Behav. Res. Ther. Vol. 27, No. 3, pp. 233–236, 1989
Printed in Great Britain.

0005-7967/89 $3.00 + 0.00

COMPONENTS OF DENTAL FEAR IN ADULTS?

DANIEL W. MCNEIL and M. LEE BERRYMAN
Department of Psychology, Oklahoma State University, Stillwater, OK 74078–0250, U.S.A.

(Received 22 July 1988)

Summary—The functional relatedness between dental fear and multiple other fears was studied in a normative sample of 285 undergraduates. Rachman and Lopatka's work on the inter-dependence of multiple fears within individuals, as well as Lang's bioinformational theory of emotion, provided a theoretical background for this investigation. Fears about social contact, pain, mutilation (e.g. injury, blood, disfigurement), and being closed-in were assessed within the realm of verbal report; they were studied as possible components and/or concomitants of the dental fear construct. Multiple regression analyses with these variables utilized the Dental Fear Survey total score as a criterion variable. Fear of pain was found to be the most significant predictor of dental fear in both males and females. For females only, mutilation fear was the next strongest determinant. Fear of being closed-in was an additional significant dental fear predictor for both sexes. The possible role of social fears in the manifestation of dental fear was not confirmed and awaits further investigation. Results were consistent with the idea that there may often be a moderate degree of functional dependence between dental fear and the other fears identified here.

Investigations by Rachman and Lopatka (1986a, b) have addressed summation and functional independence of multiple fears within individuals. This work has encouraged further study of the topography of fears, using Lang's (1985) bioinformational theory of emotion as a conceptual base. Lang's idea that associative networks in memory are prototypes for emotional expression provides a useful framework for the study of multiple fears. Techniques for the study of multiple fears, such as that forwarded by Rachman and Lopatka (1986a, b), should help to provide evidence about the degree of functional inter-dependence of the fear networks (or a network?) that may exist in memory within individuals who have multiple fears. The studies by Rachman and Lopatka (1986a, b) have already highlighted the importance of this area of research for clinical practice, e.g. deciding on the order of treatment of multiple phobias based on their functional relatedness. This earlier work concentrated on snake and spider phobias. The present study focused on dental fear in a normative sample, using multiple regression to assess relatedness of fears.

Within the behavioral dentistry literature, a number of studies have addressed the origin and topography of dental fear. There are data to indicate that adults with high dental fear have a learning history that very frequently includes dental trauma earlier in life (Lautch, 1971) and/or a family environment that included individuals who modeled dental fear behavior (Lautch, 1971; Shoben and Borland, 1954). Forgione and Clark (1974), however, later indicated that low pain tolerance, history of facial injury, and high trait anxiety contribute to dental fear as well. It has also been suggested by Melamed (1979) that a number of other fears are concomitant with (or possibly a part of) dental fear, including fears of (a) intraoral injections, (b) dental drilling, (c) critical comments by dental personnel due to poor oral hygiene, (d) pain, and (e) loss of control.

The sight and feeling of the anesthetic needle, and the sight, sound, and feeling of the drill, have been well substantiated by research as important dental fear stimuli (Hirschman, Revland, Hawk and Young, 1980; Kleinknecht, Klepac and Alexander, 1973). In fact, the Dental Fear Survey has a factor structure that designates a subscale to measure fears of specific dental stimuli (Kleinknecht, Thorndike, McGlynn and Harkavy, 1984; McGlynn, McNeil, Gallagher and Vrana, 1987). Since injection and drilling fears contribute to the Dental Fear Survey score, which will be used as a criterion variable here, they will not be further considered as to their relatedness to the general construct of dental fear.

Social fears, particularly fear of negative evaluation by the dentist, appear to be related to dental fear (Gale, 1972; Stouthard and Hoogstraten, 1987). Other studies have indicated that fear of pain and dental fear are positively and significantly related (McNeil, Rainwater and Al-Jazireh, 1986), and that young adult dental patients with high dental fear report experiencing more pain during treatment than their low fear counterparts (Kleinknecht and Bernstein, 1978), and that highly

fearful dental patients have lower tolerance of dental pain (Klepac, Dowling and Hauge, 1982). Additionally, it is intuitively compelling, but not substantiated by research, that confinement in the dental chair, surrounded by the dentist and dental assistant, with the attendant necessity of sitting still and otherwise cooperating during dental procedures, could contribute to feelings of fear related to a sense of being closed-in and/or loss of control. Finally, another seemingly likely, but as yet unverified, antecedent of dental fear is fear of mutilation (e.g. tissue damage).

While there is scattered empirical support for the premise that these various fears are related to dental fear, there has been no investigation that delineates their relative contribution. This study addressed that need, investigating various dental-related fears that could be reliably measured with available verbal report instruments. Specifically, social fear, fear of pain, mutilation fear, and fear of being closed-in were assessed in terms of their ability to "predict" dental fear. It may be that some or all of these fears are frequently actual components of the more general construct of dental fear. Conversely, perhaps dental fear and these other fears are related in being functionally dependent on one another, with interwoven fear networks in memory. Whatever the case, it was hypothesized that each of these fears would contribute, at least somewhat, as significant "predictors" of dental fear.

METHOD

Subjects

The *S*s were 304 introductory psychology students from Oklahoma State University. Of this sample, 285 *S*s (163 females, 122 males) produced complete data and were included in the analyses. The mean age of the *S*s was 19.1 yr (SD = 2.3) with a range of 18–37.

Materials and procedure

*S*s were administered a battery of verbal report instruments in single mass screening sessions. Informed consent was obtained; extra class credit was awarded for participation. The Dental Fear Survey (DFS; Kleinknecht, *et al.*, 1973) was utilized as the criterion measure since it is a very well researched instrument for assessing dental fear (McGlynn, 1988), and since it has available factor analytic data (Kleinknecht, *et al.*, 1984; McGlynn, *et al.*, 1987), predictive validity information (Kleinknecht and Berstein, 1978), and a related structured interview (Vrana, McNeil and McGlynn, 1986). Other questionnaires completed by the *S*s included two instruments that assess fears about social situations, the Social Avoidance and Distress Scale (SADS; Watson and Friend, 1969; 26 of the original 28 SADS items were used), and the Interaction Anxiety Questionnaire (IAQ; Leary, 1983); the Fear of Pain Questionnaire-I (FPQ-I; McNeil *et al.*, 1986); the Claustrophobia Questionnaire (CQ; Cuthbert, Schwartz and Lang, 1989); and the Mutilation Questionnaire (MQ; Klorman, Weerts, Hastings, Melamed and Lang, 1974).

RESULTS

The data were analyzed using stepwise multiple regression as well as correlational analysis. The stepwise regression procedure was utilized due to a lack of previous research indicating a preferential ordering of the dependent variables included in the model. Table 1 presents the results of three separate stepwise analyses. The DFS total score was the criterion variable for all three tests.

Initially, the total sample (both genders) was included to ascertain the factors which contributed significantly to the total dental fear variance. Consistent with predictions, the FPQ-I, CQ, and MQ were found to be significant components of dental fear. These three variables in total accounted for about 19% of the variance in the criterion.

Then, to elucidate possible gender differences, as have been found in previous fear research (e.g. Kaloupek, Peterson and Levis, 1981), independent stepwise regressions were performed for each gender. A gender difference was found. Males included only the FPQ-I and CQ as significant predictors of dental fear. Females, however, included the same three predictors as the total sample, FPQ-I, MQ, and CQ, although with different order of entry into the model.

Table 1. Stepwise regressions of dental fear against significant components (predictors) and their correlations

Variable	R^2	Increase in R^2	d.f.	Both genders Intercorrelations FPQ-I	CQ	MQ	Correlation with DFS total score
FPQ-I	0.1283	0.1283	1	—			0.36
CQ	0.1726	0.0444	2	0.35	—		0.32
MQ	0.1926	0.0200	3	0.44	0.42	—	0.34
			Males only				
FPQ-I	0.0905	0.0905	1	—			0.30
CQ	0.1408	0.0503	2	0.24	—		0.29
MQ*	—	—	—	0.34	0.38	—	0.27
			Females only†				
FPQ-I	0.1174	0.1174	1	—			0.34
MQ	0.1598	0.0424	2	0.34	—		0.32
CQ	0.1809	0.0211	3	0.38	0.38	—	0.30

Note. FPQ-I = Fear of Pain Questionnaire-I, CQ = Claustrophobia Questionnaire, MQ = Mutilation Questionnaire, DFS = Dental Fear Survey.

Note. All R^2 and intercorrelation values are significant at or beyond the 0.05 probability level.

Note. The SADS and IAQ are not listed in this table as they did not contribute significantly to the total dental fear variance.

*In the "male only" analysis, the MQ was not a significant component/predictor.

†In the "female only" analysis, order of entry for MQ and CQ were reversed relative to the other two analyses.

Inconsistent with the hypotheses, the SADS and the IAQ did not emerge as significant predictors of dental fear, even when a more liberal 0.15 significance level was used. In fact, across analyses, correlations between the SADS and the DFS, and the IAQ and the DFS, were very low, not exceeding $r = 0.14$.

DISCUSSION

These results support the hypotheses that fears of pain, being closed-in, and mutilation are related to dental fear in young adults. These fears are perhaps concomitant with, and/or are components of the construct of dental fear. Given the general, nondental nature of all the questionnaires upon which the predictors were based, it is impressive that three variables contributed significantly. Viewed from Lang's (1985) model, these data allow for the possibility that in some individuals, information about pain, closed-in situations, and mutilation may be coded in memory into a dental fear network, or into related network(s). Moreover, conceptualizing these results using Rachman and Lopatka's (1986a, b) ideas about multiple fears, it appears that there may be at least some degree of inter-dependence of dental fear and these other fears in certain individuals. Clinical implications are that dentists and behavioral scientists/practitioners should consider that pain, confinement (to the dental chair), and/or mutilation fears might be manifest in dental fearful patients.

Despite earlier evidence to the contrary (Gale, 1972; Stouthard and Hoogstraten, 1987), social fears were not found to be significant predictors/components of dental fear, even though two social anxiety questionnaires were used in this study. One of these instruments (the SADS), however, is a general instrument that may not have been sensitive enough to elucidate the specific type(s) of social fear that may relate to dental fear. Moreover, the IAQ, while more focused on social interaction fear than the SADS, may not have assessed the specific area(s) of concern. Future research might incorporate a means to directly measure fears about negative social evaluation. Additionally, it may be that the use of more dental-relevant social fear assessment instruments would yield positive results. In general, the use of more dental-relevant assessment instruments might be advantageous in assessing the contribution of other fear constructs to dental fear.

The gender differences noted here are intriguing. Perhaps females have greater fears of injury or disfigurement from dental treatment than do males, thereby leading the Mutilation Questionnaire score to be a significant predictor for females, but not for males alone. New studies should address these possible gender differences.

The amount of variance contributed by each predictor variable was modest, but significant. In part, the degree of contribution may be due to moderate to small (but again, significant) intercorrelations among the FPQ-I, CQ and MQ. While there is some independent influence from

each of these variables, there is probably overlap among them in their contribution to the dental fear variance.

Finally, caution should be used in generalizing these findings to the adult population at large. The sample used here was young and was derived exlusively from a college population. Future research might include a broader age range of dental patients and/or dental avoidant participants.

Acknowledgements—Portions of this research were presented at the 1988 meeting of the Southwestern Psychological Association, Tulsa, Oklahoma. We gratefully acknowledge the assistance of a number of undergraduate and graduate students from Dr McNeil's research team. Statistical consultation from Dr James M. Price is also appreciated. Correspondence concerning this article should be sent to Daniel W. McNeil, Department of Psychology, Oklahoma State University, Stillwater, OK 74078–0250, U.S.A.

REFERENCES

Cuthbert B. N., Schwartz S. and Lang P. J. (1989) *Demand Characteristics in a Claustrophobia Behavior Test.* Manuscript in preparation.

Forgione A. G. and Clark R. E. (1974) Comments on an empirical study of the causes of dental fears. *J. dent. Res.* **53,** 496.

Gale E. N. (1972) Fears of the dental situation. *J. dent. Res.* **51,** 964–966.

Hirschman R., Revland P., Hawk G. and Young D. (1980) Effects of dental anxiety and phase of treatment on discomfort during dental simulation. *J. dent. Res.* **59,** 1064.

Kaloupek D. G., Peterson D. A. and Levis D. J. (1981) An investigation of the normative and factor analytic composition of six questionnaires used for subject selection. *J. Behav. Assess.* **3,** 149–165.

Kleinknecht R. A. and Bernstein D. A. (1978) The assessment of dental fear. *Behav. Ther.* **9,** 626–634.

Kleinknecht R. A., Klepac R. K. and Alexander L. D. (1973) Origins and characteristics of fear of dentistry. *J. Am. dent. Assess.* **86,** 842–848.

Kleinknecht R. A., Thorndike R. M., McGlynn F. D. and Harkavy J. (1984) Factor analysis of the Dental Fear Survey with cross-validation. *J. Am. dent. Assess.* **108,** 59–61.

Klepac R. K., Dowling J. and Hauge G. (1982) Characteristics of clients seeking therapy for the reduction of dental avoidance: reactions to pain. *J. Behav. Ther. exp. Psychiat.* **13,** 293–300.

Klorman R., Weerts T. C., Hastings J. E., Melamed B. G. and Lang P. J. (1974) Psychometric description of some specific-fear questionnaires. *Behav. Ther.* **5,** 401–409.

Lang P. J. (1985) The cognitive psychophysiology of emotion: fear and anxiety. *Anxiety and the Anxiety Disorders* (Ed. by Tuma A. H. and Maser J. D.). Erlbaum, Hillsdale, N.J.

Lautch H. (1971) Dental phobia. *Br. J. Psychiat.* **119,** 151–158.

Leary M. R. (1983) Social anxiousness: the construct and its measurement. *J. Pers. Assess.* **47,** 66–75.

McGlynn F. D. (1988) Dental Fear Survey. In *Dictionary of Behavioral Assessment Techniques* (Ed. by Hersen M. and Bellack A. S.) Pergamon, New York, U.S.A.

McGlynn F. D., McNeil D. W., Gallagher S. L. and Vrana S. (1987) Factor structure, stability, and internal consistency of the Dental Fear Survey. *Behav. Assess.* **9,** 57–66.

McNeil D. W., Rainwater A. J. and Al-Jazireh L. (1986, November) *Development of a methodology to measure fear of pain.* Presented at: Meeting of the Association for Advancement of Behavior Therapy, Chicago, Ill.

Melamed B. G. (1979) Behavioral approaches to fear in dental settings. In *Progress in Behavior Modification* (Ed. by Hersen M., Eisler R. M., and Miller P. M.). Academic Press, New York.

Rachman S. and Lopatka C. (1986a) Do fears summate?—III. *Behav. Res. Ther.* **24,** 653–660.

Rachman S. and Lopatka C. (1986b) A simple method for determining the functional independence of two or more fears—IV. *Behav. Res. Ther.* **24,** 661–664.

Shoben E. J. Jr and Borland L. (1954) An empirical study of the etiology of dental fears. *J. clin. Psychol* **10,** 171–174.

Stouthard M. E. A. and Hoogstraten J. (1987) Ratings of fears associated with twelve dental situations. *J. dent Res.* **66,** 1175–1178.

Vrana S., McNeil D. W. and McGlynn F. D. (1986) A structured interview for assessing dental fear. *J. Behav. Ther. exp. Psychiat.* **17,** 175–178.

Watson D. and Friend R. (1969) Measurement of social-evaluative anxiety. *J. consult. clin. Psychol.* **33,** 448–457.