jou tandjies omgee" *(care for your teeth)* and changing "primêre tandjies" *(primary teeth)* to "melk tandjies" *(milk teeth)*.

Another suggestion was to add more structure to the programme manual, especially when it was presented to a group of children. Adding more structure to the programme would make it easier for the facilitator to effectively teach children about proper dental care since there would be more guidelines to ensure that all the necessary information is included, and that the presentation follows a logical order. However, the programme presenter would still have to be creative and flexible to prevent the presentation from becoming mechanical and losing its spontaneity.

The researcher considered using sketches of the dentist's instruments instead of photos, as suggested by one of the experts. Exchanging the photos for pictures would make the instruments look harmless and friendly. However, the original reason that photos were chosen was so that children could recognise the actual instruments when they were presented to them during the session. It was therefore decided to retain the photos and to rather introduce the instruments with humour and animation to prevent a possible fearful reaction when children are confronted with the instruments in the dentist's office.

For the intervention to be a success, it is crucial for parents to be involved. Some of the activities are indicated as activities that the child can complete independently. However, the manual should pertinently state that parents should start the sessions with their child and sit with them whilst they complete the activity by themselves. The aim is for the child to learn about proper dental care by completing the activities in a goal-directed manner, and not just aimlessly. Parents should constantly reflect on what the child has learnt up to that point to ensure the success of the intervention.

DISCUSSION

It has been proven that preventive dental care contributes to the overall health of children. Insight into human behaviour is often helpful in preventive primary health. The present study recognised that psychology could make a worthwhile contribution to preventive dental care on an interdisciplinary level. The study focused on developing an age-appropriate programme that aimed to increase children's knowledge and awareness of proper dental care. The programme was specifically developed for children between the ages of five and seven years and was based on Piaget's cognitive development theory. The relevance and appropriateness of the programme can be ascribed to a number of factors, two of which appear to have played a significant role in the outcomes of this study. First, the baseline assessment and thorough literature investigation produced valuable information that was used to make critical decisions regarding the content of the programme. Second, the use of age-appropriate material during the programme design ensured that the programme would be relevant and stimulating for the target age

group. Although found to be creative and stimulating in nature, professional experts in the field offered suggestions to further adjust and refine the programme. These suggestions were considered by the researcher and the necessary adjustments were made to ensure the effectiveness of the intervention.

Limitations of the study

There are some important limitations in this study. Firstly, only children of an average to above-average socioeconomic status are represented in the study. The study can therefore not be considered representative of the whole community, since these children have probably been to visit the dentist and have heard of ways to care for their teeth, whereas children from more rural areas, where access to healthcare services is limited, are possibly not as aware of the importance of dental care. The baseline assessment was therefore not an accurate representation of the average child's knowledge and awareness of proper dental care.

Secondly, only Afrikaans-speaking children participated in the study, which does not provide an accurate representation of the average South African child's knowledge and awareness of proper dental care across different cultures. Aspects that should be taken into consideration are that this programme would only be effective in collaboration with basic dental services, enhancing their effectiveness and ultimately leading to overall improved dental care. Therefore children and their parents require access to these services, as well as access to toothbrushes, toothpaste, and so on. The programme will also have to be affordable and accessible to the families or communities.

Furthermore referral systems for children with dental problems need to be in place so that the adults involved in the process can act in the best interest of the children and refer them and their parents to appropriate medical or dental intervention. For example, the programme presenter may refer the child to his or her teacher, the teacher would refer the child to the school nurse and the school nurse would refer the child to either his or her parents or to a known community dentist.

Recommendations

Recommendations for further research are to apply the various suggestions made in this study to the programme, and to then determine the efficacy of the programme by implementing it in the community. The programme's impact could be measured by identifying a possible increase in children's knowledge and awareness. A constant evaluation of the programme is necessary throughout the development process to eventually implement an intervention that is appropriate and effective.

CONCLUSION

Tooth decay has been identified in many studies as a persisting health problem among children, although it is entirely preventable. This study identified a need for a programme aimed at increasing children's

awareness and knowledge of proper dental care. Piaget's model of cognitive development was used as the foundation for developing a programme. Piaget's model was used since the level of development of the identified age group was considered to be critically important in teaching children the basic aspects of proper dental care through information and activities that are stimulating, creative and challenging to the child. Evaluation of the programme by specialists in the fields of developmental psychology and dentistry indicated that the programme seems to be a well-designed intervention that could contribute positively to addressing the problem of tooth decay and other dental health problems among children. Suggestions were made for adjustments to the programme in certain areas to make it more appealing to children and to increase its appropriateness and relevance. Since interventions need to be in the best interest of the client, the programme requires additional adjustments based on these recommendations, to ensure that all information and activities contribute to the wellbeing of the client. Through this process of development and evaluation, this intervention may be a suitable companion in the attempt to address dental care among children

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