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An investigation of the fear responses of children in the dental situation

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and he may therefore think that if his mother is afraid then clearly there must be something to fear.

In so far as these verbalisations of the mother express her unfavourable attitude towards, and fear of, the dental situation, it is likely that her child may respond by developing similar attitudes and fears. Since her feelings are expressed openly and directly, and in a manner which her child can readily understand, it is suggested that she may be projecting her own fearfulness into a situation which the child may not have originally perceived or considered fearful.

It is interesting to note that this kind of situation has a parallel, but in a slightly modified manner. It has been observed by the investigator of the present study that children entering the dental situation for the first time, and exhibiting no apparent overt fear, have subsequently shown fearfulness in response to such mother statements as "..... don't worry, it's not going to hurt", or "..... this doctor won't hurt you." Although the mother is not necessarily verbalising her own fears, these statements do suggest that the situation into which the child is about to find himself may be fear-evoking because of the reference made to pain. Fearfulness in the child in some cases emerged almost immediately in response to the statements made by the mother.

It is hypothesised then that the mother by projecting her own fears into what, for the child, is an otherwise innocuous situation and/or drawing his attention, albeit in a seemingly reassuring manner, to a potentially painful and therefore fearful situation, may be the agent of her child's fearfulness.

Hypothesis 4

Children who have had dental experience of a traumatic nature are more likely to be fearful than children whose dental experience has been non-traumatic.

A traumatic experience is any experience to which a subject may respond with a high degree of intensity of negative emotion, such as fear and anxiety, and where the effects of such an experience may lead to reactions of a similar nature in the future. In the dental situation, pain (either its direct experience or its anticipation) seems to be in certain instances a central feature of what may constitute a traumatic experience. Since certain dental procedures are at times painful, it would not be unreasonable to expect, therefore, to find some patients fearful of the dental situation. A brief questioning of patients who show fear often elicits a history of trauma and many patients in an

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attempt to explain or justify their fears will volunteer information relating to past experiences which they have considered traumatic.

Although this information is subjective in nature and relies upon the memory of the subject, the investigator of the present study has little option but to accept it, since there are no other means whereby this may be obtained. On the basis, however, of the subject's present fear, which is often overt and observable and what he says about past dental experience which he (the subject) has considered traumatic, it is suggested that there is a link between previous traumatic dental experience and fear of the dental situation.

This is substantiated by a proposition which may be deduced from the postulates of learning theory. The results of the work of Watson and Rayner (1920) on the formation of conditioned emotional responses which may include fear of the dental situation, seemed to show conclusively "..... that directly conditioned emotional responses .. persist, although with a certain loss of the intensity of the reaction, for a longer period than one month. Our view is that they persist and modify personality throughout life."

CHAPTER IV

MEASUREMENT OF VARIABLES

A) FEAR

Jersild (1968) states that "..... fear, as is anxiety, is a personal experience and in the life of the individual these are uniquely embedded in his own particular life history. But it also has symptoms and manifestations." This has led psychologists to measure fear in terms of what are regarded as some of its specific manifestations. Gesell (1929), for example, points out that a child in a particular situation (in this case, being confined in a small pen), "..... responded by vigorous crying and that this reaction may be described as fear or fright."

Further, items in the "Children's Manifest Anxiety Scale", devised by Castaneda, McCandless and Palermo (1956), a scale which includes such items as: it is hard for me to keep my mind on anything; I get nervous when someone watches me work; I am secretly afraid of many things; my hands feel sweaty; my feelings are easily hurt; I blush easily; indicate that the generally held view of the anxiety syndrome, which has psychological and behavioural components, also has a physiological component. This is also true of fear, and any measurement of fear must take both the physiological and psychological factors into account. Since fear itself cannot be measured, attention is turned to what are believed to be its manifestations within the context of the stimulus or stimuli which evoke it. Thus, referring again to Gesell's example - "a child of 32 weeks placed in a small pen responded after a while by crying." We infer that the stimulus of being confined in a restricted space gives rise in a child of that age to fear, which is expressed by crying; and it is the crying response to which we turn our attention.

METHODS OF MEASURING FEAR

1. Interviews

Subjects may be interviewed and be asked to state what kind of fears they have and the intensity with which they experience them. These may then be compared with observations and ratings of other persons closely associated with the subject.

Since, however, the subject is not directly experiencing a fearful situation, there may in fact be a significant discrepancy between what he really feels and what he says he feels when asked to recall it. If his

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behaviour is observed and rated, it is likely that the discrepancy between the ratings of two or more observers may differ to a degree sufficient to render the results inaccurate. This is pointed out by Jersild and Holmes (1935), who state that "..... information based on live episodes is probably more authentic than information gained from interviews, which call upon mothers to report in terms of their recollections of past incidents of fear." An added point which is made is that when mothers were asked to recall their children's fears, they (the children) may have had fears which the mothers did not notice.

2. Fear Records and Self-Reports

In the classic investigation on children's fears by Jersild and Holmes (1935), one method of obtaining data was to ask mothers to keep records of fears they actually observed in their children's daily lives. Information based on their observations were then set down in anecdotal reports. These reports also included fears openly expressed by their children. A number of interesting discrepancies emerged which have since been confirmed by Lapouse and Monk (1958) and Lazar (1963). In the former study, it was noted that mothers "..... frequently reported a child having fewer fears and worries than the child himself reported." In Lazar's study, children were asked to report about their own fears in response to a questionnaire containing a list of 24 "fears and worries". They were then questioned about how they thought any other specified child would respond to the same questions. Mothers were also asked to indicate whether or not their children exhibited the fears stated on the list.

Lazar concluded as follows: "..... there was more correspondence between the fears the children themselves reported and the fears attributed to them by other children than between the fears reported by the children themselves and the fears attributed to them by their mothers." A further interesting point emerged. This was regarding the nature of the fears which mothers do, or do not, detect in their children (as reported by the children themselves).

Lazar stated "On the whole, parents are more likely to agree with their children's accounts of their fears in connection with objective or practical conditions, such as thunder and lightning, doctors, dentists, tests and examinations, ... Parents are likely to underestimate, or not to notice, children's fears of a more subjective nature."

This also implies, therefore, that self-reports used as instruments to measure fear are not sufficiently refined or sophisticated to tap the subtle underlying factors which influence an observer's perceptions of the fears of others - particularly when mothers are observing and reporting on their children.

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3. Measuring Scales and Questionnaires

As has been previously mentioned, fear and anxiety are personal experiences, which, while they cannot be tapped directly, show certain symptoms and manifestations which are observable and measurable. It is to this end that certain measuring scales and questionnaires have been designed. One such scale, referred to earlier, is the Children's Manifest Anxiety Scale, designed by Castaneda, McCandless and Palermo (1953). A level of anxiety is indicated by the number of "yes" responses to the 42 items in the scale. Some of the items have been mentioned previously earlier in this section.

Two other scales for measuring anxiety have been prepared by Sarason, Davidson, Lighthall, Waite and Ruebush (1960). One is the General Anxiety Scale for Children (often referred to as the G.A.S.C.); and the other is called The Test Anxiety Scale for Children. The first deals with fears and worries in a variety of situations (e.g., fear of snakes, high places, going home alone at night, etc.), and the second, as its name suggests, touches specifically on children's reactions to tests and test-like conditions.

Jersild (1969) makes the following comments: "..... the prospect of getting a realistic view of a particular child's condition by counting his "yes" responses to a conglomerate of specific questions seems, off-hand, to be rather unpromising. ..... the measure of anxiety .. is not the number of items in a list of symptoms he happens to have. He might have many; he might have few; he might not even have any of those on the list. This may especially be the case of a test anxiety scale if we can trust autobiographical data offered by persons who claimed that they have used 'flight into the intellect' as a defence against anxiety (Jersild, Lazar and Brodkin, 1962). A bright anxious youngster may develop so effective a strategy of academic achievement that tests at school leave him quite undisturbed ... and that something more personal and threatening than a test is needed to evoke his anxiety."

To misgivings such as these must be added the weakness inherent in a test that asks a person to reveal himself. He might be forthright, or deny his fears; he might wish to co-operate, or not to. Theoretically, at least, the possible responses of an anxious subject being tested for anxiety may range from consistent defensive falsifications to abject acquiescence.

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Another form of questionnaire which is available, is the Fear Survey Schedule, devised by Lang and Wolpe (1964), otherwise known as the F.S.S. It has a list of 72 items, each one graded on a five-point scale. It is essentially intended for diagnostic and therapeutic use and relies upon the subject to recall and grade his fears in relation to the list of events, incidents, objects and situations. Because of this, it is subject to the hazards of self-report inventories previously mentioned, and therefore makes the reliability and accuracy of the F.S.S. somewhat questionable.

4. Physiological Measures

While emotions may be overtly expressed, they are also translated physiologically and, as such, fall under the control of the autonomic nervous system and those endocrine systems or processes which relate to it. Specific reference is made to the adrenal cortex and its secretion of adrenalin. Since these responses are governed by the autonomic nervous system, they are not influenced by the cerebral cortex of which they are independent and are therefore totally involuntary. As such, they seem to provide the most reliable data as "physiological indicators of psychological change" (Johnson and Dabbs, 1967).

A wide range of physiological systems is involved, which is able to give rise to responses which are accessible to reasonably accurate measurement. These include blood pressure, heart rate, respiratory rate, electrical conductivity of the skin, capillary dilatation, pupillary reflexes and sweat gland activity. A large variety of complex and sophisticated equipment has been devised to measure physiological responses and requires, therefore, the hand of a trained technician to use it. The need for an experienced technician may be one factor which may contra-indicate the use of such equipment in the dental situation, plus the fact that subject co-operation requires a minimum of movement, if not complete immobility. Immobility of the subject may not be possible for a patient undergoing dental treatment when a certain amount of movement usually occurs and may well be entirely impractical in the case of young children. The difficulty of obtaining subject co-operation may no doubt be due to the fact that children appear to be far more "movement prone" than are adults. It is likely, therefore, that if a G.S.R. machine were used to measure skin conductance of a young child, the likelihood of getting distorted and inaccurate readings is fairly high. It is also postulated that the presence of the machine itself, and the electrodes which attach to the patient, may act as an added fear stimulus.

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The biggest problem, however, is that, while physiological changes may be accurately measured, these measures do not tell us what psychological factors may underly the change. There can never be complete certainty, for example, that measuring this change in the dental situation is necessarily measuring fear - the underlying factors, assumed to be emotional, may show a wide range of variability and could include such emotions as anger, resentment and, rarely, pleasure (the author of the present study has in fact come across one patient who stated that he experienced sensations of pleasure while undergoing dental attention - he referred specifically to the sensations he experienced while his teeth were being drilled).

It seems, then, that physiological measures alone will not suffice to measure specific emotions. What is probably necessary is a combination of behavioural manifestations (as judged against previously constructed criteria), plus physiological measures occurring within the context of the stimulus situation. This combination would probably give a more comprehensive and accurate measure than if physiological measures were used alone.

5. Structured Stimulus Situations

The structured stimulus situation was used by Jersild and Holmes (1935) in their investigation of children's fears. The situations, although semi-experimental, were specific in nature, and were designed to investigate age trends with regard to children's fears. The situations which the children were requested to face, were:-

(a) Being left alone
(b) Walking on raised boards with a fear of possible loss of support
(c) A dark room
(d) A strange person
(e) Falling boards
(f) A loud sound
(g) A snake
(h) A dog

Jersild (1969) states that: "The experimental situations were not designed to frighten the child (except that he might be startled by the noise and the inclined board), but rather to confront the child with a situation into which he could choose to enter and participate and from which he was free to withdraw and retreat. Observers recorded the behavior and the presence or absence of fear was determined according to carefully formulated criteria."

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This method has the advantage of placing subjects in "real" and "fearful" situations, where it would be expected that some sort of reaction would be evoked and which can be directly observed and recorded. Although only simulating real life situations, it can be expected that data, particularly of children's behaviour, obtained in this manner, would probably be more reliable than data obtained from the other measures previously described. Other measures referred to are self-report inventories, questionnaires recalling past fears, and reports by others.

In measuring children's fears with a measuring instrument that requires the use of verbal communication, a problem to be overcome is the ability of the child to understand what is required of him in the test situation. Such limiting factorsas the child's lack of intellectual maturity (which further implies a lack of understanding), inability to communicate and illiteracy (applicable to the pre-school and early grade school child), make the use of interviews and pencil-and-paper tests undesirable in the measurement of children's behaviour.

In measuring adults' fears by means of interviews and self-report inventories, problems of a different nature may be present. Two factors which could give rise to unreliable and inaccurate results may be:-

(a) the absence of the stimulus which causes fear, and
(b) the inaccuracy of recall.

Subjects are rarely, if ever, required to report on their fears while experiencing them; but if asked to do so, are usually not in the fear-evoking situation. It requires, therefore, a mental reconstruction of a fear stimulus-response pattern without an actual experience of the fear. If, furthermore, the report requires the subject to grade his fears (as in the Lang-Wolpe F.S.S.), it is likely that he may grade them incorrectly.

Recalling fear in terms of past recollections of fear-evoking incidents, may give rise to distortion and gaps in the original experience. This applies to remembering one's own fears as well as the fears of others. Jersild (1935) pointed this out when discussing the problem of obtaining records of children's fears by asking mothers to report on them; and found, for example, that some fears even went unnoticed.

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B) MOTHERS' AND CHILDREN'S ON-GOING BEHAVIOUR

In previous sections, mention has been made of the possibility of children's fears in general (and of the dental situation in particular), being rooted in the mother-child relationship. The nature of this relationship is expressed in various behaviour patterns of the mother and child towards each other. It becomes necessary therefore, to recognise, isolate and measure these patterns in order to determine, if possible, whether these behaviour patterns and children's fears of the dental situation are in any way related.

Various methods for measuring on-going behaviour are available and may broadly be classified as follows:

(a) Observation methods
  (i) Rating scales,
  (ii) Category systems;

(b) Self-report methods
  (i) Interviews,
  (ii) Sociometry.

Rating scales and interviews have already been considered in the previous section dealing with the measurement of fear. Sociometry, originally developed by Moreno in 1934, was designed more for the study of group structures based on the feelings that group members had for one another, than for dyadic relationships, and although Sociometry has been extended to include dyadic relationships measured in terms of frequency of contact, his method is not directly applicable in this study.

The method of category systems was the measurement of choice in the present study, but in a somewhat modified manner to be described in a later section.

A study by Bishop (1951), in which this method was used, was applied to dyadic groups of mothers and their children. The purpose was to ascertain the social behaviour of children and to determine if possible whether this behaviour was in fact rooted in the interaction which occurred between mother and child.

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subject, she was told that the experimenters "..... wished to observe children's play in the presence of adults. The mothers were free to act in any way they pleased - as if they were at home". To what extent this method is actually successful in evoking customary behaviour on the p art of the mother has not been determined, but certain advantages are however present. It allows for uninterrupted observation under controlled conditions (a disadvantage when observations are made in the home), and a running record of all on-going behaviour sequences. It also allows for the production of data which are amenable to statistical analysis.

With regard to shortcomings, however, Bishop has this to say, "..... the most important source of error in the method lies in the possible discrepancy between the observed sample of the mother-child relationship and the true relationship. Any one of several factors may operate to distort more habitual behaviour. Another problem inherent in the method is the difficulty in accurately interpreting the meaning of behavior as it appears to the individuals involved. Both disadvantages, however, are characteristic to a greater or lesser degree, of other methods of investigation."

C) THE PRESENCE OF THE INVESTIGATOR AND PARTICIPANT OBSERVATION

In the present study the situation is further complicated by the presence of the investigator who is also an active participant in the experimental procedures. To the extent that his actions influence the totality of the situation, the degree to which this occurs must be regarded as something of an unknown quantity; but which, however, also remains fairly constant. It must be remembered that the dental situation falls into the category of a "natural group", observed under uncontrolled conditions and of which group the dentist is always a member.

The method of participant observation has been used by various investigators to study groups in their natural settings. The common procedure is for the observer to participate with the group in its various activities, noting and recording all the while their nature and meaning. The dental group (in the present study mother, child, operator and nurse), however, are engaged essentially in one specific activity (namely, performance of dental operations on the child) in which only the dentist and the child are directly participating. It has the advantage of clearly defining the boundaries and therefore the limits of the situation.

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One of the most extensive uses of this method was made by Whyte (1943) in his studies of street-corner gangs in Boston. His presence did, to some extent, alter the natural setting of the group, but according to McCandless (1967), "..... after the group they are observing is familiar with them, the group goes back to behaving completely or almost completely naturally." Whyte, however, described his role as follows: "..... it is well to play a semi-detached role ... but still to have it recognised that you are interested in research." His studies also emphasise discussion after whatever activities were engaged in at the time.

The problem of limited time in the dental situation, however, precluded discussion and in the present study, the mother and child were informed of their participation in it, but were not told that their behaviour during the visit was being observed. These observations were then categorised immediately after the visit in a previously constructed behaviour check-list.

MEASUREMENTS CHOSEN FOR THE PRESENT STUDY

A) CHILDREN

Two measures were chosen for use on children:

1. Physiological
2. Category system of behaviour.

Since children are immature and intellectually inadequate, the use of non-verbal tests became the measures of choice. The difficulties usually encountered with subjects of limited and undeveloped intellect may be a failure to understand what is required of them, illiteracy and difficulty in communication. Such measurements as interviews and self-report inventories are therefore not applicable in the present study, i.e., where some of the subjects to be investigated are children. Thus it was proposed to use on the children a physiological measure of fear, and as an adjunct, a category system of behaviour (which may also include manifestations of fear on the behavioural level). Both measures were to be used in order to cover the possible contingency of a fearful child not expressing his fearfulness overtly, but which may be present at a physiological level.

The physiological measure was one devised by Johnson and Dabbs (1967) and is used to measure sweat-gland activity. Johnson and Dabbs suggest that its use may be described "as a physiological indicator of psychological change." The choice of this method in the present study was based essentially on its simplicity and ease of application.

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This obviated the need for complicated apparatus generally used for the measurement of other physiological responses such as G.S.R. heart-rate, and respiratory rate, etc. Movement of the subject does not affect the accuracy of the record which is also permanent, and it is suggested that the material used (the impression solution and a piece of sticky tape) are less likely to be an added potential fear stimulus than the electrodes of a G.S.R. machine.

In order to measure the child's overt and on-going behaviour, a previously constructed check list of all possible behaviour categories was used and any observed behaviour was noted in the appropriate category. Its simplicity of application and its implementation by untrained observers, if necessary, make this a method of choice.

Furthermore, since the dental situation is highly structured, the range of possible child behaviour becomes fairly narrow. As a consequence it makes it reasonably easy to construct a behaviour check-list with a reasonable degree of predictability and accuracy in terms of expected behaviour patterns. Since the situation is well defined, the responses may be comprehensively covered.

The routine dental visit usually occurs over a relatively short time span. Since the situation is narrowed and the range of possible responses limited, identification and accurate recall of these responses is a fairly easy task if the check-list is to be completed immediately after the child's visit. It is often impossible to do so during the visit, since the operator, who is also the investigator in the present study, is otherwise occupied in rendering a dental service. As an incidental comment, it may be noted that to refrain from making observations during the visit may help to minimise subject awareness.

B) MOTHERS

Three measures were to be used on mothers:

1. Physiological
2. Self-report inventory
3. Category system of behaviour.

The use of physiological and behaviour category measures were to be used for adults and the choice of these measures was made for the same reasons as those for children. Added to this, was a self-report inventory in order to establish a "fear profile" of the mother. Use was to be made of the Lang-Wolpe Fear Survey Schedule, which is easily administered, easy to understand and completed within the space of a few minutes.

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CHAPTER V

DEFINITION AND CLASSIFICATION OF VARIABLES

In the four hypotheses thus stated, the variables to be considered are:

1. Fear in children
2. Fear in mothers
3. Positive and negative behaviour of mothers
4. Histories of traumatic dental experience.

These variables are described and dealt with in the following manner.

A) FEAR IN CHILDREN (Response Schedule)

A child is considered fearful if that child exhibits overt observable and measurable behaviour in terms of a pre-determined check-list of behaviour categories designed to cover all possible forms of fearful behaviour in the dental situation. With one or two exceptions, any child exhibiting at least one response covered by the schedule is considered fearful.

Such categories as "leaning forward in the chair", or "grasping arm-rests while chair was tipped back", do not necessarily indicate fearfulness. Such a child with no other overt manifestations would be classified as non-fearful.

Classification

1. It was planned that if a child showed no fear responses, he would be classified as non-fearful.

2. If a child shows fear responses which are in fact specific reactions to pain, sudden tilting of the chair, unexpected noise, etc., the child may not necessarily be classified as fearful.

3. A child will be classified as fearful if he makes responses within a context of general fear and anxiety and which may be categorised according to the pre-determined check-list.

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Physiological Measure.

It had been suggested earlier (see page 33) that it would not be wise to rely on only one test to measure fear. It was therefore decided to use two tests in order to tap both the behavioural and physiological components of fear in order to yield a more accurate classification of subjects. It is proposed therefore to use a physiological measure of fear as well as the response schedule.

The physiological measure of fear is an enumeration of sweat glands taken from the impression of the finger tip. Active glands are seen as little circles occurring along the ridges of the finger tip's central whorl, which area is isolated for counting. This count is based on a method devised by Johnson and Dabbs (1967). A median for the total sample is planned. Any reading above the median will classify the subject as fearful.

The following table shows that classification of childrens fears using the response schedule and the palmer sweating index.

TABLE V.I.

P.S.I.

Response Schedule		Fearful	Non-Fearful	
	Fearful	10	0	10
	Non-fearful	6	14	20
		16	14	30

Table V.II is a classification of mother's fears using the palmer sweating index and the fear schedule survey.

TABLE V.II.

P.S.I.

F.S.S.		Fearful	Non-fearful	
	Fearful	8	6	14
	Non-fearful	8	8	16
		16	14	30

It is evident from the above tables that a discrepancy exists in the classification of both mothers and children by the two tests. Since the tests do not classify subjects in the same way they cannot therefore be considered equivalent. (For an interpretation of the possible meanings of these discrepancies see pages 52 and 53).

Previous Traumatic Dental Experience

For any subject who has responded with fear to a previous dental experience, this experience will be regarded as traumatic. Any information gained about such a history, although relying upon the report of the individual, and therefore on data of a subjective nature, may however still be considered valid. The ultimate criterion is that, if the patient believes that his present fearfulness of the dental situation is due to past experiences which he considers to have been traumatic, then the subject's account of his experience will be accepted by the present investigator.

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B) MOTHERS

1. Fearfulness

The mother's fearfulness in the dental situation will be classified as follows:

(a) General anxiety for her child
(b) Specific anxiety relating to her child in the dental situation
(c) Mother's own general fearfulness
(d) Mother's own fear of the dentist.

Those variables classified under (a) and (b) will be measured in terms of the response schedule for mothers. Variables classified under (c) and (d) will be measured by the Lang-Wolpe Fear Survey Schedule. In categories (c) and (d), any score above the median will be used to classify the mother as fearful.

2. Positive Behaviour

A mother will be classified as positive if she exhibits the two basic dimensions of warmth and affection towards her child as described by Schaefer (1959). This positive classification also includes such behaviour which shows a sensitivity to her child's needs and an understanding of the limitations of his maturity. The mother, therefore, who is reassuring, comforting, encouraging, etc., will be categorised as positive. Together with the positive features mentioned, the absence of certain factors will be taken into account when regarding positive mother behaviour as a totality. These factors are: freedom or anxiety in the mother, a lack of fearfulness, absence of reinforcement of the child's fear, absence of threat as punishment, and absence of anger and criticism towards her child.

It may be noted that such expressions of mild impatience, simulated irritation, gentle rebuking, may not necessarily be valid criteria in classifying a mother as negative. While the data will be rated independently by two judges in order to determine whether a mother is positive or not, doubtful cases will be judged solely by the investigator of the present study, whose evidence will be accepted as objective. Doubtful cases are those cases where behaviour is diffuse and undifferentiated and where categorisation of these behaviour patterns can only be made from a knowledge of the total situation, which the independent judges do not have. Data relating to all aspects of mother behaviour will be obtained from the response schedule for mothers.

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A negative mother is one who is punitive, harsh, critical, etc., and these criteria may be used to classify mothers with regard to any behaviour that is not considered positive. A mother whose behaviour is neutral, i.e., one who does not show any form of punitiveness or aggression, etc., will be considered negative.

3. Verbalisation of Mother's Fears

Any statement taken from the response schedule for mothers, which express a mother's fears of the dental situation (such as "You should take my fingerprints now" - Case No. 2 - mother getting into chair), or "I'm terrified of a dentist" - Case 9)*, will be accepted as a verbalisation of the mother's fears. These verbalisations will also include expressions of her general fearfulness for her child, specific anxiety relating to her child in the dental situation, and her own general anxiety and fearfulness.

In order to allow for those fearful mothers who do not verbalise their fears, but may be fearful, a physiological measure will also be used. The significance and validity of the physiological measure is subject to the same analysis as applied to the children's measures of fearfulness, viz., correlations of sweat-gland counts with overt behaviour on the response schedule, and with scores on the fear survey schedule.

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*Footnote - Cases refer to the subjects in the sample who were allocated numbers.

CHAPTER VI

DESCRIPTION OF METHODS IN OBTAINING AND PROCESSING DATA

A) SAMPLE

1. Subjects

The subjects chosen for the present study were mother-child pairs drawn from the patients of the present investigator's practice. Where a mother came with more than one child for dental attention, only one of the children was chosen to participate in the study. The choice was indirectly left to the mother, for the child chosen was the one the mother suggested should go first for dental attention.

No attempt was made to match the mother-child pairs for socio-economic status, age, intelligence, personality, religious beliefs, etc. The sample consisted of subjects who came from different backgrounds and probably provided a fair cross-section of the population of the town in which this study was carried out.

Since most of the children in the present study were young, their ages ranging from approximately three to ten years, it may be inferred that the mothers were in a young adult age group with their ages ranging from approximately 20 to 35 years. No attempt was made to classify the children with regard to sex and both boys and girls were included in the sample.

2. Choosing Subjects

Although theoretically it was possible to choose a random sample of mother-child pairs, the difficulties involved precluded the use of this method.

Random sampling would have meant choosing from the appointment book every eighth or tenth mother-child appointment, say, for inclusion in the sample. Since appointments are spaced days and often weeks apart, this would mean a long waiting period before the arrival of those subjects to be tested. Furthermore, there was no certainty that the appointment would be kept and this, therefore, would have added further delay. Added to this was the probability of the unpredicted arrival of a mother with a child, who required emergency treatment, and who may have therefore been suitable subjects for inclusion in the sample. Since an unpredicted arrival would upset the sequence of random selection, they would therefore not be eligible.

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Because of these drawbacks, but essentially because the sampling process would have been exceedingly time-consuming, it was decided that from a certain date all consecutive pairs of mothers and children who presented themselves for dental attention, whether by appointment or not, would be included in the sample. This procedure was carried out until the required number was obtained.

3. Sample Size

The size of the sample used in this study was 30 pairs of mothers and children, i.e., 60 subjects in all.

Although it is always possible to obtain larger samples, it was felt that the 30 pairs of subjects chosen would be sufficient for statistical analysis.

B) MEASUREMENT OF BEHAVIOUR AND ACQUISITION OF DATA

1. Standardisation

The testing procedure was carried out in the same manner for all subjects and was done as follows:

(a) As mother and child entered the surgery, they were asked if they would be prepared to participate in a study. The nature of the study was explained to them, as was its purpose and object. All potential subjects were told that they could refuse if desired, but none did so.

(b) Testing was carried out in the following manner, care being taken to replicate the procedure for all subjects:

(i) The first measure administered was the physiological one, and was carried out in the manner described by Johnson and Dabbs (1967). Fingerprints were taken first from the child, then from the mother. This was for the purpose of obtaining their sweat-gland activity. The use of the P.S.I. test as a physiological measure of fear has been described elsewhere in the study.

(ii) On completion of sweat gland measures, the child was requested to sit in the chair and dental procedures commenced. All overt behaviour exhibited by both mother and child was noted by the operator and the chair-side assistant. This behaviour was then recorded on a previously constructed check-list

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which included every contingency of mother-child behaviour that could be expected in the dental situation.

Owing to the lack of a trained observer, which meant that mother-child behaviour could not be recorded as it occurred, recording was done by the operator immediately after termination of the visit. Recollection of relevant conversation and general behaviour patterns of both mother and child was usually adequate, since the recency of the event allowed for a very short time lag and memory of the event therefore remained clear and vivid. The check-list for mother and child were completed in the presence of, and with the aid of, the chair-side assistant, whose own observations helped to fill any gaps that may have occurred.

The following procedure for completing the check-lists were adopted:

Children

Observed responses were ticked off under "yes" column in appropriate behaviour categories. Absence of responses were ticked off under "no" column in all remaining categories.

The stage during the visit at which fearful responses occurred was noted and entered in the appropriate column opposite the relevant behaviour category.

Any relevant history regarding previous dental experience, usually obtained from the mother, or from the records of the present investigator, was then entered in the column headed "Previous Dental Experience".

Completion of the check-list for children was carried out entirely by the present investigator.

Mothers

Observed responses were ticked off under "yes" column in appropriate behaviour category. Absence of responses were ticked off under "no" column for all remaining categories.

Under "Verbal Response" heading, all comments made by mothers were judged and categorised by the present investigator and entered in the check-list in the category that was judged to be appropriate. These data were then submitted to two judges for independent rating.

The role of the chair-side assistant, was to supply any information which would assist in recalling the mothers comments verbatim. Any relevant comments made by mothers in the waiting-room prior to entering the surgery were also recalled by the chair-side assistant. The check-lists were otherwise completed entirely by the investigator of the present study.

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The stage of the visit, during which the mother's verbal and/or noted behaviour occurred, was entered in the appropriate column.

The operator, whose role was that of a participant observer, tried to maintain a consistent attitude, aiming for as much objectivity and detachment as possible, and concerning himself only with the dental problem at hand. Simultaneously, however, mother and child behaviour patterns were constantly observed by both the operator and the chair-side assistant. It may be important to note that in every case the mother was always present in the dental surgery.

(iii) When dental treatment was completed for the child, the mother was requested to fill in the Lang-Wolpe Fear Survey Schedule. This could be done at her convenience and returned to the investigator. If the mother was also a patient, she was requested to fill in the questionnaire after her treatment was completed.

(iv) Finally, after all the dental procedures had been completed, the child was requested to go to the waiting room while the mother was questioned by the present investigator about her child's previous dental experience. Such information as the recency and the nature of the experience with special regard to whether it was traumatic or not were obtained and the data recorded. If the child's previous dental experience was associated with the investigator of the present study, i.e., the child was his patient, reference was made to his personal files on the nature of his previous experience.

2. Measures Used and their Purpose

(a) Palmar Sweating Index

This is a procedure devised from a method by Thompson and Sutarman (1953). The P.S.I. is defined as "the number of glands secreting sweat in a 4 m.m. square area around the central whorl of a fingertip". It serves as a simple physiological indicator of psychological change.

Active sweat glands are visible in a fingerprint made with the following solution:

Polyvinyl Formal - 5 gms
Butyl Phthalate - 10 ml.
Semi-collodial dispersion of graphite in trichloroethylene - 20 gms
Ethylene dichloride - 100 ml.

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Fingerprints were taken as follows. The fingertip was wiped to remove residual sweat and a thin layer of the solution was applied from a container with a single dab of the cork stopper. When the solution dried, it was covered with transparent sticky tape. The tape was then removed with the fingerprint adhering to it and placed directly on a glass microscope slide. For scoring the print was enlarged ten to twenty diameters with a micro-projector. A white scoring templet, defining four millimetres of the central whorl of the print was placed over the fingerprint and projected onto a screen. Active sweat glands which show up as open pores and are seen as little rings along the ridges of the fingerprint were then counted. Counts by independent observers were carried out in order to check for accuracy.

Two independent observers were used to check the sweat gland counts. They were second year students of psychology. Each observer was requested to undertake independent counts, after the present investigator had completed them. The final score for each subject was the mean of the three counts. Agreement between the observers was fairly high with differences between them ranging from 2 - 8 over the total counts - i.e., for each individual count the discrepancy between the observers did not exceed 8, and was not less than 2.

(b) The Lang-Wolpe Fear Survey Schedule

This is a measure of general fearfulness and gives a fear profile of the subject. This measure was submitted to the mother who filled it in while at the consulting rooms, if time permitted, or who took it home and returned the completed schedule at her own convenience. The requirements of the schedule were explained to all subjects. They were asked to write the number of each item in the column that described how much they were disturbed by the items nowadays. The items were graded as "not at all", "a little", "a fair amount", "much", "very much". There were 72 items.

Scoring was carried out as follows: Each item was marked from 1 to 5 and the scores for the 72 items were summed, thus giving a total raw score for each subject. For the raw scores of the total sample, the median was computed, thus establishing a sample norm and allowing for a classification of mothers as either fearful or non-fearful. Data concerning fearful and non-fearful mothers was then subjected to statistical analysis. The analysis is dealt with in a separate section later in the study.

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C) USE OF CHECK-LISTS

These were constructed prior to the commencement of the investigation and their application was carried out inthe following manner. All patients attending for dental treatment in general, but mothers and children in particular, were observed and notes made of their behaviour patterns. This was continued for some time until it was felt that every possible form of observable behaviour in the dental situation was covered. From these notes, the check-list was constructed and served as a measure for the behaviour patterns of mothers and children in the experimental situation.

The check-list served as an added measure to the physiological one, inasmuch as it helped to classify subjects as fearful and non-fearful, but also yielded information with regard to the nature of the child's previous dental experience and also some aspects of the mother-child relationship as it manifested itself in the dental situation. Separate check-lists were made for both mothers and children and their behaviour was recorded in the appropriate categories in the manner previously mentioned.

D) DATA PROCESSING

1. The Nature of the Data

Data consisted of the following:

(a) Sweat-gland counts of mother and child

(b) Raw scores of mothers' fears (general fear profile) as obtained from the Lang-Wolpe Fear Survey Schedule

(c) Verbal, emotional and motor behaviour of mother as obtained from the check-lists

(d) Verbal, emotional and motor behaviour of the child as obtained from the check-list.

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Since the check-lists yielded data, in some cases, of an intricate and complex nature, particularly data concerning mothers' movements and verbal responses, and since the data could therefore be subject to varied interpretations, data was carefully scrutinized before being classified into the two broad behaviour categories of:

(a) fearful and non-fearful, and
(b) positive and negative - this classification was important in regard to the second hypothesis.

Furthermore, two independent judges were asked to abstract from the check-list all relevant information enabling them to classify mothers' behaviour in terms of previously defined positive and negative attitudes. The judges were second-year students of psychology. Before submitting the data to the judges, the original classification was carried out by the investigator of the present study, which information was withheld from the judges. Subsequent correlation of this investigator's classification with that of the judges' ratings was undertaken.

E) STATISTICAL ANALYSIS

It was decided to subject all data to non-parametric analysis, because the variables were only of nominal value, i.e., they could be classified into only one of two categories:

For mothers: (a) positive and negative
(b) fearful and non-fearful
(c) verbalise fears and do not verbalise fears.

For children: (a) fearful and non-fearful
(b) traumatic dental experience and non-traumatic dental experience.

This classification was used throughout

Hypothesis Testing

For each hypothesis the data were classified and frequency distributions for each variable were constructed. For all the data in all the hypotheses the distributions could be arranged in 2 x 2 contingency tables. Expected frequencies for all cells were computed. The values of these frequencies determined the choice of the statistical tests of significance.

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For any cell with an expected frequency of less than 5, the Fisher Exact Probability Test was applied. This test had to be applied to the data relating to hypotheses 3 and 4. Hypotheses 1 and 2 qualified for the use of the chi-square test since expected frequencies in any given cell exceeded 5.

Use of Non-parametric Statistics

Siegel (1956) suggests a number of reasons for the suitability of using Non-parametric Statistics. The tests are often called "distribution free", one of their primary merits being that they do not assume that the scores under analysis were drawn from a population distributed in a certain way, e.g., from a normally distributed population. Alternatively, many of these tests were identified as ranking or categorising tests and this title suggests their other principle merit, viz., that non-parametric techniques may be used with scores which are not exact in any numerical sense, but which in effect are simply ranks or categories. Finally, these tests are useful with small samples and may be generally considered as descriptive in nature.

The data obtained in this study readily fulfil the requirements for non-parametric analysis and hence their choice for use in this investigation.

CHAPTER VII

RESULTS

The following results of this investigation were obtained:

A) MEDIANS

Computations of medians for all scores resulting from measures of all variables (where applicable) were carried out. These variables included mothers' and children's fearfulness measured by the sweat-gland count and mothers' fearfulness as measured by the Lang-Wolpe Fear Survey Schedule. All other data yielded by the response schedule for mothers and children were classificatory in nature and allowed for a classification of fearfulness/non-fearfulness, positive/negative and traumatic/non-traumatic.

1. Mothers' Fearfulness

(a) Sweat Gland Counts

Range 10 - 97

Median 69.5

The median classifies the mothers as 50% fearful and 50% non-fearful.

(b) F.S.S.

Range 100 - 260

Median 164.5

The median divides the mothers into 50% fearful and 50% non-fearful.

2. Children's Fearfulness

(a) Sweat Gland Counts

Range 52 - 169

Median 107.5

The median classifies the children as 50% fearful and 50% non-fearful. *

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* Footnote - As a matter of interest, means and standard deviations were also computed, but since only non-parametric statistics were used, the mean and standard deviation values were not included for use in the present study. Classification of mothers' and children's fears using the mean was also carried out and the distributions obtained were subjected to statistical analysis. Although the chi-square values obtained differed from those using the median, the significance of the results remained unchanged.

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USEFULNESS OF THE PALMAR SWEATING INDEX AS A MEASURE OF FEARFULNESS IN THIS STUDY

A review of studies on the Palmar Sweating Index by Johnson and Dabbs (1967), Harrison and MacKinnon (1962), Thomson and Sutarman (1953), Collins, Sargent and Weiner (1959), and Ferreira and Winter (1963), showed that investigators all used a series of measures of Palmar Sweat Prints for any given individual. This means that repeated prints allow the investigator to observe changes in sweat-gland activity. It also makes it possible to express P.S.I. scores as changes from previous scores, as deviations from an individual mean or as deviations from a baseline.

The investigator of the present study, however, used only single readings on his subjects, mainly because of the limited amount of time available to him. Since the present study was carried out in the setting of a busy dental practice, where time is unfortunately at a premium, it was decided to use single-measure readings. It may be pointed out that it was hoped to take simultaneous readings of both mother and child, in order to make a comparison under the same conditions, but the difficulty of doing so while the child was undergoing dental treatment made this almost impossible. However, in order to at least confine and narrow down the time period, mother and child prints were taken, one immediately following the other, just prior to the commencement of dental treatment.

It may be interesting to note that the sweat gland counts obtained in the present study, fell within the range of mean readings of sweat gland counts obtained in other studies. The studies referred to are those by Johnson and Dabbs (1967), Harrison and MacKinnon (1962), and Thomson and Sutarman (1953). While the use of the P.S.I. measure in the present study may still be treated with some circumspection, the above evidence does not totally invalidate its usefulness.

B) RESPONSE SCHEDULE

Of the total sample of 30 children, 10 were classified as fearful and 20 as non-fearful. On the P.S.I. measure alone, 16 children were measured as fearful, which is 6 more than on the response schedule. Where more than one measure for any given variable is used, one is bound to find some discrepancy between the measures. Since the measures of fear used in the present study are not very good, the obtained discrepancy may therefore not be unexpected. This discrepancy may possibly be seen

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as a function of the dichotomisation of the sample at the median.*

JUDGES' AGREEMENT ON POSITIVE AND NEGATIVE MOTHERS

From the response schedule for mothers, all the statements and comments made were abstracted and submitted for rating by two independent judges. These judges rated twelve mothers as positive and four as negative. Of the fourteen remaining subjects who were unclassifiable, three showed positive tendencies and one case showed a tendency towards the negative. The remaining ten cases were classified as "don't know". Correlation between the judges' ratings was .64.

VERBALISATION OF MOTHERS' FEARS

Again using the response schedule for mothers, all statements that mothers made reflecting their own fears of the dental situation were abstracted and classified by the investigator of the present study. Of the total sample of 30 mothers, 7 made definite statements expressing their fears of dental procedures. The remainder did not make comments expressing their fearfulness. It does not necessarily follow, therefore, that those who did not verbalise their fears, or make any negative comments about the dental situation in general, were not fearful. The fact that fearful mothers do not necessarily verbalise their fears may indeed be true, for although only 7 mothers verbalised their fears, 17 mothers were shown to have a generalised fearfulness as measured by the fear survey schedule. Of these, 12 had specific fears of the dentist and/or dentistry.

HISTORY OF DENTAL TRAUMA

Only 5 of the total sample of 30 children had had previous dental experience of a traumatic nature. This information was obtained both from the records of the investigator of the present study and from reports obtained from the mothers. On the P.S.I. measure, 4 of the 5 were fearful and 1 non-fearful. On the response schedule, the same result was obtained. The remaining subject (Case 4) was classified as non-fearful on both the

*Footnote - It should be noted that 9 children were rated as fearful on both measures and that a tenth was rated as fearful on the response schedule, but not on the P.S.I. The five additional cases of fearfulness measured by the P.S.I. are simply a function of the dichotomisation of the sample at the median.

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response schedule and the F.S.I. The remaining 25 subjects did not present histories of having had previous dental experience of a traumatic nature, with 12 of these children having had no previous dental experience at all. Of these 12, however, 3 were fearful as measured by the response schedule and 9 were non-fearful.

The remaining 13 children had had previous dental experience but not of a traumatic nature. Of these, 3 children were fearful as measured by the response schedule.

HYPOTHESIS TESTING

All hypotheses were tested by non-parametric tests of significance with Hypotheses 1 and 2 qualifying for the use of the chi-square test and Hypotheses 3 and 4 qualifying for the use of the Fisher Exact Probability Test. The following criteria were adopted for use of the Fisher Test:

(a) The test is to be used when the smallest expected frequency is less than 5;

(b) The test is to be used when N is less than 20.

All tests were one-tailed, with critical values at the .05 level of significance.

Hypothesis 1

Children who are fearful are more likely than non-fearful children to have mothers who are fearful.

The Lang-Wolpe Fear Survey Schedule (F.S.S.) was used as the measure of mothers' fearfulness and the Response Schedule (R.S.) as the measure of children's fearfulness. The figures set out in Table 1(a) were obtained.

TABLE 1(a)

Fearful and Non-fearful Mothers and Children as Measured by F.S.S. and R.S.

Children	Mothers: Fearful	Mothers: Non-fearful	
Fearful	5	5	10
Non-fearful	10	10	20
	15	15	30

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Author Brand Abraham Aaron
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