THE ROLE OF EXPERIENCED PAIN IN THE ASSESSMENT OF FEAR OF PAIN: A PREDICTIVE VALIDITY STUDY OF THE FEAR OF PAIN QUESTIONNAIRE - III

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Abstract

This study investigated the hypothesis that individuals classified as pain-fearful by the Fear of Pain Questionnaire - III (FPQ-III) would demonstrate greater behavioral avoidance of pain when compared to low fear controls. Groups high and low in fear of pain were identified and subjects completed psychometric instruments and participated in a behavioral assessment test (BAT) in which they experienced a painful stimulus from an algometer designed to produce a clinical-like physical pain. During the BAT, verbal reports and heart rate were collected, as was performance data. The predictive validity hypothesis was supported as high fear subjects evidenced significantly greater avoidance than their low fear counterparts, and manifested significant increases in state anxiety, over the course of the BAT. Greater cardiac increase during the BAT was also found in the high fear group relative to the low fear group.

The Role of Experienced Pain in the Assessment of Fear of Pain: A Predictive Validity Study of the Fear of Pain Questionnaire - III

The negative consequences of living with pain reach into the affected person's personal, interpersonal, and occupational life. Patients who struggle with a pain disorder are frequently depressed (Schaffer, Donlon, & Bittle, 1980; Brown, Rawlinson, & Hardin, 1982), and have marital (Flor, Turk, & Scholz, 1987) and sexual problems (Maruta, Osborne, Swanson, & Halling, 1981). The total cost of health care for pain treatment approaches 40 billion dollars annually; with the average American employee missing five days a year because of pain, the productivity loss reaches 55 billion dollars (Budiansky, Carey, Wellborn, & Silberner, 1987).

The fear associated with pain can be so intense that it will lead to avoidance of many different types of potentially painful situations. This overgeneralized avoidance does not promote healing; it may only insulate the individual from experiencing further pain (Boles & Fanselow, 1980), and can lead to an exacerbation of disease (Lindsay & Woolgrove, 1982). This fear of pain can even influence individuals to abandon health-oriented behaviors (Philips, 1983), including exercise, and medical/dental procedures. This avoidance

behavior may then predispose the patient to developing chronic pain syndrome (Philips & Jahanshahi, 1985).

In a historical review of the literature, it appears that not much work has been done investigating fear of pain. James (1899) did allude to the concept when he described anxiety as a fear prompted by awareness of peripheral physiological changes generated by imminent danger of pain. An existential view of fear of pain was taken by Walker (1945) when he discussed it as one of the many fears of growing old, along with fears of suffering and death. The first mention of the concept in a clinical vein seems to be Webb's (1966) use of the phrase "fear of pain" in the title of an article aimed at helping pediatric nurse trainees deal with children who are frightened in anticipation of pain. A subsequent published article looked at the cause and effect aspect of the fear of pain concept, and specifically "the two-way interactions between fear and pain" (British Dental Association, 1975, p. 308). It is posited in this article that pain-fearful individuals experience pain in the dental clinic at every appointment and are thus predisposed to not want to return to the dentist's office. This idea of anticipatory pain has been a consistent area of investigation through the years. More recently, Kent (1985) investigated anticipatory pain problems in dental patients and found that anxious patients report experiencing more pain than their

nonanxious counterparts. The pain these anxious dental patients indicate, however, is not as great as they anticipated prior to dental work. Therefore, the anticipation of and anxiety associated with pain are central psychological factors in the experience of pain. This finding is consistent with Melzack and Wall's (1982) hypothesis that anticipation of pain is sufficient to raise anxiety, which intensifies the subjective experience of pain.

Looking at the more theoretical aspects of the fear of pain concept, Lethem, Slade, Troup, and Bentley (1983) propose that the degree of fear of pain and the style of responding to pain (i.e., confronting versus avoiding), work together to produce avoidance behavior. In this conceptualization, patients develop chronic pain syndrome when they avoid pain because of fear. Individuals who confront pain-related fear are more likely to progress past the acute phase of pain and return to functional living. Further work (Slade, Troup, Lethem, & Bentley, 1983) has supported the fear-avoidance model with data indicating that fear plays a major role in the ability to deal with pain. Specifically, in this study, back pain patients using passive styles of coping with pain were found to have significantly longer, and more frequent back pain episodes than those with active (i.e., confrontive) strategies.

Focusing on this interaction between fear and pain, the purpose of the present investigation was to further validate a verbal report measure of fear of pain (i.e., the Fear of Pain Questionnaire) by testing its use in predicting behavioral avoidance of a painful stimulus. The original version of the Fear of Pain Questionnaire (FPQ-I) was developed and refined (FPQ-II) in a preceding study (Rainwater & McNeil, 1986) in a program of investigations describing and assessing fear of pain. In subsequent work (McNeil, Rainwater, & Aljazireh, 1986), the FPQ-II was successfully used to predict avoidance behavior in a pain-analogue situation (e.g., viewing videotape segments of painful dental procedures). The questionnaire has now been factor analyzed (McNeil & Rainwater, 1989) and is used in its most sophisticated form to date as the Fear of Pain Questionnaire - III (FPQ-III).

The question of how gender might influence fear of pain has been addressed (Rainwater & McNeil, 1986; McNeil & Rainwater, 1989) with results failing to support the existence of a significant gender difference. However, this finding goes contrary to the historical trend for females to exhibit more overt expressions of fear (Geer, 1965; Bernstein & Allen, 1969; Farley, Mealiea, & Sewell, 1981).

To further validate the instrument, and specifically to test the FPQ-III's predictive validity, a logical step was taken

in this study to move the methodology from an analogue to an experiential level. Subjects' in vivo experience of pain will be accomplished by presenting them with a controlled degree of actual physical pain. This pain will be produced using an algometer, a device that produces a dull aching sensation that eventually becomes painful via a weighted bar pressed against a finger (for a literature review on this device, see Appendix A). The ultimate goal of this program of research is the development and refinement of a screening instrument that will help identify pain patients in the early stages of pain recovery whose fear of pain makes them vulnerable to avoidance of recuperative health care and consequently to becoming chronic pain patients. If it becomes possible to identify these at-risk patients through use of the Fear of Pain Questionnaire - III, clinical interventions might be devised to help prevent them from developing chronic pain syndrome.

Hypotheses. It is anticipated that fear of pain, as represented by FPQ-III total scores, will be shown to be predictive of behavioral avoidance of physical pain, as evidenced by a high fear group's demonstration of greater avoidance of, and more state anxiety associated with physical pain, relative to a low fear of pain group. If these group differences are manifested, then they will provide support for

the predictive validity of the FPQ-III via successful identification of individuals who evidence behavioral avoidance of pain. It is expected that subject gender will influence responses, such that females will manifest greater verbal reports of fear, and behavioral avoidance associated with pain. It is further expected that the FPQ-III will be the best predictor of behavioral avoidance when compared to selected measures of fear, psychopathology, anxiety and imagery ability. Moreover, it is specifically predicted that degree of fear of pain will be positively related to state anxiety, to the overall level of psychopathology, and to the subject's imagery ability. Finally, it is predicted that there will be both baseline and within trial differences in psychophysiology between the fear groups, with the high fear subjects evidencing greater psychophysiological arousal.

Method

Subjects

Subjects were selected from a screening pool of undergraduate university students in Introduction to Psychology classes. There were two equal-numbered, gender-balanced groups of 20 subjects each; the mean age of the sample was 19.3 years (*SD* = 1.7). To maintain consistency with prior studies (e.g., Rainwater & McNeil, 1986; McNeil, Rainwater, & Aljazireh, 1986), the high fear group consisted of

students who scored high in reported fear of pain (i.e., top 8% of their same-gender distribution of self-rated fear of pain), while the low fear group was composed of students with lower scores (i.e., bottom 20-30% of their same-gender distribution).

Materials

The FPQ-I was originally developed as a 32-item screening tool (Rainwater & McNeil, 1986). The FPQ-I presented detailed descriptions of eight painful situations (e.g., hitting your thumb with a hammer, having dental work done). It required the subject to rate the degree of fear and other affective responses s/he would experience if confronted with various painful stimuli. The instrument was then expanded and presented as the FPQ-II (McNeil, Rainwater, & Aljazireh, 1986) which consisted of 57 items (e.g., burning your finger with a match, receiving an injection in your arm) rated on a 5-point Likert-type scale (Likert, Roslow, & Murphy, 1934). Factor analytic refinement (McNeil & Rainwater, 1989) of the FPQ-II streamlined the questionnaire into its current version as the FPQ-III (see Appendix B) consisting of 30 painful experiences, based on the original FPQ-II items, which are rated on the same 5-point Likert-type scale. The principal components analysis of the FPQ-III utilized varimax rotation and yielded three stable factors, each with an eigenvalue greater than 1.0. The factors are contributed to from

subscales of ten items each: Minor Pain, Severe Pain and Medical Pain.

Each subject completed the FPQ-III and other psychometric instruments including: the Fear Survey Schedule - III (FSS-III; Wolpe & Lang, 1964, 1969), the Eysenck Personality Inventory (Psychoticism-Neuroticism scale, EPI-PN; Extroversion-Introversion scale, EPI-EI; Eysenck & Eysenck, 1968), the State (STAI-S) and Trait (STAI-T) portions of the State-Trait Anxiety Inventory (STAI, Form Y; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1977), and the Questionnaire upon Mental Imagery (QMI; Sheehan, 1967; shortened version of Betts' 1909 Questionnaire upon Mental Imagery; reprinted in Richardson, 1969). The FPQ-III, FSS-III and STAI were utilized to measure different types of anxiety and fears. The EPI and QMI were employed to gain an understanding of the general neuroticism and imagery abilities of these subjects to begin to explore the relationships between these characteristics and the fear of pain construct.

Apparatus and Laboratory

The algometer constructed for this study was patterned after the device introduced by Forgione and Barber (1971). Modifications of this instrument described by Forgione (personal communication, September 4, 1987) and experimentally utilized by Dougher, Goldstein and Leight

(1987) were also incorporated. These modifications allowed the algometer to produce pressure from a vertical slide position rather than the angled pressure of the original device, which utilized a hinged and slanted approach.

The apparatus was used to apply focal pressure to an area of skin sparse in muscle and fat and directly over bone (i.e., second phalanx of the finger). A dull lucite edge (approximately 10 mm wide and .25 mm thick at the point of contact with the skin) was lowered onto the finger with vertical pressure (i.e., 1000g) which produced a slowly "...building 'aching' pain that tends to resemble the type of pain commonly observed in clinical settings" (Forgione & Barber, 1971, p. 105).

Heart rate (HR) activity was recorded using electrocardiogram (ECG) signals that were amplified and filtered using a Coulbourn Instruments (CI) High Gain Bioamplifier/Coupler (Model S75-01) and a Schmitt trigger apparatus (a CI Bipolar Comparator [Model S21-06] and a CI Retriggerable One Shot [Model S52-12]). This equipment signaled the detection of cardiac R-waves. A Scientific Solutions Labmaster laboratory interface board was used to link the cardiac data apparatus with an IBM-PC XT, which was used for data acquisition. Data collection and SAM stimuli presentation were controlled through a multipurpose software

program written specifically for collection of psychophysiological and other data with this configuration of hardware (Cook, Atkinson, & Lang, 1987).

The experiment room was adjacent to a control room and linked via intercom; a one-way mirror allowed a secondary experimenter, who ran the psychophysiological instrumentation, to observe the subject during the BAT. The subject was seated in an armless desk chair at a table measuring 60.3 cm wide, 111.1 cm long, and 72.4 cm high upon which the algometer was stationed.

Procedure

Subjects in the screening pool were administered the FPQ-III en masse, and told that they might be contacted later and asked to volunteer for the second part of the study. Those that met the percentile criteria for inclusion in one of the groups were then identified. Next, telephone calls were made to invite individuals to participate in the subsequent laboratory experiment (see Appendix C). After the subject reported to the lab, informed consent (see Appendix D) was obtained by the primary experimenter. Next, some basic information about the subject was obtained, to assure that s/he was appropriate for inclusion in the study (see Appendix E). After introducing the questionnaires, the primary experimenter left the room to allow the subject to complete

them in the following order: FPQ-III, FSS-III, EPI, STAI, and QMI.

To assess how these subjects might respond to pain, they were asked to participate in a behavioral assessment test (BAT) consisting of placing a finger in an algometer that produces a deep tissue pain. For performance in the BAT, the subjects were divided into gender and group-balanced subgroups. The principal investigator served as the male primary experimenter for one of these subgroups, and a female undergraduate assistant, trained specifically as an experimenter for this study, served as the primary experimenter for the other subgroup. This allowed an equal number of males and females in both the high fear and the low fear groups to be assessed by a same or an opposite gender experimenter.

After completion of the questionnaires, the subject was rejoined by the primary experimenter and escorted to an experiment room where the primary experimenter conducted the BAT. The subject was seated and Beckman 16 mm, self-adhesive silver-silver chloride ECG electrodes were applied in the standard dual proximal-ventral forearm position for recording HR. Prior to placement, the electrode site was cleaned and prepared with an alcohol prep-pad and dried with a gauze sponge.

Audiotaped instructions (see Appendix F) for participating in the BAT were broadcast to the subject advising that any pain trial could be avoided at any point. These instructions were recorded in the voice of the primary experimenter and followed a low-demand style (Miller & Bernstein, 1972) so as to readily allow avoidance. Baseline psychophysiological data was then recorded for 4 min.

The experimenter began the BAT by lowering the blade onto the subject's right index finger. When the blade touched the subject's finger, the primary experimenter said aloud "start," thus signaling the secondary experimenter to simultaneously start the timing of the trial and the recording of the psychophysiology. At 10 s intervals, the subject was asked to report the status of his/her feeling state using a scale such as that reported by Otto and Dougher (1985): 1 = mild pressure, 2 = moderate pressure, 3 = mild discomfort, 4 = moderate discomfort, 5 = mild pain, 6 = moderate pain, 7 = severe pain. When the subject reported a "7," the primary experimenter stopped asking the subject to report on the sensation and said: "Please hold." (The subject had been previously informed in the BAT audiotaped instructions that this "endurance period" would be stopped by the primary experimenter after a maximum time period of 1 min, unless the subject stopped it before that time.) When the subject

said "stop," the timed trial and the physiology recording were ended, and the primary experimenter immediately lifted the pressure blade. The time (rounded to the nearest second) taken to elicit a report of "5" represented the subject's pain threshold (Otto & Dougher, 1985), and the time to report a "7" was taken to measure the subject's pain ceiling (Dougher, 1979) for the trial. The length of time (rounded to the nearest second) the level "7" pain was tolerated was taken as the subject's level of pain tolerance (Merskey, 1974).

Measures of refusal behavior and avoidance times were calculated. Refusal behavior was defined as a dichotomous event where outright refusal to participate in any portion of one or more trials (out of a maximum of six) placed a subject in the category of having refused some portion of the total BAT. The number of trials refused by a subject was taken to represent the degree of refusal behavior. Avoidance time was calculated by subtracting the amount of time spent in the BAT from the maximum (240 s) possible time for the trials.

The subjects then rated their experience in each trial using Lang's (1980) self-assessment mannequin (SAM). An interactive computer program allowed the subject to use SAM figures to give ratings on the following 21-point (0-20) scales: valence (i.e., happy--unhappy), control (i.e., in control-

-controled), and arousal (i.e., aroused--calm). Ratings were rendered after each trial.

A maximum of six trials were conducted with each subject. If the subject chose to continue in the experiment, the subsequent trials were conducted in the same manner as the first. Different fingers on alternating hands (i.e., Right Index, Left Index, Right Middle, Left Middle, Right Ring, Left Ring) were used for each trial. When the BAT was finished, the subject was asked to complete the State portion of the STAI. Once this final measure was obtained, the electrodes were removed from the subject.

An exit interview (see Appendix G) was then conducted to gather information on the subject's previous exposure to pain, how s/he experienced the pain of the algometer, and his/her physical exercise style. Inquiry was also made as to the research participant's subjective feeling state vis a vis his/her fingers. Finally, participants were thoroughly debriefed as to the purpose of the experiment and future applications (e.g., work with chronic pain patients.); questions from participants were elicited and answered fully.

Data Reduction

The HR instrumentation was calibrated for each subject to minimize "double trigger" recordings (i.e., one heartbeat measured twice). The data were later edited for any such HR

outliers. This editing consisted of collapsing the two very rapid heartbeats into a single recording that was more consistent with the modal HR for that subject.

A single median HR value was then calculated for each subject for each trial, including the baseline and each subsequent trial (or portion thereof) in which they participated. Heart rate change scores were then calculated for univariate analysis. These change scores were derived by subtracting the median HR baseline (240 s) from the median HR of each trial (up to 240 s).

Results

To begin the statistical analysis, the data were reduced into logical divisions so that multivariate analyses of variance (MANOVA) could be performed, as appropriate, for the main factors of group membership, subject gender, and experimenter gender (Jain & Dubes, 1988). These divisions included: (a) the psychometric instruments (i.e., FSS-III, QMI, EPI-PN, EPI-EI, STAI-T, STAI-S-pre, and STAI-S-post), (b) refusal behavior and avoidance time data from the BAT trials (i.e., refusals, amount of time spent in the pain trials, total pain threshold, total pain ceiling, and total pain tolerance), and (c) self-report data collected in the BAT and exit interview (SAM scores, pain similarity rating, personal pain experience, witnessing of pain experience, routine exercise, and pain associated with

exercise). The HR data were analysed with a 2 x 2 repeated measure ANOVA on HR change scores.

As a function of the experimental design, cardiac and SAM data were "lost" as subjects exercised their right to not continue through all six trials of the BAT. When this was the case, analyses were appropriately adjusted for unequal cell sizes.

Significant main effects were found in the psychometric data for subject group (F [7,26] = 4.76, $p < .01$), and subject gender (F [7,26] = 2.29, $p < .10$). (Since this latter effect was hypothesized, a significance level of $p < .10$ was considered appropriate for further consideration of univariate results.) Effects for experimenter gender and interactions were nonsignificant (all p's > .10).

Subject group exerted a significant main effect on the BAT behavioral data (F [6,27] = 4.47, $p < .01$). The MANOVA main effect for subject gender on BAT behavior, however, was not significant ($p > .10$). The experimenter gender and interaction variables were also nonsignificant (all p's > .10).

A significant main effect was found for the self-report (i.e., SAM and exit interview) data of the BAT for subject gender (F [8,24] = 3.50, $p < .01$). The remaining variables of group membership and experimenter gender, and all interactions were nonsignificant (all p's > .10).

As noted above, the experimenter gender factor did not exert any significant effects on any of the dependent variables (all *p*'s > .10). Thus, no further analysis or discussion will include this independent variable.

Psychometric Data

The subject selection process was successful as there were significant group differences for the FPQ-III total score (*F* [1,38] = 68.23, *p* < .0001), the FPQ-III minor pain subscale (*F* [1,38] = 61.87, *p* < .0001), the FPQ-III severe pain subscale (*F* [1,38] = 30.93, *p* < .0001), and the FPQ-III medical pain subscale (*F* [1,38] = 28.87, *p* < .0001) with the high fear group means being higher in all cases. On other questionnaires, the high fear group was generally more fearful (FSS-III; *F* [1,32] = 21.15, *p* < .0001) and more neurotic (EPI-PN; *F* [1,32] = 12.95, *p* < .001). There was a significant group difference on trait anxiety with the high fear group evidencing significantly more characterological anxiety (*F* [1, 32] = 4.39, *p* < .05). Table 1 presents means and standard deviations for all psychometric instruments by group.

Insert Table 1 about here

It was predicted that the high fear subjects would exhibit more state anxiety than low fear subjects. This

differences was significant for the post pain trial measurement of state anxiety (High fear M = 40.9, Low fear M = 35.9; F [1,32] = 3.01, $p < .05$, one-tailed). The direction of the means was the same for the STAI-S-pre measure (High fear M = 36.2, Low fear M = 34.4), but was nonsignificant (F [1,32] = .31, $p > .10$, one-tailed).

To assess if the level of state anxiety changed pre to post, the data were conceptualized in a 2 x 2 ANOVA fashion to produce an error estimate so that planned comparisons could be performed. The groups did not differ in the amount of change in state anxiety (F [1, 38] = 1.45, $p > .10$). There were, however, significant within-group differences. While both groups experienced an increase in anxiety as a result of participating in the BAT, the low fear subjects' change was nonsignificant (pre-M = 34.4, post-M = 35.9; $t(38) = .8112$, $p > .10$, one-tailed). The change from the original measurement (M = 36.2) to the post-BAT measurement (M = 40.9) was a significant increase for the high fear subjects, $t(38) = 2.51$, $p < .05$, one-tailed.

To investigate the relationship between fear of pain and anxiety, correlational analyses were performed between the FPQ-III and the other psychometric instruments. As expected, the FPQ-III was found to be significantly positively correlated with the subject's overall level of psychopathology as

measured by the FSS-III ($r(39) = .77$, $p < .0001$) and the psychoticism-neuroticism scale of the EPI ($r(39) = .49$, $p < .01$). Contrary to predictions, fear of pain was not found to be significantly related to state anxiety either before the pain trials (pre-$r(39) = .233$, $p > .10$), or following them (post-$r(39) = .235$, $p > .10$), or to imagery ability as represented by QMI scores, $r(39) = .13$, $p > .10$. The correlation for trait anxiety was low and marginally significant (STAI-Trait; $r(39) = .297$, $p < .10$).

An additional correlation was calculated between the total scores of the FPQ-III given during the screening and those obtained during the experimental phase as a measure of reliability. A strong test-retest relationship was found, $r(39) = .88$, $p < .0001$.

To assess which of the psychometrics given was the best predictor of behavioral avoidance, a stepwise regression analysis was performed. As predicted, the FPQ-III was the strongest predictor of the amount of time avoided in the pain trials ($R2 = .50$, $p < .0001$). Additionally, the FPQ-III was also the best predictor of pain thresholds ($R2 = .34$, $p < .0001$), pain ceilings ($R2 = .38$, $p < .0001$), and pain tolerances ($R2 = .59$, $p < .0001$). In an attempt to see if the percentage of variance accounted for might be meaningfully increased, data from other psychometric measurements (e.g., FSS-III, QMI, EPI-EI,

EPI-PN, STAI-S-PRE, and STAI-T) were added to the model as predictors (Belsley, Kuh, & Welsch, 1980). However, no predictors other than the FPQ-III met a 0.15 significance level criteria for entry into the model.

Given the marginal MANOVA result ($p < .10$) for gender influence on the psychometric data, results from univariate analyses will be presented with caution. In keeping with the expectation that gender would influence the report of fear, females ($M = 153$) reported more fear that males ($M = 89.3$) on the FSS-III (F [1,38] = 9.69, $p < .01$, one-tailed). A significant difference was found on the FPQ-III, (F [1,38] = 3.64, $p < .05$, one-tailed) with females ($M = 94.8$) having significantly higher scores then males ($M = 80.2$) as predicted. Table 2 presents means and standard deviations for all psychometric instruments by gender.

Insert Table 2 about here

Behavioral Data

As illustrated in Figure 1, significant group differences were evidenced for degree of refusal behavior with high fear subjects having more refusals on average ($M = 1.6$, $SD = 2.1$) than low fear subjects ($M = .5$, $SD = 1.2$), F [1,38] = 4.58, $p < .05$, one-tailed.

Insert Figure 1 about here

When considering refusal behavior as a dichotomous event, the use of the FPQ-III scores was reasonably successful in predicting group responses, $\chi 2(1) = 3.135$, $p < .10$; see Table 3. Table 4 shows how the high fear group avoided a significantly

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Insert Tables 3 and 4 about here

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greater total amount of time in the pain trials (F [1,38] = 20.69, $p < .0001$). As can be seen from the univariate analyses of variance (ANOVAs) in Table 5, these differences in avoidance times were not only a function of the total avoidance time, but were consistently different across all trials.

Insert Table 5 about here

Additionally, the groups evidenced predicted directional differences on pain threshold (F [1,32] = 11.10, $p < .01$, one-tailed), pain ceiling (F [1,32] = 15.05, $p < .01$, one-tailed), and pain tolerance (F [1,32] = 28.76, $p < .0001$). The ANOVAs on

these data across trials are presented in Table 6. Figures 2, 3, and 4 illustrate that the high fear group had significantly

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Insert Table 6 about here

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lower pain thresholds, pain ceilings, and pain tolerances than the low fear group.

Insert Figures 2, 3 and 4 about here

As stated earlier, there was no significant MANOVA main effect for gender on the behavioral data. However, examination of univariate ANOVA's may help guide future research in this area. It was hypothesized that females would evidence greater behavioral avoidance than males. Contrary to this, the males ($\underline{M}$ = 923.8) had larger average total avoidance times than did the females ($\underline{M}$ = 858.7), thus the directional hypothesis failed ($\underline{F}$[1,38] = 4.00, $\underline{p}$ > .10, one tailed). If the same hypothesis is considered nondirectionally, it approaches significance ($\underline{p}$ < .10) suggesting gender may indeed play a meaningful role. However, lack of consistent gender differences in the following ANOVAs suggests uncertainty about the possibility of gender exerting significant influence over fearful behavior. There was no gender difference in

average totals for pain threshold (F [1,32] = 2.09, p > .05; male M = 287.4, SD = 231.7; female M = 178.2, SD = 288.1), but differences were seen for pain ceiling (F [1,32] = 4.17, p < .05; female M = 540.2, SD = 444.8; male M = 305.4, SD = 384.0) and pain tolerance (F [1,32] = 5.63, p < .05; male M = 189.6, SD = 133.2; female M = 166.5, SD = 123.6).

Psychophysiological Data

The repeated measures ANOVA revealed there was a significant effect of HR change across trials, F[5,25] = 3.17, p < .05, one-tailed. However, group differences in HR change were statistically significant only in trial four (F[1,29] = 5.11, p < .05, one-tailed; p's for all other trials > .10). Table 7 reveals that mean HR changes across trials were greater in the high fear group for trials one through four. This difference, however, fails in trials five and six. These findings suggest the between group difference is the result of a

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Insert Table 7 about here

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pattern of significance based on individual trial effects that was too small relative to the amount of variability present (Bernstein, Garbin, & Teng, 1988). Contrary to predictions, the high fear (M = 71.4 bpm, SD = 12.0) HR baseline was not

significantly greater than that of the low fear (M = 73.3 bpm, SD = 8.8) group (F[1,38] = .30, one-tailed, p > .10).

While no subject gender hypothesis was posited for HR, a posteriori investigation of the data was performed because of the inconsistent findings seen for HR differences between groups. A significant (F [1,38] = 6.04, p < .05) HR baseline difference was found between genders with females (M = 76.2 bpm, SD = 11.6) showing greater resting HRs than males (M = 68.5 bpm, SD = 7.7).

Self-Report Data

As already noted, the MANOVA revealed no significant main effect for the self-report data. In Table 8, a variety of gender differences are seen in the self-report data given in conjunction with the BAT. Males were more likely to have had

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Insert Table 8 about here

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experience with "severe pain" (F [1,31] = 5.70, p < .05); females rated the pain produced by the algometer as more similar to "real pain" (F [1,31] = 8.59, p < .001). There was no difference in the amount of routine exercise obtained by the males and females (F [1,31] = .20, p > .10), but there was a trend for the

males to experience pain more routinely as a part of their exercise, F [1,31] = 3.46, $p < .10$.

Males felt significantly more dominated by the pain experienced in the BAT than did the females (F [1,31] = 5.55, $p < .05$), and there was a nonsignificant trend for females to experience more arousal (F [1,31] = 3.60, $p < .10$). No gender differences were found for the valence ratings of the BAT, F [1,31] = .13, $p > .10$.

Discussion

Reduced activity levels and avoidance as a response style have been linked to the development of chronic pain (Dolce, Crocker, Moletteire, & Doleys, 1986). Avoidance behavior due to pain is such a prevalent sequela of major physiological injuries that it has been incorporated into proposed criteria for the determination of disability due to pain (Turk, Rudy, & Stieg, 1988). The results of the present study are consistent with the general hypothesis that part of what motivates this avoidance is fear of pain.

The major hypothesis regarding the predictive validity of the FPQ-III was supported in this study. The FPQ-III was successfully used to predict the high fear of pain group's greater avoidance of pain in the BAT task. Specifically, the high fear group exhibited more total avoidance time, and

consistently avoided more quickly in each trial, relative to the low fear subjects.

Specific characteristics of avoidance are seen in the group differences between pain threshold, pain ceiling, and pain tolerance. For all of these variables, the high fear group demonstrated significantly less endurance of exposure, indicating less tolerance and more avoidance specific to the pain stimulus. It has been suggested that pain threshold and pain tolerance are not strongly related (Benjamin, 1958; Gelfand, 1964). This lack of relationship has been explained as pain threshold being more dependent on physiological factors and pain tolerance more closely associated with psychological factors (Merskey & Spear, 1967). The tolerance-psychopathology conceptualization is consistent with the high fear group exhibiting significantly greater pain tolerance and psychopathology as evidenced by higher neuroticism scores (EPI-P/N), and greater general fearfulness (FSS-III scores).

The predictive validity hypothesis was also supported as the high fear group demonstrated increasing state anxiety as a function of the BAT trials while the low fear group's state anxiety did not significantly change. The absence of any baseline differences in state anxiety is taken to represent the homogeneous initial effect the task had on all the subjects. It was not until the tasks (and associated pain) were actually

experienced did the difference in state anxiety appear. This finding is consistent with the intuitive notion that anyone would approach a pain task with some anxiety. Once the pain was experienced, the high fear group's greater fear of pain significantly increased the state anxiety.

One objective of the current study was to elucidate correlates of the fear of pain construct. While it was found that fear of pain was associated with greater general psychopathology, it was not significantly related to a specific expression of anxiety (e.g., state or trait) or imagery ability. A positive correlation has been reported (Jensen, 1988) between amount of pain and severity of nonpsychotic psychopathology; data also exists showing greater psychopathology (as measured by the EPI) in dentally anxious subjects (Klepac, Dowling, & Hauge, 1982; Lautch, 1971). However, the complex relationship between pain behavior and psychological dysfunction that others (Romano, Syrjala, Levy, Turner, Evans, & Keefe, 1988) have found is seen in the present study in regard to the role state anxiety plays in fear of pain. While the lack of a positive relationship between fear of pain and state anxiety is contrary to expected results, it is not an isolated finding. Weisenberg, Aviram, Wolf and Raphaeli (1984) also failed to find state anxiety differences between high and low anxiety groups exposed to a painful and anxiety-

provoking task. Further, anxiety has been found to fluctuate greatly during experimentally-induced pain (VonGraffenried, Adler, Abt, Nuesch, & Spiegel, 1978). It may be that fear of pain is independent of state anxiety, but further research will be necessary in this area before any confident conclusion can be drawn.

The hypothesized influence of gender is inconsistently seen in this study. The instability comes from the opposite gender than predicted having the expected influence in several instances, and from these differences being present only as a trend within the data. No stable conclusions can be drawn from these data, thus, they are discussed here with noted caution for the benefit they might have in developing hypotheses for future research.

When looking at specific characteristics of interaction with the pain stimulus, a gender difference trend was found for pain tolerance; this finding is consistent with other reports of gender influence on pain tolerance (Petrie, 1967; Woodrow, Friedman, Siegelaub, & Collen, 1972). The lack of gender differences in pain threshold in this study is also consistent with previous findings (Notermanns et al., 1966, 1967). The presence of significant gender differences in the total amount of time avoided in the BAT adds support to the influence of gender on avoidance.

The prediction that gender would be a factor influencing verbal report of fear was also supported as females had significantly higher FPQ-III and FSS-III scores then males. The role that social desirability and sex-role beliefs might play in this type of finding has been investigated (Otto & Dougher, 1985). The outcome related to affective responsivity however, is not clearly understood. While these findings are in keeping with previous outcomes (Klorman, Weerts, Hastings, Melamed, & Lang, 1974; Kleinknecht, Klepac, & Alexander, 1973), they can not be fully understood until more research is done relative to the effect of gender in anxiety studies. A similar dilemma exists for the role imagery ability might play in the development and maintenance of fear of pain. Lang (1977) and colleagues (Cook, Melamed, Cuthbert, McNeil, & Lang, 1988) have demonstrated the importance of imagery in anxiety disorders. Nevertheless, the present findings do not reveal if and how imagery ability is a factor in the expression of fear of pain.

The FPQ-III was found to be the best predictor of behavioral avoidance, accounting for 50% of the variance in the total amount of time avoided in the BAT, and an even stronger 59% of pain tolerance variance. So unique was the FPQ-III in its predictive power of pain avoidance, that it was the only measure used that met a 15% inclusion criteria of the

regression equation. This performance strengthens earlier findings supporting the validity of the fear of pain construct as unique and different from other fears and anxieties (Rainwater & McNeil, 1986; McNeil & Rainwater, 1989).

Interpretation of the HR data in this study must be done with caution because of its preliminary nature. Returning to the argument that anyone would approach a pain task with some degree of anxious arousal, it is perhaps not surprising that no group baseline differences were found for HR. If HR is an indicator of general arousal (Lang, 1971), then it appears the BAT task was equally imposing for all subjects. Weisenberg et al. (1984) found no significant HR differences between high and low anxious groups, a finding consistent with the current one. In a study that also used a multitrial protocol, Klorman (1974) found that HR habituated over trials in a linear fashion. However, significant HR baseline differences were seen when the data were viewed by gender. This might suggest predicted HR differences were successfully blurred by some type of group-specific phenomenon such as different levels of defensiveness to the task, different orienting responses or different habituation styles. It is also possible that muscle and movement artifact may have significantly cluttered the data.

Philips (1983) has reported on the lack of a 1:1 relationship between physiological and behavioral aspects of pain. This may be part of why no group differences were seen in this study. Why this imperfect relationship may have obscured any stable group HR differences, but allowed gender baseline differences to emerge is not known.

Future theoretical studies. According to the perceptual-defensive-recuperative hypothesis of pain (Boles & Fanselow, 1980), fear and pain are competing states, each serving a distinct purpose. Fear functions to override pain in times of danger, in service of self-protection. Pain serves to slow the organism down in nonthreatening times in service of self-healing.

In this model, fear of pain might be seen as a malfunction in which the fear aspect of the system is continuously or often activated for self-protection from the second factor of the system, pain. In this aberrant modification of the system, avoidance would become the norm. If Boles and Fanselow (1980) are correct, a negative correlation should be found between fear and pain. The present study offers a framework for a preliminary test of this hypothesis. Specifically, the negative relationship should be between amount of fear experienced in association with pain, and length of time pain is experienced.

The anticipated correlation between the physiological (SAM arousal data) and behavioral (amount of time spent in pain trials) components of fear is seen significantly for low fear subjects ($r(39) = -0.61$, $p < .01$), but not for the high fear of pain group ($r(39) = -0.20$, $p > .10$). This finding might suggest that the low fear group's perceptual-defensive-recuperative system is working "correctly;" it may also be evidence for the previously mentioned malfunction of this system in the high fear of pain subjects. This preliminary finding warrants additional research using this, or a similar paradigm.

The finding within this data of a significant main effect of group HR is encouraging, but the lack of a clear and consistent trend among the individual trial means warrants further study. The use of a dual forearm electrode placement may have contributed to the confusing status of this outcome. The amount of movement artifact caused by this placement necessitated extensive editing of the HR data as mentioned above. Future studies should used conventional electrocardiogram chest placements to assure cleaner and thus more reliable data.

The data on gender differences in this study, taken together, do not add any new reliable information to the question of gender influence because of inconsistent findings.

However, these findings do, again, underline the need for studies designed specifically to investigate the role of gender in behavioral research.

Future clinical research. Turning now to the need for clinical research, it has been found that low back pain patients often fear the discomfort and difficulty of recuperation and that they need help in reducing these fears if they are to return to health (Lichter, Hewson, Radke, & Blum, 1984). Knowing which patients will need the most help is still a guessing game. The program of research that has led to the validation of the FPQ-III has been designed to produce an instrument that might help solve this dilemma. The instrument has been proven effective in predicting experimental pain avoidance, and recent results show the degree of fear of pain is positively related to the length of time chronic pain has been endured (Rainwater, McNeil, Piech, & Wilkie, 1989). The next task is to utilize the FPQ-III in predicting the development of chronic pain and/or avoidance of clinical pain. This would allow the FPQ-III to be applied clinically in attempts to reduce the onset of chronic pain syndromes via early intervention with patients who are identified as "at risk" to develop chronic pain problems. Such a treatment approach would hopefully lead to better understanding of the patient's beliefs and fears concerning a

variety of pain types (Twycross & Lack, 1983) including fear of cancer pain (Levin, Cleeland, & Dar, 1985).

There is also a need to further investigate the relationship between fear of pain and other anxieties since the two studies to date (McNeil & Rainwater, 1989, and the present study) that have considered these factors have yielded equivocal results. The same situation exists for the function gender might play in both the development and experience of fear of pain. Finally, Keefe and colleagues (1986) have recently reported success with measuring depression as a positive predictor of pain. Research needs to be done to see if the FPQ-III's already strong predictive power might be significantly increased by combining it with a measure of depression.

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Appendix A

Algometer Literature Review

The problems of creating a technique for producing pain for experimental purposes that is reliable, easy, and safe are evidenced by the more than 80 methodologies presented in the literature (Goetzl, Burrill, & Ivy, 1943). The myriad attempts to produce a workable device have typically involved stimulation of a chemical, electrical, thermal or mechanical nature. An instrument that applies pressure to produce and assess pain is commonly referred to as a pressure algometer, although it is sometimes called "Catell's Algometer" (Head & Holmes, 1911). "This well established instrument {has been} used as far back as the Victorian days" (p. 636), and was chosen for use in the present study because, according to Keele (1954), it best meets the need for the instrument to be simple to use and to appear as nonnoxious to the subject as possible. This discussion of algometry therefore will be limited to mechanical devices involving cutaneous or deep somatic pressure.

Algometer Requirements

Part of the difficulty in creating an effective instrument has stemmed from the varied requirements a pain device (algometer) must meet to be useful experimentally and clinically. Hardy, Wolff, and Goodwell (1952) began the

process of defining what is needed in an algometer by calling for measurability, controllability and reproducibility of the stimulus, an adequate range from threshold to ceiling in the clear perception of pain, minimal tissue damage, convenience and simplicity. These criteria were later expanded (Beecher, 1959) to include: (a) the availability of applying the stimulus at a body point where individual neurohistological variations are at a minimum, and (b) a method of quantification of stimulus responses over time. Finally, the criteria of reliability and the capability of using the device ". . . without the end result being influenced by the experimenter" (Merskey, 1974, p. 97) were added.

All these criteria, with the exception of the final one, are met in the algometers currently being used clinically and experimentally (e.g., Forgione & Barber, 1971; Fisher, 1986). It is true that present algometers use weight as a constant stimulus to prevent the influence that previously existed through the experimenter applying force manually. However, the experiential circumstance of the pain is still under experimenter influence and this capability has been constructively manipulated as an independent variable to test the effect of instructional sets (Gelfand, 1964; Spanos, Barber, & Lang, 1969; Dougher, 1979) and anxiety types

(Haslam, 1966; Malow, 1981; Dougher, Goldstein & Leight, 1987) on pain perception and response.

Device Styles and Quantification

The problem of how to quantify stimulation also contributed to the evolution of the pressure algometer. While Catell's algometer (Head & Holmes, 1911) evidently had no objective method of measurement and relied on the experimenter's subjective assessment, varying device styles have been tried in hopes of producing a unit that was easy to use while still allowing an adequate method of quantification. The amount of pressure applied in Eddy's (1932) device was controlled by a spring-loaded arm which was cranked down to apply pressure to a platform. The number of crank turns moved a marker on a scale that had "been graduated by the application of known weights to the spiral spring and read(s) to the half kilogram" (p. 344). The subjective report of the experimenter was again used in 1934 by Libman in having the experimenter judge how hard the thumb was pressed into the styloid process to produce pain.

Spring-style. The most common early appearance of the device was a plunger rod with a flat circular end attached to some form of a hand-held graduated spring from a weighing device (Head & Holmes, 1911; Keele, 1954; Merskey, Gillis, & Marszalek, 1962; Merskey & Spear, 1964; Haslam, 1967;

Patkin, 1970). These spring gauges, typically calibrated in kilograms, were most often based on the idea introduced by Keele (1954). McCarty and colleagues (1965, 1968) devised a special application of this design to quantify articular tenderness. The "analgesiometer" (Clutton-Brock, 1957) also used a spring gauge, but did so by attaching the plunger bar to one side of a scale balance.

Dial gauge-style. Several instruments relying on dial gauges have also been tried. The amount of cuff pressure generated was the dependent measure in a sphygmomanometer device which included a metal grater sewn into the cuff (Hollander, 1939). This technique was later made more aggressive by Poser (1962) who replaced the grater with 94 point projections attached to a plastic base. This alteration, however, tended to leave marks on the subject's arm which persisted for several days. A dial type measure was also used by Pelner (1941) in his "sensometer." This dial was actually a type of watch with a rod attached to the workings so that the hands would move when pressure was applied to the rod. This device was hand held and typically pressed into the proximal phalanx of the subject's thumb. The sphygmomanometer gauge concept was revived by Harrison and Bigelow (1943) in their modification of Lewis' (1942) ischemic pain test. Finally, an air pressure gauge was used in the "dolorimeter" (Gluzek,

1944) to ascertain how much pressure two discs exerted against the subject's skin.

Blade-style. The most elaborate method of quantification uses a pressure transducer which is calibrated and measured through attachment to a polygraph (Forgione & Barber, 1971). This "focal pain stimulator" calls for the finger to be secured in a trough while a weighted blade, attached via a hinge to the end of the trough, is lowered onto the second phalanx of the finger. The blade is attached to the transducer which is in turn connected to a polygraph that affords serial collection of pressure data. This algometer has had its most significant impact not so much for its use of the serial data collection afforded by the polygraph, but for its use of standard weight amounts to apply a constant pressure. This device, and several modifications of it, has been extensively utilized (Dougher, 1979; Malow & Dougher, 1979; Malow, Grimm, & Olson, 1980; Malow, 1981; Malow & Olson, 1981; Otto & Dougher, 1985; Dougher, Goldstein, & Leight, 1987; Malow, West, & Sutker, 1987).

Comment. Of the devices listed, none are actually available for purchase; they must be built by an instrument-maker. The "pressure threshold meter" (Fisher, 1986; Reeves, Jaeger, & Graf-Radford, 1986), however, is commercially produced (Pain Diagnostics and Thermography, 17 Wooley Lane

East, Great Neck, NY 11021). This device is a sophisticated modification of the Geneva Lens measure used by Pelner (1941). It is hand-held and has a circular dial (available with different calibrations and rod tips for different applications) that moves in response to the amount of manual pressure applied by the experimenter/clinician. Thus, this most modern of the devices offers a unique blend of old and new. The instrumentation and mechanistic workings are highly reliable and sensitive, yet this improvement is still somewhat subject to the skill of the user in placement of the pressure tip and smoothness of the application of pressure.

Appendix B

FEAR OF PAIN QUESTIONNAIRE-III

INSTRUCTIONS: The items listed below describe painful experiences. Please look at each item and think about how **FEARFUL** you are of experiencing the **PAIN** associated with each item. If you have never experienced the **PAIN** of a particular item please answer on the basis of how **FEARFUL** you expect you would be if you had such an experience. Use the answers below to rate your **FEAR OF PAIN** in relation to each event.

	(1)	(2)	(3)	(4)	(5)
ANSWERS:	Not At All	A Little	A Fair Amount	Very Much	Extreme

ITEMS

1. _____ being in an automobile accident
2. _____ biting your tongue while eating
3. _____ breaking you arm
4. _____ cutting your tongue licking an envelope
5. _____ having a heavy object hit you in the head
6. _____ breaking your leg
7. _____ hitting a sensitive bone in your elbow - your "funny bone"
8 _____ having a blood sample drawn with a hypodermic

needle

9. _____ having someone slam a heavy car door on your hand
10. _____ falling down a flight of concrete stairs.
11. _____ receiving an injection in your arm
12. _____ burning your fingers with a match
13. _____ breaking your neck
14. _____ receiving an injection in your hip/buttocks
15. _____ having a deep splinter in the sole of your foot probed and removed with tweezers
16. _____ having an eye doctor remove a foreign particle stuck in your eye
17. _____ receiving an injection in your mouth
18. _____ being burned on your face by a lit cigarette
19. _____ getting a paper-cut on your finger
20. _____ receiving stitches in your lip
21. _____ having a foot doctor remove a wart from your foot with a sharp instrument
22. _____ cutting yourself while shaving with a sharp razor
23. _____ gulping a hot drink before it has cooled
24. _____ getting strong soap in both your eyes while bathing or showering
25. _____ having a terminal illness that causes you daily pain
26. _____ having a tooth pulled
27. _____ vomiting repeatedly because of food poisoning

28. _____ having sand or dust blow into your eyes
29. _____ having one of your teeth drilled
30. _____ having a muscle cramp

Appendix C

Telephone Recruiting Script

Hello, my name is _____ and I am calling from the Psychology Department of Oklahoma State University. In the first week of this semester you completed a series of questionnaires in your Introduction to Psychology class on different types of anxiety. Do you remember?

I am calling now to again thank you for participating in the first part of our experiment, and to invite you to be a subject in the main portion of the study. You will receive 2 extra credit points toward your final Intro to Psychology grade for participating. If you think you might be interested I can tell you what your participation will involve.

(If the subject is not interested in participating for extra credit, and they are a much needed subject, say; would you be interested in participating if we agreed to pay you five dollars?)

The whole process will take about an hour and a half and will entail your filling out some additional questionnaires and participating in a mildly painful task. The task involves a weight being placed on your finger and then removing the weight when you say it feels painful. You will not experience any amount of pain that you do not choose to, and you are at complete liberty to stop your participation at anytime.

You will only have to come in once, and as I said earlier, you will be awarded 2 extra credit points for your efforts. I presently have an appointment time at _____a.m./p.m. on _____ (day of the week). Would you like to come at that time? Good, why don't you get a pen and some paper so you can write down the appointment time and the directions for how to get here. Do you know where North Murray Hall is? (If no, give directions.) You will need to come to room 422 in North Murray Hall.

Thank you. See you at _____(time) on _____ (day).

Appendix D

Informed Consent Agreement

Participant's Name (print): _____ Date: _____

Project Title: Assessment of Fear of Pain and its Role in the Experience of Pain

Investigators: Avie James Rainwater, III, M.Sc., M.S , and Daniel W. McNeil, Ph.D.

Procedures: By my signature, I agree to participate in this research and further understand the following statements concerning the study:

1. I will be asked to complete several psychological questionnaires about anxiety and pain.

2. I will be asked to participate in a painful task and will be instructed as to how to stop the task at any time I choose. I will be able to stop any trial of the task at any point in order to avoid experiencing a level of pain that I find unacceptable.

3. During this procedure, recordings of physiological reactivity (e.g., heart rate, muscle tension) will be completed using devices attached to my skin. These sensors will be

attached using tape or other adhesives and are painless. I will not feel anything through them, only their presence on my skin. Risk of any type of electrical shock is extremely unlikely because of rigid safeguards.

4. My involvement in the study will require approximately one and a half hours of my time.

5. I will be debriefed at the end of my participation and will be given the opportunity to ask questions of one of the experimenters at that time concerning the purpose and goal of the study and my participation.

6. I will be exposed to no inherent risk as a function of my participation in the study. However, there is an infinitely minimal chance of risk involved, and thus I may terminate my participation in the study at any time I choose. Should I require medical or psychological treatment as a result of my involvement in this study, I will be assisted in gaining this help by a member of the research team. I understand that no health care will be provided me without charge.

7. I will be given information about my particular participation, and this may prove beneficial to me in that it may provide insight into the way I relate to pain. My involvement may also prove beneficial to others as the experimenters learn how to help others through my involvement.

8. All records concerning my participation will be kept confidential in Dr. McNeil's lab with access available only to research associates of the lab.

9. My participation is voluntary and I may refuse to begin involvement in the study, or may terminate my involvement during any part of the experimental task, without penalty.

10. I have been fully informed as to what will be asked of me as a part of my participation, and agree to the risks and benefits that may be a product of the study.

As compensation for participation in this experiment, I will be awarded two (2) extra credit points toward my grade in Introductory Psychology.

Signature of Participant	Date
Witness to Signature	Date
Co-Principal Investigators:	
Avie J. Rainwater, III, M.Sc., M.S.	Date
Daniel W. McNeil, Ph.D.	Date

Appendix E

Subject Information Sheet

Name_____ Sub#: AX08____

PE: BH TP AR SE: BH TP AR Time:_____ Date:_____

Age____ Gender: __M __F Handedness: __L __R

Ethnicity: ___Cau ___Blk ___NAI ___His

___Far East ___Mid East ___Other:_____

==========

1. Do you currently have any cuts or scrapes on the tops of your fingers?

___No ___Yes (Explain_____)

2. Please describe for me your:

a. use of tobacco _____

b. use of alcohol _____

c. use of marijuana _____

d. use of other illicit drugs _____

e. use of prescription drugs _____

3. Are you diabetic? ___No ___Yes (Medication_____)

4. Have you ever had any circulation problems in your hands or in your feet? ___No ___Yes (Explain_____)

5. Have you ever had any type of heart problem?
___No ___Yes (Explain_____)

6. Have you ever had any other type of serious health problems? ___No ___Yes (Explain_____)

7. Approximately how many hours of sleep did you get last night? _____

==========

Comments:

Appendix F

BAT Instruction Script

For this part of the study, we want to find out exactly when you begin to feel pain, when pain becomes severe for you, and how long you choose to tolerate pain. In a short while, the experimenter will ask you to place one of your fingers into the device you see situated on the table before you, just as is being demonstrated now. The top part of the device will then be slowly lowered onto your finger and the weight added in the same fashion as the experimenter is now doing.

Every 10 seconds, the experimenter will ask you to describe the sensation you feel by reporting a number from the rating scale you see on the table. On this scale, severe pain is defined as pain that which, if you experienced it, it would be hard to sit still and you would want it to stop. When the pain becomes severe to you, please indicate this by responding with a rating of seven. Once you report a seven, the experimenter will stop asking you to rate the sensation and will say "Please hold." You should not push yourself to endure the pain during this "hold" period. Rather, you should say "stop" when the pain reaches a level where you would want it to stop if you experienced it in your everyday life. When you say "stop", the experimenter will immediately lift the weight from your

finger. This "tolerance period" will be stopped by the experimenter after one minute if you have not already said "stop."

You will be asked to participate in several trials of this procedure. You may stop any portion of any trial at any time by simply saying "stop." You may also elect to not participate in any of the trials, or to not continue with any remaining trials if you so choose. If you have any questions the experimenter will answer them now.

Appendix G

Exit Interview

Subject Name_____ AX08_____

1. Have you had any experience with severe or prolonged pain at any point in your life? ___No(=0) ___Yes(=1)

   Explain:_____

2. Have you every witnessed anyone in severe or prolonged pain at any point in your life? ___No(=0) ___Yes(=1)

   Explain:_____

3. How would you describe the pain you experienced in this experiment?_____

4. How did the pain producing part of the experiment make you feel? _____

5. Please rate how similar the pain you experienced today was to other "real" pain you have experienced. (1=not at all, 7=very) _____

6. Are you active in any sports or exercise? ___No(=0) ___Yes(=1) (List_____)

7. If yes, do you routinely experience pain as a part of this activity? ___No(=0) ___Yes(=1) (Explain_____)

8. _____ Debriefing explanation given. (Purpose and rationale for the study, subject's role, future plans for FPQ-III.)

9. _____ Subject given opportunity for questions.

10. _____ Status of each finger checked.

11. _____ Did subject express any concerns about his/her fingers? ___No ___Yes (Explain:_____)

Experimenter: _____

Author Notes

The author wishes to express his appreciation to Ms. Brenna Hassell for serving as the female primary experimenter, and to Ms. Trish Privett for serving as the secondary experimenter.

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Table 1

Psychometric Instrument's Mean and Standard Deviation Scores by Group

	High Fear		Low Fear	
	M	SD	M	SD
FPQ-III Total	107.2	16.0	67.8	14.2
FPQ-III Minor	29.4	6.5	15.8	4.1
FPQ-III Severe	41.0	6.9	28.6	7.4
FPQ-III Medical	36.9	8.2	23.4	7.8
FSS-III	159.0	75.2	83.3	42.8
QMI	78.1	24.0	80.6	20.9
EPI-PN	14.5	3.6	9.8	4.3
EPI-EI	13.7	3.6	15.2	3.5
STAI-Trait	41.0	9.8	35.4	7.3
STAI-S-Pre	36.2	11.2	34.4	8.9
STAI-S-Post	40.9	10.5	35.9	7.6

Table 2

Psychometric Instrument's Mean and Standard Deviation Scores by Gender

	Males		Females	
	M	SD	M	SD
FPQ-III Total	80.2	22.2	94.8	25.4
FPQ-III Minor	21.2	7.9	24.0	9.5
FPQ-III Severe	33.2	8.9	36.4	9.7
FPQ-III Medical	25.9	9.3	34.4	10.0
FSS-III	89.3	48.8	153.0	77.4
QMI	80.6	25.2	78.1	19.4
EPI-PN	12.2	5.2	12.1	4.0
EPI-EI	14.4	3.0	14.5	4.2
STAI-Trait	38.2	10.0	38.3	8.0
STAI-S-Pre	34.4	9.9	36.2	10.4
STAI-S-Post	37.9	10.1	38.9	8.9

Table 3

Chi-Square Frequencies of Behavioral Avoidance by Group

	Refuse		
	No	Yes	Totals
High Fear			
frequency	12	8	20
expected	14.5	5.5	
percent	30.0	20.0	50.0
Low Fear			
frequency	17	3	20
expected	14.5	5.5	
percent	42.50	7.5	50.0
Totals	29	11	40
	72.50	27.50	100.00

$\chi 2$ (1) = 3.135, $p < .10$

Table 4

Means and Standard Deviations for Avoidance Times (in seconds) Across Trials by Group

	High Fear		Low Fear	
Trial	M	SD	M	SD
1	166.4	58.2	80.4	67.2
2	191.7	38.2	100.7	80.3
3	189.6	54.2	84.0	84.7
4	201.8	58.2	120.9	86.4
5	206.5	42.4	133.1	86.2
6	216.9	31.7	132.7	92.6
All	1169.9	234.5	612.6	495.2

Table 5

Summary of Univariate Analyses of Variance for Avoidance Times Across Trials by Group

Trial	SS-Group	MSW	F	p
1	74046.025	3948.035	18.76	.0001
2	82810.000	3957.063	20.93	.0001
3	111724.900	5056.460	22.10	.0001
4	65448.100	5427.218	12.06	.01
5	53949.025	4611.946	11.70	.01
6	70896.400	4792.579	14.79	.001
All	3105832.900	150101.647	20.69	.0001

Note. df = 1,38 for all tests

Table 6

Summary of Univariate Analyses of Variance for Pain Thresholds, Ceilings, and Tolerances Across Trials by Group

Trial	SS-Group	MSW	F	p
Thresholds				
1	24502.500	2407.237	10.18	.01
2	21622.500	2625.658	8.24	.01
3	35521.600	2838.179	12.52	.01
4	11560.000	1773.684	6.52	.05
5	12110.400	1910.979	6.34	.05
6	7317.025	795.683	9.20	.01
All	632271.025	54836.156	11.53	.01
Ceilings				
1	56250.000	4335.263	12.97	.001
2	69555.000	4791.074	14.52	.001
3	85100.625	4878.730	17.44	.001
4	45900.625	5035.546	9.12	.01
5	31922.500	4184.710	7.63	.01
6	51194.025	4826.209	10.61	.01
All	1993176.025	134713.656	14.80	.001

Table 6 continued.

Trial	SS-Group	MSW	F	p
Tolerances				
1	5313.025	496.930	10.69	.01
2	8179.600	497.168	16.45	.001
3	9891.025	435.678	22.70	.0001
4	7924.225	479.567	16.52	.001
5	6734.025	438.314	15.36	.001
6	7645.225	440.099	17.37	.001
All	271755.225	10755.836	25.27	.0001

Note. df = 1,38 for all tests

Table 7

Trial Means and Standard Deviations for Heart Rate Change Scores by Group (in Beats per Minute)

	High Fear		Low Fear	
Trial	M	SD	M	SD
1.	4.4	12.1	-0.3	10.8
2.	4.2	13.3	1.3	11.1
3.	0.6	9.4	-0.6	10.2
4.	1.6	7.2	-2.8	3.3
5.	-0.2	2.7	-0.3	11.9
6.	1.1	5.3	1.2	16.7

Table 8

Mean and Standard Deviation Scores for Self-Report Data by Gender

	Males		Females	
	M	SD	M	SD
Personal pain experience	0.7	0.5	0.3	0.5
Pain similarity rating	2.9	1.5	4.5	1.5
Routine exercise	0.8	0.4	0.7	0.5
Pain upon routine exercise	0.6	0.5	0.4	0.5
SAM valence	11.5	3.4	11.3	2.8
SAM dominance	13.3	4.4	9.9	5.1
SAM arousal	8.3	3.2	10.7	4.9

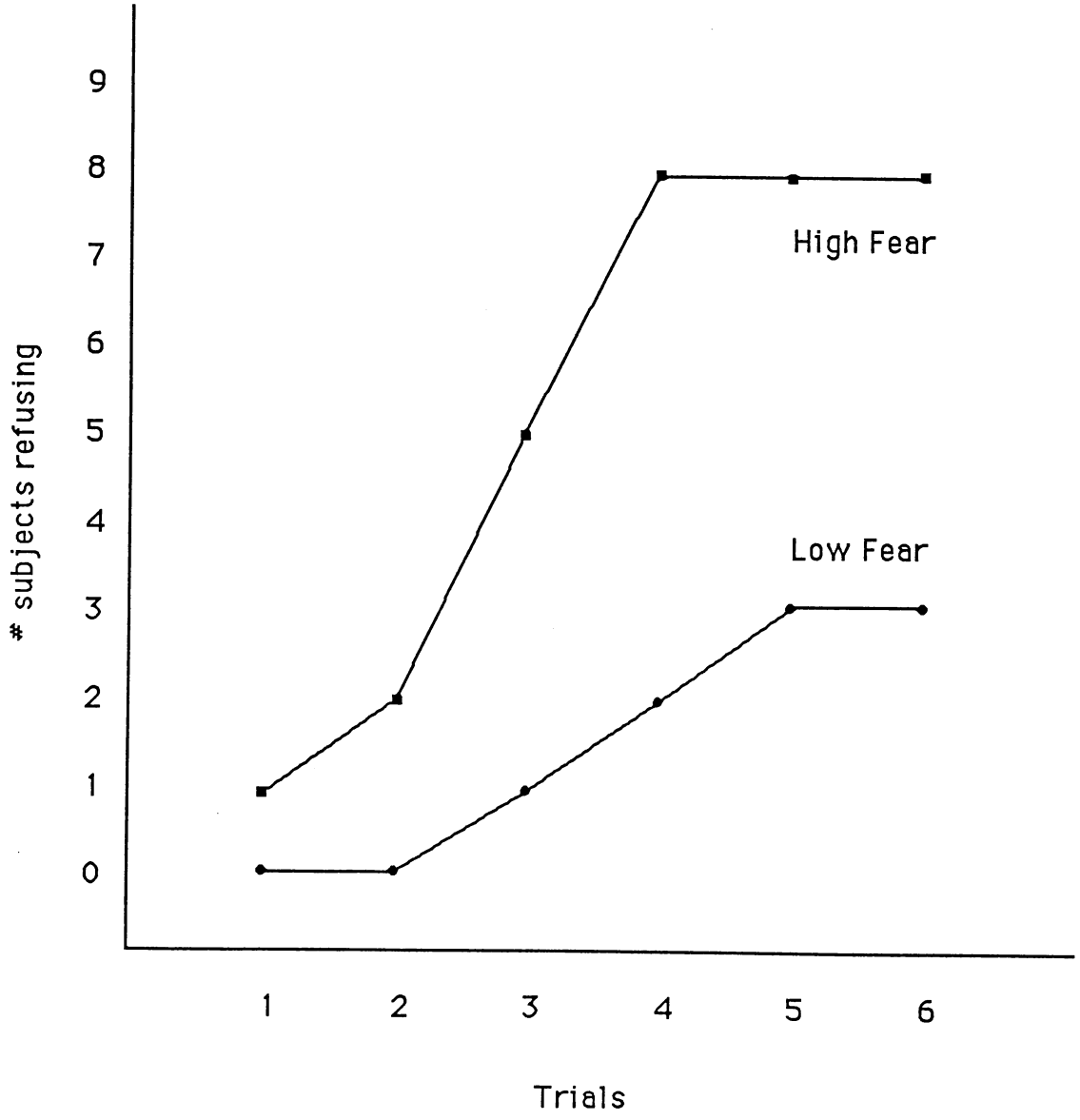
Figure Captions

Figure 1. Number of subjects refusing to participate in each trial by group.

Figure 2. Average pain thresholds across trials by group.

Figure 3. Average pain ceilings across trials by group.

Figure 4. Average pain tolerances across trials by group.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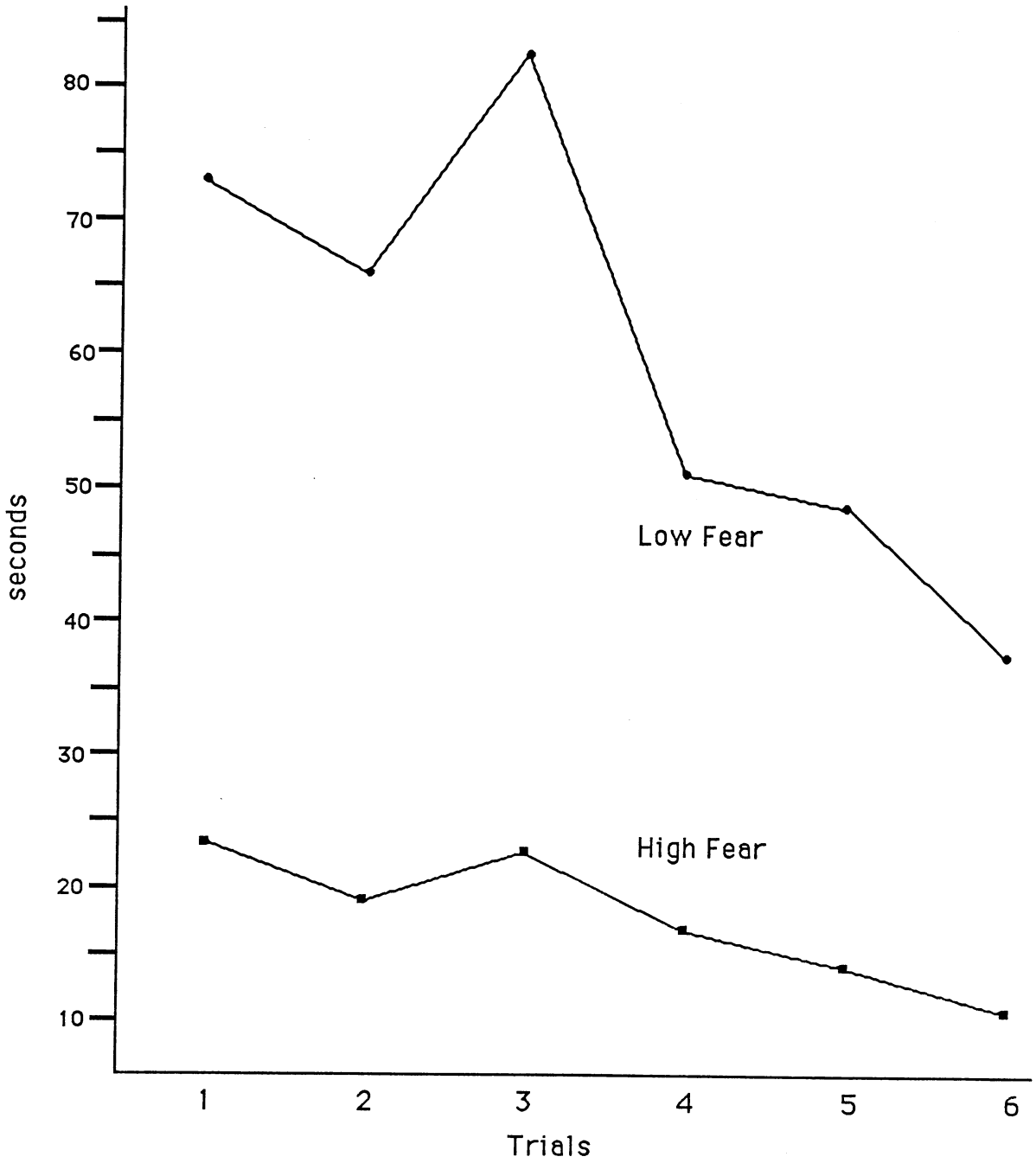
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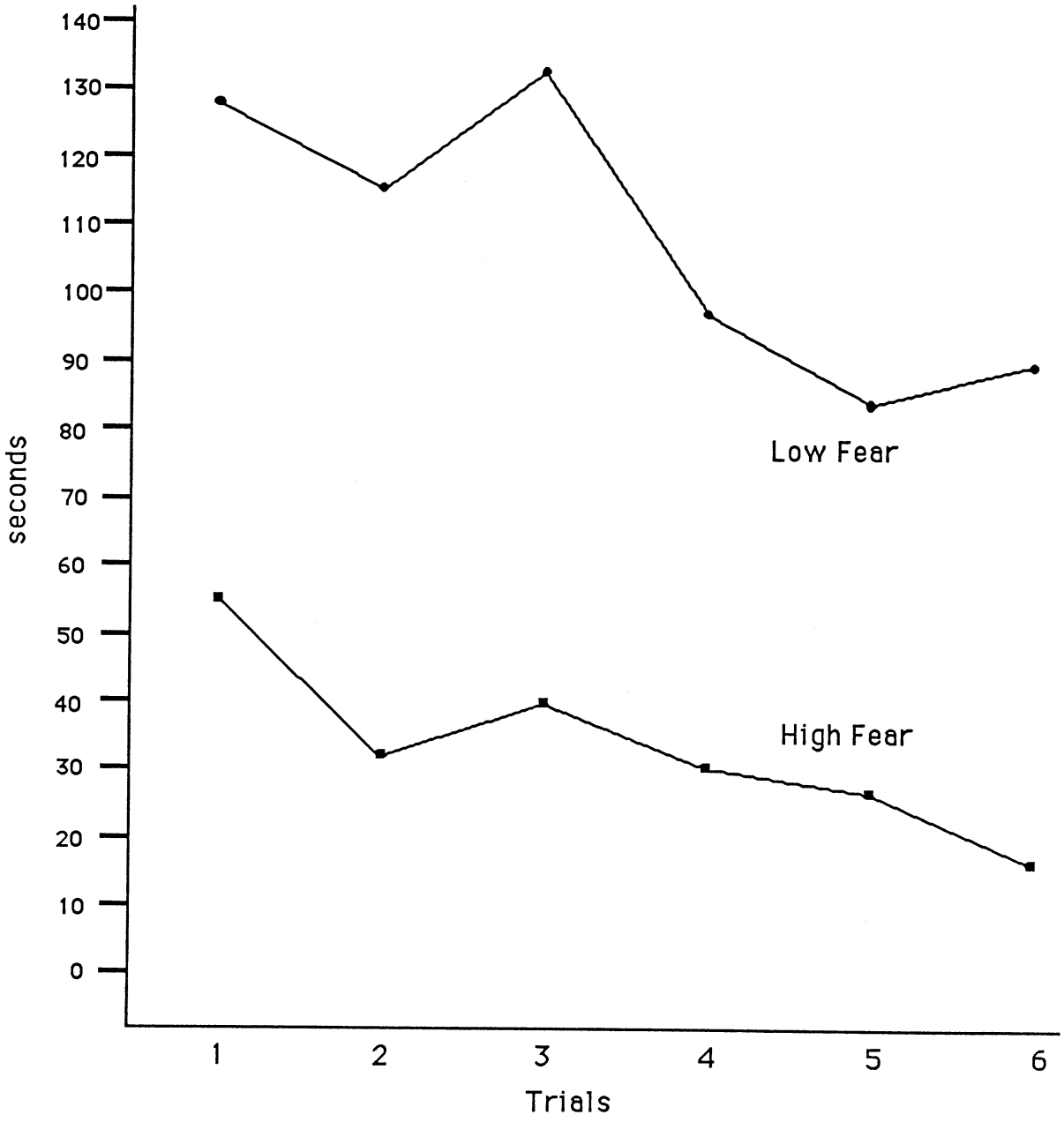
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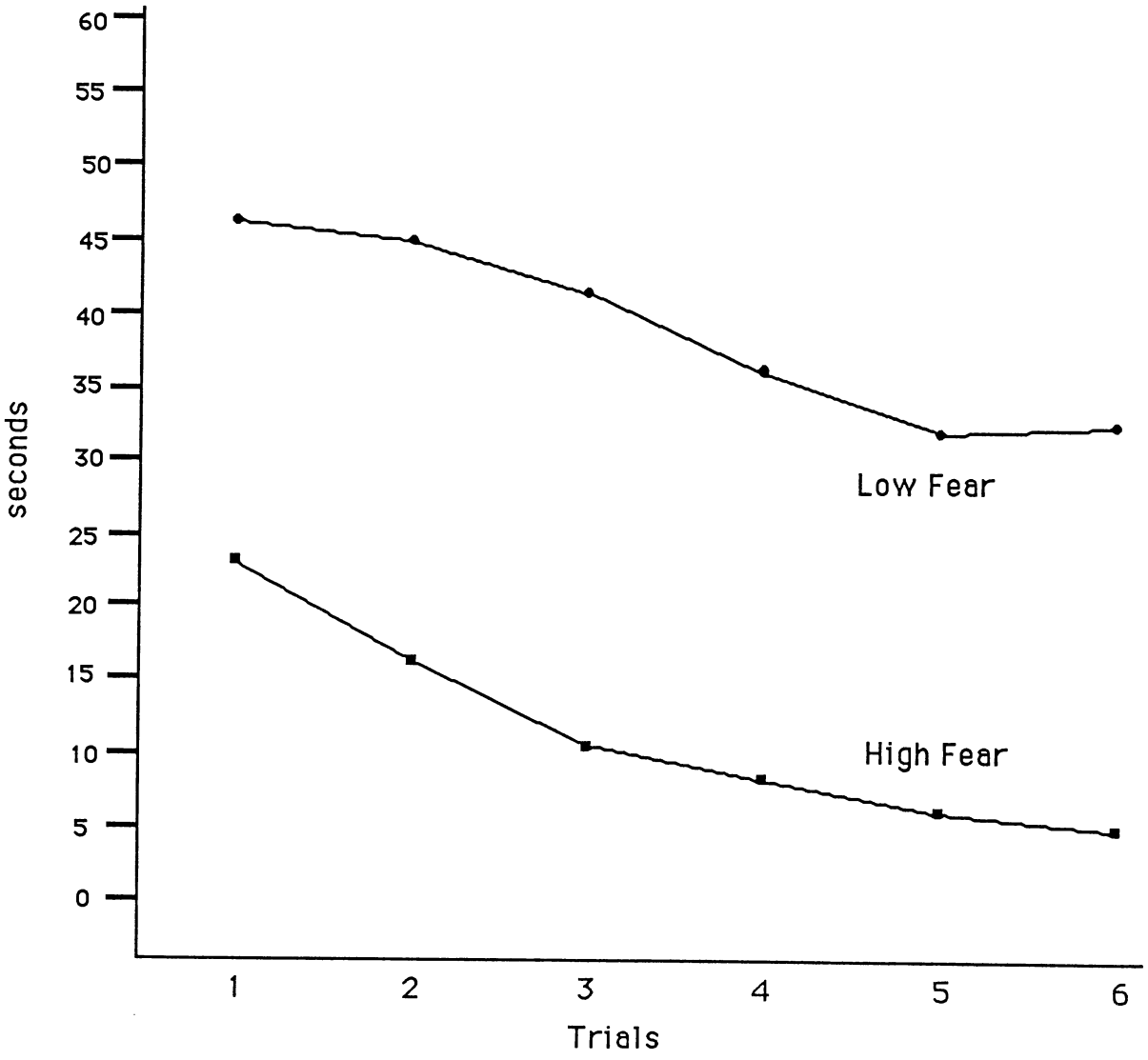
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VITA 2

Avie James Rainwater, III

Candidate for the Degree of
Doctor of Philosophy

Thesis: THE ROLE OF EXPERIENCED PAIN IN THE ASSESSMENT OF FEAR OF PAIN: A PREDICTIVE VALIDITY STUDY OF THE FEAR OF PAIN QUESTIONNAIRE - III

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