Pre-operative expectations and recovery outcomes for third molar extraction surgery in Nigeria

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Aim: Research on Western patient populations has indicated that patient expectations are important in recovery from third molar extraction (TME). However, little research has been carried out in the Sub-Saharan context. The aim of this study is to extend previous work, and explore the role of patient expectations in recovery from (TME) across a broad range of variables (including analgesic consumption, fear of dental pain and dental anxiety) for adult patients in Nigeria, using the Self Regulatory Model (SRM) as a framework. **Design:** A prospective questionnaire-based design was employed, which included key SRM variables. Seventy-five Nigerian TME hospital patients were tested at two time points; at pre-operative assessment and at seven days post-TME surgery. **Results:** There was a strong association between both preoperative expectations and the difference in anticipated and experienced symptoms ($r = -0.82$, $p < 0.001$) and also post-operative expectations and this difference score ($r = 0.65$, $p < 0.001$) demonstrating that patients either over-or underestimated the severity of symptoms, and subsequently experienced less or more severe symptoms than anticipated. State anxiety showed the strongest association with the differences in expected and experienced symptoms, rather than trait dental anxiety or fear of dental pain. **Discussion:** There may be implications for the type and nature of TME pre-operative information provided to Nigerian patients to help facilitate patients having more realistic expectations of surgery. The importance of state anxiety (not dental anxiety) in expectations may be related to TME surgery being carried out in hospital, thus possibly not perceived as a dental procedure *per se*. Thus, it may be most useful to assess and target state anxiety pre-operatively for this type of surgery. **Conclusion:** Overall, the SRM was a useful framework to examine preoperative expectations in relation to TME outcome, although it was only moderately successful in predicting outcome. Further research, possibly comparing African and European TME samples, and including clinical data would be worthy of investigation.

Key words: Preoperative expectations, surgical recovery, self-regulatory model, third molar extraction, anxiety

BACKGROUND

Third molar extractions (TME)

The removal of third molars is the most frequent oral surgery procedure after simple tooth extraction. It is commonly performed on otherwise healthy, young people who have rarely had previous experience with surgery (Litt *et al*., 1995). Although it is generally a straightforward procedure, there are a number of potential post-operative sequelae including trouble eating and swelling (Ogden *et al*., 1998), and patients often report high anxiety and pain (Conrad *et al*., 1999). Indeed, Desjardins (2000) argues that the pre-operative, intra-operative and post-operative management of pain and anxiety is a major challenge faced by oral and maxillofacial surgeons on an ongoing basis.

Pre-operative expectations

There is a growing body of evidence demonstrating that preoperative expectations can predict psychological and functional recovery in major and minor surgery. However, there is little research carried out within the TME literature. One notable study which has addressed this within the TME context is a study by McCarthy *et al*. (2003). They applied Leventhal's self-regulatory model (SRM; Leventhal, Meyer, & Nerenz, 1980) to inform the measurement of preoperative expectations, and to establish its usefulness as a framework for predicting recovery outcomes in oral surgery patients. The SRM proposes that individuals attempt to make sense of symptoms, health threats and illness by means of cognitive representations (pre-existing knowledge or schemas) and that these representations influence the selection and performance of strategies to cope with that illness (e.g., taking medicines). The results of McCarthy *et al.'s* study demonstrated that preoperative expectations can predict both objective and subjective measures of recovery. Three aspects of the model were particularly predictive of recovery; these were expected symptom severity, expected days back to normal functioning and expected ability to control symptoms.

It is important to note that there are several pre-operative assessment measures that would be useful to incorporate in a similar study, that were not included in McCarthy *et al.'s* study. First, dental anxiety was not specifically assessed. It is well documented that dental anxiety is common, with studies indicating that approximately 7-12% of individuals experience high levels of dental anxiety or phobia (Vassend, 1993; Locker,

2003; Sohn & Ismail, 2005; Health and Social Care Information Centre, 2010). Although state and trait anxiety measures may give some insight into general anxiety experienced, it may be more informative to consider the role of specific dental anxiety and its relation to expectations and recovery. Moreover, it has been found that a specific fear of dental pain is associated with dental anxiety. Van Wijk and colleagues (2006) outline a vicious circle scenario whereby anxious individuals may overestimate anticipated pain (Arntz *et al*., 1994) which may then provoke anxiety. We know that anxious individuals may experience pain more intensely (Rhudy & Meagher, 2000). Thus, it would be beneficial to assess specific fear of dental pain in order to establish how this concept relates to dental anxiety, expectations and recovery from surgery.

In summary, McCarthy *et al.* have shown that the SRM is a valuable model for understanding how preoperative expectations can influence recovery from TME surgery, and as a theoretical framework for developing and testing interventions. However, most research using this model has been conducted on Western samples (including McCarthy's study which was conducted in the UK) making their results difficult to generalise to non-Western cultures. It would be worthwhile to extend this work outside of countries and cultures which may have free access to TME and a generally high standard of living. Sub-Saharan African countries such as Nigeria have multiple tribes, varied cultural beliefs and high levels of unemployment and poverty. These differences may influence expectations and recovery variables. Nigerian general dental practitioners and oral surgeons are faced with the need to remove impacted third molars in the course of their daily practice and post-operative pain, swelling and trismus are well-documented in this population (Obimakinde, Opeodu & Akinpelu, 2012). The role of psychological factors, however, remains un-explored. Therefore, the aim of this study is to explore and understand the role of patient expectations in recovery from TME surgery across a broad range of variables (including fear of dental pain and dental anxiety) for adult patients in Nigeria.

MATERIALS AND METHODS

Design

This study was a prospective questionnaire-based design. A one sample group was tested at two time points; at pre-operative assessment and at seven days post-TME surgery. Participants were selected from the surgical waiting list for TME, conducted under local anaesthesia at a day surgery centre based in the Lagos University teaching hospital. Exclusion criteria included patients who: (a) had a chronic illness that interfered with postoperative recovery, (b) were taking medication that interfered with recovery, (c) were unable to understand or converse in English, (d) were under sixteen years of age and (e) were unable to give informed consent.

One hundred and five individuals were approached and 25 patients declined to take part; 18 gave no specific reason, 6 reported feeling too anxious, and one patient was due to emigrate after surgery. Out of the 80 participants that agreed to take part, 75 completed both pre-operative and post-operative questionnaires (41 females). Their levels of education ranged from secondary school leaving certificate to University degree. All participants were proficient in the English language, although English was their second language. All participants were black and of African descent. They included students, housewives, and both unemployed and employed individuals.

Measures

Preoperative Measures

State anxiety

The short-form version of the Spielberger *et al*. (1983) state anxiety scale, known as the STAI-6 (Marteau and Bekker, 1992) was used. This 6-item scale asks how participants currently feel: calm, tense, upset, relaxed, contented and worried. Responses are given on a 5-point Likert scale. In the present study, Cronbach's alpha was 0.73.

Trait dental anxiety

Dental anxiety was measured using the Modified Dental Anxiety Scale (MDAS; Humphries *et al*., 1995). It comprises five items reflecting the dental experience (e.g. "If you were about to have your tooth drilled, how would you feel?") and is rated on a 5-point scale ranging from 'Not anxious' to 'extremely anxious'. This measure has demonstrated good internal reliability (e.g. Newton & Edwards, 2005) and is commonly used in dental research. Cronbach's alpha was 0.79 in the present study.

Fear of dental pain

The short version of the fear of dental pain questionnaire was included in the questionnaire (s-FDPQ; Van Wijk *et al*., 2006). This questionnaire comprises five items and assesses fear of pain associated with a variety of dental procedures. Each item was answered on a rating scale of 1 (no fear) to 5 (extreme fear). In the present study, Cronbach's alpha was 0.75.

Preoperative expectations

The Illness Perception Questionnaire for Oral Surgery (IPQ-OS; McCarthy et al., 2003) assessed patients' pre-operative expectations. The measure, which was developed by McCarthy *et al*. (2003), aims to assess preoperative expectations specific to TME and (Cronbach's Alpha for this study was 0.86). The subscales are outlined below.

- Symptom identity: Participants endorse whether or not they expect to experience each of 26 symptoms, and rate the anticipated severity of each one on a 7-point Likert scale, ranging from mild to severe

- Timeline: One item was used to assess anticipated length of recovery. Participants were required to estimate the number of days they believe it will take to return to normal daily activity

- Consequences: Five statements assess participants' expectations that undergoing this surgery would affect their daily activities, social life, mood, finances, the way they see

themselves, the way others see them and their views on the seriousness of this operation. Participants respond to the statements by endorsing one of five response choices; from strongly agree to strongly disagree

- Cure/control: Two items assessed participants' expectations that they could control their symptoms and speed of their recovery. Participants respond to each item on a five-point scale from strongly agree to strongly disagree.

Outcome variables

- Symptoms: Participants indicated the severity of symptoms experienced, in the seven days post-surgery. The same symptom list was used as outlined in the preoperative measures at both time points (Cronbach's Alpha = 0.78)

- Days needed to return to work: Patients were asked on which postoperative day they had returned to work. Those that had not returned to work yet were asked to estimate the date they thought they would be returning to work

- Analgesic consumption: Patients were told to take analgesics if and when they needed to. They were asked to keep a record of the amount of pain experienced for each of the seven days following the extraction as well as the number and type of analgesics taken in this time period (these were recorded in a pain diary). The pain diary consists of a 7-day diary with a scale ranging from 0 (no pain experienced) to 5 (excessive pain experienced) for patients to record postoperative discomfort. In addition to the scale, there was a list of common analgesics, for example Feldene [piroxicam], Tabalon [Ibuprofen], Cataflam [Dicofanac Potassium], Voltaren Retard [Diclofanac Sodium]; patients were asked to tick the ones they consumed and also note the dosage.

Procedure

Patients scheduled to attend a pre-operative assessment, in preparation for TME, were sent an invitation letter and information sheet in advance of the study, to give them the opportunity to decide whether they wanted to participate.

At the pre-operative assessment appointment, which followed local routine procedures, patients were asked if they would like to participate in the study and if they had any questions. Patients who agreed to participate were asked to complete the pre-operative questionnaire booklet. Completion of these measures took no longer than 30 minutes. After patients had undergone TME (with local anaesthetic), they were given a booklet of post-operative measures to complete over the next seven days with a pre-paid envelope. Patients were asked to bring these to the seven day post-operative check-up, or to send them back in the pre-paid envelope if they could not make the appointment. Ethical approval was obtained from the Ethics committees of Kings College London and the University of Lagos Teaching Hospital.

Statistical analyses

Descriptive statistics were used to describe the sample characteristics. The Pearson correlation coefficient was used as a measure of linear association. Distributions of categorical variables were analyzed using the Chi^2-test. Independent (between groups) and dependent (within groups) mean scores were compared using the independent-samples t-test and the paired-samples t-test respectively. Hierarchical (stepwise) regression analysis was performed to investigate whether preoperative expectations would be predictive of postoperative outcomes after controlling for other variables (such as age and gender). Cronbach's alpha was used as a measure of internal consistency. The level of significance was set at alpha = 0.05.

RESULTS

A total of 75 patients were included in the analysis (41 females). A summary of patient variables is presented in *Table 1*. Age was recorded in categories and male and female patients were distributed equally across age categories, $\chi 2\ (2) = 0.14$, $p < 0.94$. Male and female patients were compared on all relevant variables. Results are displayed in *Table 2*. Only one significant difference was found; females reported taking more analgesics, $t\ (70) = 2.26$, $p < 0.03$.

Symptom severity

Pearson's correlation between expected symptom severity and experienced symptom severity was nearly zero ($r = -0.10$, $p < 0.42$) indicating a lack of association. In addition, a paired samples t-test showed no difference in mean score, $t\ (74) = 0.27$, $p < 0.79$. Next, anticipated symptom severity was deducted from experienced symptom severity resulting in a difference score (a higher score reflects more severely experienced symptoms than anticipated). The difference between anticipated and experienced symptoms was correlated with pre- and postoperative IPQ scores. See *Table 3* for an overview of correlations between all relevant variables. A strong association between preoperative IPQ and the difference score was found, $r = -0.82$, $p < 0.001$, and also between postoperative IPQ and the difference score, $r = 0.65$, $p < 0.001$, implying that patients in general either over- or underestimated the severity of symptoms, and subsequently experienced less or more pain than anticipated. The difference score was also correlated with the anxiety and fear measures. Both trait dental anxiety ($r = -0.38$, $n = 75$, $p < 0.001$) and state anxiety ($r = -0.47$, $n = 74$, $p < 0.001$) correlated significantly with IPQ difference score. However, regression analysis showed that dental anxiety had no significant contribution in the prediction of IPQ difference score after state anxiety was entered in the equation. This implies that dental anxiety contributes to a smaller extent to the difference of anticipated and experienced symptom severity.

Days back to work

Patients needed on average 8.6 days (s.d. = 2.6, range = 3-14) to return to work (which is significantly longer than in the McCarthy study; $t\ (73) = 9.71$, $p < 0.001$, where an average of 5.7 days is reported). A hierarchical regression analysis was

performed in order to test whether any of the preoperative expectations could predict the number of days needed before returning to work. MDAS, s-FDP, STAI, gender and age were entered in the first block while the preoperative expectations (IPQ-score, anticipated length of recovery, anticipated consequences and level of control/cure) were entered stepwise into the equation. Anticipated length of recovery was the only variable that had a significant contribution in predicting the number of days needed before returning to work ($p < 0.05$), after controlling for anxiety, gender and age. However, the overall model was not significant, $F (6, 66) = 1.55$, $p < 0.18$.

Next, days needed before returning to work was dichotomised into 9 days or less (n=41), and 10 days or more (n=33), and compared on the preoperative expectations and postoperative experience variables. There was no significant difference on any of the preoperative expectation variables. The group that needed 10 days or more to return to work reported taking more analgesics, $t (70) = -3.88$, $p < 0.001$, and also reported less postoperative symptom severity, $t (72) = 3.95$, $p < 0.001$, than the group with 9 days of pain or less.

Reported pain levels

None of the anxiety measures were significantly associated with pain reported in the postoperative week. Again, a hierarchical regression analysis was performed but none of the preoperative expectations was able to significantly predict the level of pain experienced. Next, pain was dichotomised using the median score (=16) and the two groups (low vs high) were compared. Results showed that as expected, the low pain group scored significantly lower on number of analgesics taken, $t (70) = -2.43$, $p < 0.02$.

Analgesic consumption

Number of painkillers taken was not normally distributed. Therefore, the following results need to be interpreted with some caution. A hierarchical regression analysis was performed, controlling for the anxiety measures, age and gender. Three variables were significant predictors for the number of painkillers taken. These were postoperative IPQ (beta = -0.57), postoperative pain (beta = 0.35) and 'consequences' (beta = 0.19), $R2 = 0.60$, $F (8, 62) = 11.78$, $p < 0.001$. The beta coefficients for postoperative pain and anticipated consequences were positive. The beta coefficient for postoperative IPQ was negative, implying that more severely experienced symptoms were related to taking fewer painkillers. Number of painkillers was dichotomised using a median split (=8). Low vs. high use of painkillers was related to gender, $\chi 2 (1) = 6.82$, $p < 0.009$, resulting from relatively more female patients in the high use of painkillers group. To conclude, a significant difference was shown on the level of pain reported, $t (70) = -4.36$, $p < 0.001$, resulting from a lower score from the group who took the most painkillers.

Table 1. Summary of patients' characteristics

		M (n=36)	F (n=39)	Total
Age	21-30 31-40 41-above	15 13 8	16 13 10	31 26 18
Maritial status	Single Married Divorced Separated	16 17 1 2	19 18 0 2	35 35 1 4
Education years	Mean (SD) =	16.3) (4.8)	14.5 (3.7)	15.4 (4.3)

Table 2. Mean scores and standard deviations, for male, female and total sample on all measures.

	Female		Male		Total	
Measure	Mean	S.D.	Mean	S.D.	Mean	S.D.
Anxiety						
Trait dental anxiety (MDAS)	15.59	3.39	14.0	4.68	14.83	4.12
Fear of dental pain (s-FDPQ)	18.10	4.05	16.44	4.53	17.31	4.34
State anxiety (STAI-6)	14.95	4.10	13.14	4.61	14.07	4.58
Expectations						
IPQ-pretreatment	41.46	21.67	40.14	24.57	40.83	22.96
Anticipated length of recovery	5.97	2.31	7.06	2.92	6.49	2.66
Consequences of surgery	15.44	3.06	14.83	3.34	15.15	3.19
Control of recovery	4.39	1.07	3.94	1.33	4.17	1.21
Experience						
Pain after surgery	16.67	2.90	16.61	3.48	16.64	3.17
Number of analgesics taken*	10.35	2.89	8.8	2.92	9.60	2.99
Number of days back to work	8.45	2.84	8.75	2.27	8.60	2.56
IPQ after surgery	36.82	16.86	43.25	17.04	39.91	17.14

* $P < 0.05$.

Table 3. Pearson's correlations between all relevant variables.

	Preoperative expectations			Postoperative Experience				
	2	3	4	5	6	7	8	9
Preoperative expectations								
1 IPQ (preop)	0.16	-0.19	0.21	-0.15	-0.16	0.07	-0.09	**-0.82**
2 Days back to work		-0.12	0.19	-0.20	-0.15	-0.15	0.19	-0.01
3 Consequences			-0.03	0.09	0.20	-0.04	0.04	0.16
4 Cure control				-0.13	-0.02	-0.05	-0.05	-0.20
Postoperative experience								
5 Pain					**0.46**	-0.01	-0.18	0.01
6 Analgesic use						0.21	**-0.64**	***-0.23***
7 Days back to work							***-0.24***	-0.20
8 IPQ (postop)								**0.65**
9 IPQ difference score								

Bold and italic: $p < 0.05$; **Bold**: $p < 0.01$

Table 4. Pearson's correlation between the anxiety measures and IPQ scores

	Pre-IPQ	Post-IPQ	STAI	MDAS
Pre-IPQ				
Post-IPQ	-0.10			
STAI	0.51	-0.14		
MDAS	0.32	-0.23	0.57	
FDP	0.13	0.01	0.32	0.24

Bold and italic: $p < 0.05$; **Bold**: $p < 0.01$

DISCUSSION

The present study set out to explore and understand the role of Nigerian patients' preoperative expectations with respect to recovery from TME surgery, in terms of postoperative pain, analgesic consumption and number of days needed before returning to work, taking into account measures of dental anxiety and fear of dental pain. To our knowledge, this is the first study of its nature to be undertaken in a non-Western country such as Nigeria, a country very different to those within which previous TME studies have been conducted e.g. UK and the Netherlands.

There was no correlation between anticipated symptom severity, as measured by the IPQ, and reported symptom severity, which does not reflect McCarthy's findings. There was also no difference between the scores on a paired t-test. Therefore, a difference score was calculated (higher score reflecting more severe experienced symptoms than anticipated) which correlated negatively with preoperative, and positively with postoperative, symptom severity. This implies that patients in general either over- or underestimated the severity of symptoms, and subsequently experienced less or more severe symptoms than anticipated. This is a potentially important clinical finding, and may have practical implications for the type and nature of TME pre-operative information provided to Nigerian patients to help facilitate patients having more realistic expectations of surgery.

State anxiety was negatively correlated ($r = -0.47$) with the IPQ difference score, suggesting that anxiety contributes to the over/underestimation of symptom severity. Research suggests that anxious individuals tend to overestimate the anticipated intensity of aversive events such as fear (Rachman and Bichard, 1988; Rachman, 1994) and pain (Arntz *et al*., 1994). Therefore, it seems a plausible explanation that the anxious patients overestimated anticipated symptom severity, and subsequently experienced less severe symptoms. This reasoning is supported by the correlation found between state anxiety and preoperative IPQ score ($r = 0.51$) implying that anxious patients overestimate the anticipated symptom severity. Conversely, it may also be the case that the patients who have less anxiety and report more severe symptoms, are not experiencing the critical or 'healthy' level of preoperative worry needed to reduce the stressfulness of surgery (Salmon, 1993). Therefore these results may support the 'work of worry' hypothesis, that a moderate amount of anxiety is optimal pre-operatively for post-operative recovery (Janis, 1958).

State anxiety showed the strongest association with the IPQ difference score, rather than dental anxiety or fear of dental pain, contrary to expectations. The MDAS and s-FDPQ are dental (pain) specific fear measures, and were included in the study as we forecast they would both be better predictors than state anxiety. It may well be the case that in this context (TME surgery in Nigeria) anxiety surrounding the dental context specifically is not as important in terms of the relationship between symptoms experienced and expected. It may be that TME is taking place in a (dental) hospital, and is framed in terms of surgery rather than routine dental treatment taking place in a dental office. Thus, the dental variables are not as relevant or potent in terms of affecting symptom perception.

Interestingly, patients in our study needed significantly longer than in the McCarthy *et al* (UK) study (8.6 vs. 5.7 days) to return to work, which may reflect a cultural difference. It certainly demonstrates the need to further explore the factors that influence post-operative recovery from TME so these can be targeted and patients can return to work sooner in Nigeria.

After correcting for age, gender, and the anxiety measures, only anticipated length of recovery was a significant predictor of days needed to return to work. Although the overall model was not significant, the result does show that this specific expectation predicts the relevant outcome variable, which is exactly what the SRM model specifies and what was found in the McCarthy (2003) study. The association between the two variables may have been obscured by differences in how they were operationalised. That is, anticipated length of recovery (timeline) asks for a 'return to normal daily activities' while the other asks for a 'return to work'. Apart from the fact that this is just not the same, 'return to work' may be biased by the fact that not all patients had jobs (reflecting the high level of unemployment in Nigeria). Moreover, if patients had not returned to work yet when returning the completed questionnaires, they had to estimate the additional number of days before returning to work. Altogether, these limitations may account for the weak association found between anticipated length of recovery (timeline) and actual recovery (days needed to return to work).

Findings regarding pain in the postoperative week were interesting. Those that reported the least amount of pain also took fewer analgesics, which is intuitive. That is, if one is not in pain then analgesics

are less likely to be needed. With respect to analgesic consumption, regression analysis showed that postoperative IPQ, postoperative pain, and anticipated consequences were significant predictors. This result also confirms the ability of some preoperative expectations to predict postoperative outcomes.

With regards to reported analgesic consumption and post-operative IPQ score (i.e. symptom severity), the beta coefficient in the regression for postoperative IPQ was negative, implying that more severely experienced symptoms were related to taking fewer painkillers. There are a number of possible explanations for this finding. Firstly, it may be that those who took fewer painkillers (due to not wanting to or not being able to take pain medications) experienced more severe symptoms. A less intuitive interpretation is that those who experienced greater severity of symptoms consumed fewer analgesics. Alternatively, there may be a third variable that is related to both of these explanations. For example, those who are worried about physical side effects of painkillers are also worried about (and over-report) post-operative symptoms. However, this is speculative and future research should seek to explore these relationships in more detail.

The most obvious limitation of this study is the lack of clinical data. Due to staffing issues, it was not possible to obtain data on numbers of molars extracted, length of surgery and difficulty of surgery. Although McCarthy et al did not find that these 'medical' factors were as predictive of recovery as patient expectations, we cannot infer the impact on key variables in this study so must interpret our current results with caution. We would recommend that, where possible, this is collected for further studies in this area.

Nevertheless, our study has a number of merits. We have recruited a sample that is traditionally under-researched in terms of oral health and psychological variables (Okunseri *et al*, 2005). We have followed patients up from pre-operation to 7 days post-TME and collected data on a number of pertinent self-report psychological (anxiety, expectations etc) and objective (analgesics) variables, within the self-regulatory framework/theory.

CONCLUSION

Overall, the Self Regulatory Model was a useful framework to examine preoperative expectations in relation to TME outcome, although it was only moderately successful in predicting outcome. This may, however, be due to the nature of the sample and the study design. Further research, possibly comparing African and European TME samples, and including clinical data (as well as clearer indicator of return to normal functioning) would be worthy of investigation.

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