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# Correlations of IQ scores and a pupil rating scale with plaque removal before and after the 1979 National Dental Health Week.

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*Keywords: IQ scores; plaque removal.*

## SUMMARY

*Correlations between the rated competence levels of pupils and plaque removal before the 1979 National Dental Health Week (NDHW) and improvements after oral health care instruction by a dentist during the 1979 NDHW were examined. No statistically significant correlations between IQ scores or the Pupil Rating Scale with plaque removal were found except for one class of Standard IV female pupils who showed a relatively strong correlation between total IQ score and plaque removal improvement 6 months after the 1979 NDHW. It is suggested that research should be directed towards clarifying background factors involved in dental and oral health care, thereby providing an indication for the character of more appropriate and effective preventive programmes.*

## OPSOMMING

*Korrelasie van berekende bekwaamheidsvlakke van leerlinge en plaakverwydering voor die 1979 Nasionale Tandheelkundige Gesondheidsweek, met verbeteringe daarin na mondgesondheidsvoorligting deur 'n tandarts gedurende dié week, is ondersoek. Met die uitsondering van een klas van standerd 4 dogters waarin 'n betreklik sterk verband tussen die totale IK-telling en verbeterde plaakverwydering 6 maande na die Gesondheidsweek waargeneem is, was daar geen statisties-betekenisvolle korrelasie tussen IK-tellings, of die Leerlingevalueringskaal, en plaakverwydering nie. Dit word aan die hand gedoen dat navorsing gemik word op die uitkenning en identifikasie van agtergrondfaktore betrokke by tand- en mondgesondheidsorg om sodoende riglyne te verkry vir meer doelgerigte en effektiewe voorkomingsprogramme.*

## INTRODUCTION

Plaque levels indicated by modified and unmodified patient hygiene performance scores (PHP scores) were recorded for Grade II and Standard IV pupils respectively. These scores were obtained prior to the 1979 National Dental Health Week (NDHW) and at 3 different consecutive time intervals thereafter (Jodaikin, 1981). Although there was a significant improvement in oral hygiene at 1, 3 and 6 months after the 1979 NDHW there was a steady decrease in the pupil's performance with time, a trend that was more prevalent amongst the male pupils in the different groups. During the course of this study a Grade II teacher who showed a keen interest in the PHP scores of her pupils noted that there may be a correlation between pupil intelligence and oral health care. As such information could facilitate the development of future preventive programmes this hypothesis was tested by correlating various competence levels of Grade II and Standard IV pupils with their modified and unmodified PHP scores before the 1979 NDHW and with the change in plaque removal at the 3 different time intervals after the 1979 NDHW programme.

## METHOD AND MATERIALS

Plaque levels for middle class white English-speaking pupils were recorded prior to the 1979 NDHW and at 1, 3 and 6 months thereafter at a Boksburg primary school (Jodaikin 1981). The plaque levels of 46 Grade II and 47 Standard IV pupils were recorded by using modified and unmodified PHP scores (Podshadley and Haley, 1968; Jodaikin 1981). The improvements in plaque removal after 1, 3 and 6 month intervals and the PHP scores before the 1979 NDHW of the Standard IV pupils were correlated with their verbal, non-verbal and total standard Transvaal Education Department IQ scores, which were obtained from the pupil's school. The reason for not having used similar scores for Grade II is because the school IQ tests had not yet been conducted on the Grade II pupils. As some young children have deficiencies in learning which distinguishes them from others in their group, methods for identifying these children's learning disabilities at an earlier stage have been developed. Although these competence level gauges do not necessarily indicate inferior potential or lack of opportunity to learn, the Pupil Rating Scale (PRS) as outlined by

*TABLE 1:* Correlations (Pearson's r) of Grade II pupils' plaque removal and pupil rating scales

| Plaque removal | Auditory | Spoken Language | Orientation | Motor | Personality | Verbal | Non-Verbal | Total |
|---|---|---|---|---|---|---|---|---|
| Before 1979 NDHW | 0,11 (p = 0,23) | 0,04 (p = 0,40) | 0,00 (p = 0,50) | 0,12 (p = 0,21) | 0,04 (p = 0,40) | 0,08 (p = 0,31) | 0,03 (p = 0,41) | 0.06 (p = 0,34) |
| Improvement 1 month after 1979 NDHW | -0,14 (p = 0,17) | -0,13 (p = 0,19) | -0,08 (p = 0,31) | 0,01 (p = 0,48) | -0,10 (p = 0,26) | -0,14 (p = 0,17) | -0,06 (p = 0,35) | -0,10 (p = 0,25) |
| Improvement 3 months after 1979 NDHW | -0,04 (p = 0,39) | -0,01 (p = 0,47) | -0,10 (p = 0,26) | 0,04 (p = 0,39) | -0,02 (p = 0,44) | -0,03 (p = 0,43) | -0,03 (p = 0,42) | -0,03 (p = 0,43) |
| Improvement 6 months after 1979 NDHW | 0,04 (p = 0,39) | -0,02 (p = 0,45) | -0,02 (p = 0,46) | 0,05 (p = 0,36) | 0,04 (p = 0,41) | 0,01 (p = 0,47) | -0,01 (p = 0,48) | 0,02 (p = 0,45) |

Myklebust (1971) has been used for this study as it was readily obtainable and may provide useful data for the Grade II pupils. The PRS determines auditory comprehension and spoken language (as determined by the pupil's teacher) which together constitute the verbal score. Similarly the orientation, motor co-ordination and personal-social behaviour scores constitute the non-verbal score which together with the verbal score provides a total score value. The modified PHP scores before the 1979 NDHW and the plaque removal improvements after 1, 3 and 6 month intervals of the Grade II pupils were correlated with scores obtained from the PRS.

The data was recorded on computer cards and Pearson Correlation Coefficients were determined using an IBM 370/158 computer and the Statistical Package for the Social Sciences (Nie *et al* 1975).

## RESULTS

The highest positive correlation of all the Grade II and all the Standard IV groups was the improvement in the Standard IV pupil's plaque removal scores at the 3 month time interval when correlated with their verbal IQ scores (Tables 1 and 2). Although this was not significant, Standard IV pupils with higher verbal IQs tended to have better plaque removal scores than those with lower verbal IQ scores and higher non-verbal IQ scores at the three-month interval (Table 2). This trend was however not apparent at the 1-6 month intervals (Table 2) nor when the Grade II pupils' plaque removal scores were correlated with their verbal IQ scores (Table 1). Negative correlations were evident for many of the resultsobtained for the Grade II pupils when plaque removal improvement was considered. These and all the other correlations which were calculated between the PHP scores prior to 1979 NDHW or improved PHP scores and the sub-scales of the PRS or IQ scores of the Grade II and Standard IV pupils respectively, demonstrated no significant relationships (Tables 1 and 2).

When subgroups which included parameters such as teacher, sex and education levels were analysed separately, no r values greater than 0,6 were found except for one class of ten Standard IV female pupils who had a value of r = 0,71 which was significant ($p < 0,01$) when plaque improvement 6 months after NDHW was correlated with total IQ scores.

As the PRS motor co-ordination scores are comprised of 3 criteria, namely general co-ordination, balance and manual dexterity the latter parameter was also analysed separately and no statistically significant values were found, the r values being less than 0,4.

*TABLE 2:* Correlations of Standard IV pupils' plaque removal and IQ Scores

| Plaque Removal | Verbal IQ | Non-Verbal IQ | Total IQ |
|---|---|---|---|
| Before 1979 NDHW | 0,09 (p = 0,28) | -0,08 (p = 0,29) | 0,01 (p = 0,46) |
| Improvement 1 month after 1979 NDHW | 0,08 (p = 0,29) | 0,07 (p = 0,31) | 0,06 (p = 0,35) |
| Improvement 3 months after 1979 NDHW | 0,22 (p = 0,07) | 0,10 (p = 0,25) | 0,21 (p = 0,08) |
| Improvements 6 months after 1979 NDHW | 0,02 (p = 0,46) | 0,04 (p = 0,41) | 0,07 (p = 0,33) |

## DISCUSSION

The overall lack of significant correlation at different time periods points to the possible unimportant role played by the various dimensions measured by the PRS and IQ scores in explaining all the pupil's altered dental health care patterns when sex and teacher are not considered. It is possible that if more parameters are considered, such as other competence level tests and population groups, relevant trends could become apparent. This is illustrated by the reasonably high correlation of plaque improvement with total IQ scores of a female group of Standard IV pupils. Thus factors related to teachers could be very important in affecting oral health care patterns especially in older female pupils. This may be supported by the findings of a similar group of female Standard IV pupils (taught by a different teacher) who had a very low negative r value which was not significant. More studies in this area are needed as well as investigations into why the behaviour of female and male pupils differ with regard to oral care. Findings from these types of studies may allow designers of future preventive programmes to influence male pupils more effectively.

The only Grade II PRS characteristic which always showed a positive correlation albeit not significant, was the motor scores. Although this trend could be predicted it is surprising to find that there is not a stronger correlation even when manual dexterity was considered separately. Perhaps this reflects an inadequacy of the PRS

motor score which was assessed by the pupil's teacher or a lack of know-how on the part of the Grade II pupils.

The general trends that were evident were towards a decreased correlation over time, which reinforces a notion that superficial learning did take place as a result of the 1979 NDHW programme but that this tended to be of a temporary nature except in the case of female Standard IV pupils, especially those with higher IQ scores and appropriate education. Investigations using larger numbers and other sub-groups of subjects may substantiate this notion and lead towards understanding variables such as sex, education level, teacher and competence levels in greater depth. It may be advantageous for designers of future preventive programmes to consider motivation factors for teachers, verbal and non-verbal aspects, especially motor dimensions. However, before this can be done more appropriate research into sociological, psychological, education and dental facets is needed. Unlike many other scientific disciplines data cannot always be drawn from an international pool because of important unique South African parameters which include family frameworks and educational systems. This stresses the need for local research which can be used to design more effective preventive programmes.

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