

The Relationship Between Personality Characteristics and Acute Pain Response in Postadolescent Males

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Abstract:

The purpose of this investigation was to determine the relationship between personality characteristics, as measured by the Myers-Briggs Type Indicator (MBTI) (form G), and an acute pain response in 107 postadolescent men. Subjects included 107 military school cadets. Each subject performed a cold pressor test (CPT) and was evaluated for pain threshold and pain tolerance times. Each was then evaluated for preference on eight personality characteristics: extraversion, introversion, sensing, intuition, thinking, feeling, judging, and perception. The personality characteristics were measured by the MBTI (form G). Pearson product-moment correlations between the pain threshold and tolerance times and the eight personality characteristic scores were nonsignificant. The results indicated there was no relationship between the eight personality characteristics, as measured by the MBTI (form G), and pain threshold or pain tolerance, as measured by the CPT. The findings also indicated a low correlation between pain threshold and pain tolerance ($r=.25$).

The sensation of pain is basic to all people. It acts as a warning system and alerts a living organism of danger or threat to homeostasis. Monks and Taenzer (14) state that an individual's pain perception is associated with "interrelated biological, psychological, and social factors" (p. 233).

Health care professionals are aware of individual differences among the patients they encounter with respect to personality and response to pain. However, these differences are rarely considered when planning treatment protocols. The aspect of personality type and its relation to pain response is an area that has been examined in the past. The literature indicates that personality influences pain response (1, 10, 13, 19). with a focus on extraversion and neuroticism (4, 8, 11, 20).

It has been hypothesized that a subject's pain tolerance should be positively related to extraversion and negatively related to neuroticism (5, N. Eysenck (5, 6) postulated that extraverts develop inhibition/satiation more quickly and dissipate it more slowly. As such, prolonged pain sensations should be inhibited more quickly

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and more strongly in extraverts, leading to diminished pain sensation, Beecher (2) stated that physiological pain is always associated with the apprehension of future pain, which can be conceived as an anxiety response that summates with the physiological pain response, It was further suggested that extraverts condition less well. Therefore they would not develop the component of total pain to the same degree that introverts would.

Several investigators have tested the relationship between pain and personality and have reported conflicting findings. Lynn and Eysenck (11) used the Maudsley Personality Inventory (MPI) as a measure of personality, and radiant heat as an acute pain inducer. They reported positive correlations for extraversion and pain tolerance, 0.69 (<0.01). Levine et al. (8) investigated the affinity between pain tolerance and extraversion (E) and neuroticism (N) in two subject groups. The groups were given a battery of personality profiles, including the MPI, and were interviewed on their attitudes toward pain. The pain was induced and measured through electrical stimulation. Two sets of Pearsonian correlations were computed and the correlations reported were not significant (0.07 for E, -0.20 for N) and (-0.10 for E, 0.02 for N).

In an attempt to explicate the conflicting findings, Davidson and McDougall (4) varied the means of pain stimulation, utilizing radiant heat and a cold pressor test, The pain tolerance times were correlated with personality scores from the MPI, The results showed no significant correlation between personality scores and pain tolerance (0.09 and 0.09). Schalling (18) used noxious electrical stimulation and the Marke-Nyman Temperament Inventory (M-NTI). This study reported a statistically significant negative correlation between solidarity (introvert) and pain (-0.61 for C and -0.79 for DS) (<0.01), Low solidarity (extravert) showed a higher pain tolerance, -0.64 (<0.01).

In an effort to qualify the differences in pain perception between introverts and extraverts, Shiomi (20) investigated responses in subjects utilizing the cold pressor test and the MN, The statistical analysis reported that significant positive, moderate correlations (0.55 and .048) were obtained between pain tolerance and extraversion, as scored on the MN. Ashton et al. (1) investigated the effects of the preinduced pain and personality type, Pain was induced by the cold pressor test, and personality type by means of the Eysenck Personality Questionnaire (EPQ), However, no significant correlation was reported.

The conflicting findings in the literature demonstrate a need for additional research in the area of personality and response to pain. The reviewed studies used a number of personality inventories and a number of different pain stimuli. However, none of these studies employed the MBTI (form G) in conjunction with the CPT. As such, the purpose of this investigation was to determine the efficacy of the MBTI (form G) and the CPT in determining the relationship between personality characteristics and response to acute pain.

METHODOLOGY

Subjects

Subjects included 107 males (age 18.60 yrs $\pm .58$) who were randomly selected from the cadet corps at a military academy. This subject population was composed of cadets from 31 states and 21 foreign countries, The subject population was

represented by 28 religious denominations, and more than 20% of the cadet population were from minority groups (15).

Only subjects who had no history of cardiac and respiratory problems, Raynaud's disease, frostbite, chilblains, hypertension, vascular compromise of either upper extremity, injury to either hand, or mental dysfunction were allowed to participate. All subjects read and signed a consent-to-participate form approved by a university human investigation committee.

The Myers-Briggs Type Indicator

The MBTI (form G), a means of measuring personality characteristics, was used for this investigation. It consisted of four, dichotomies that, when combined, resulted in 16 category types: extraversion (E) versus introversion (I), intuition (N) versus sensing (S), thinking (T) versus feeling (F), and judgment (J) versus Perception (P). The test was given to all subjects in one session. The instructions were read to the subjects prior to taking the test. They had an opportunity to look at the test and ask procedural questions. The examiner did not address tiny interpretive questions but read every question to the subjects in order to ensure that all had the same orientation to each question.

The Cold Pressor Test

The CPT, as first described by Hines and Brown (7), was used in this investigation and was administered as described by Wolff (21), with modifications that included a pretest and a standardization of skin temperature prior to the actual CPT. The CPT was chosen for several reasons. It is easy to administer and has limited risks. This was of paramount concern in dealing with human subjects, as the possible effects of electrical shock, ischemic pressor, and radiant heat were considered too hazardous for this subject population. An additional advantage of the CPT is that it has a low anticipatory effect. The anticipation of pain tends to heighten or increase the overall effect. The submersion of a subject's nondominant hand in cold water does not elicit as high an anticipatory effect as does an electrical shock, a spiked pressor gage, or radiant heat that can blister the skin. This was of concern in getting a pure reading on pain threshold and pain tolerance.

A final advantage of the CPT is that it gives subjects a high degree of control over the test protocol. In particular, the subjects were allowed to remove their hands from the water at any time. This allowed cognitive judgment when the pain was maximum for that subject. All were subjected to the stimulus until they could no longer tolerate the sensation and had to remove their hand. This differs from analogous forms of pain measurement in which subjects are asked to mark a line or give a number indicating where their pain falls or how much pain they feel. This aided in standardizing the pain measure for each subject.

The CPT consisted of the immersion of the subject's hand in water 0°C. The time elapsed (seconds) from immersion in the ice water to the start of the verbal statement "pain" - represented the pain threshold time. The time elapsed from immersion in the ice water to the start of the verbal statement "stop" represented the pain tolerance time. A digital stopwatch with lap counting capabilities was used for the timing. The same examiner performed all time testing.

The CPT pretest was administered to each subject 24 hours prior to administration of the actual CPT. The subjects were told they were performing a task to identify subjective responses to cold water, and that this was not a test. The pretest employed pain scales that allowed each subject to cognitively measure the amount of pain he felt in the cold water, as well as allowing him to become familiar with the experience of cold water pain. The pretest consisted of immersing the subject's dominant hand in water 0°C and lasted long enough for the subject to reach his pain tolerance or until 3 minutes had elapsed. The pretest was performed on each subject's dominant hand. It included two subjective pain scales (12): a visual analog scale and a pain rating index. The subjects marked a visual analog scale every 15 seconds while their dominant hand was submerged wrist deep in water at 0°C. When the pretest was concluded, the subjects were asked to place a checkmark next to the words on the pain rating index that best described the pain they had experienced during the pretest trial.

The CPT was performed with each subject alone in a cubical. The sides of the cubical were unmarked. The examiner stood behind and above the cubical during the CPT so that the test was visually monitored. The subjects were seated and were unable to see the examiner during the CPT. On a table in front of them were two plastic 3-gallon Igloo® coolers. The cooler marked I contained warm water maintained at body temperature (37°C). The cooler marked II contained cold water saturated with ice shavings, maintained at 0°C. Water temperature was confirmed with a Celsius thermometer prior to each CPT measurement.

Each subject listened to tape-recorded instructions prior to administration of the CPT. Subjects were then questioned to ensure that they understood the instructions, which were then repeated immediately prior to each CPT measurement. The tape recording instructed the subjects to place their nondominant hand, wrist deep, into the cooler marked I. They were instructed to say when the hand was in the warm water, and then to keep their hand in the warm water until told to remove it. The period of time in the warm water was 2 minutes, which allowed for standardization of skin temperature.

When 2 minutes had elapsed, the subjects were to place the same nondominant hand in the cooler marked II. They were instructed to say "in" when their nondominant hand was immersed up to the wrist. Each subject was to silently observe the point when the sensation in the hand first became uncomfortable. When the sensation became "definitely painful," the subject was to respond with the subjective verbal response "pain." This indicated pain threshold time. Each subject was then instructed to remain silent and to keep the hand immersed in the water until the sensation became unbearable. Each subject was to withdraw his hand from the water when he had reached his limit of pain, saying "stop." This indicated pain tolerance time. A digital stopwatch with lap counting capabilities was used for the timing.

Reliability of Measures

Pilot testing was conducted to determine the reliability of the CPT. Sixteen randomly selected male subjects (mean age 19.75 yrs) completed a CPT and were subsequently retested 14 days after the original CPT was given. The means and standard deviations for the CPT test-retest scores and their intraclass correlation coefficients (ICC) are presented in Table 1. The subjects were to follow the instructions as described by Wolff (21). However, they were told that

Table 1
Pre and Post-test Values and Intraclass Correlation Coefficients (ICC)

| | Pretest | | Posttest | | ICC |
|----------------|----------|-----------|----------|-----------|----------------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>R</i> |
| Pain threshold | .32 | .16 | .30 | .14 | <i>R</i> = .93 |
| Pain tolerance | .69 | .28 | .68 | .29 | <i>R</i> = .97 |

Note. Pre- and post-test values represented in seconds,

this was not a test but rather a subjective experience to monitor the sensation and response to cold water. This was done to enhance the cognitive response to the sensory input of the cold water and to decrease the subject's temptation to try and beat the test. These subjects were not involved with the present study being reported.

Statistical Analysis

The statistical analyses in this investigation consisted of computing Pearson product-moment correlations and multiple regressions for the preference scores on the MBTI (form G) and the pain threshold and pain tolerance time scores. The independent variables were represented by scores on the eight characteristics on the MBTI (form G) (x1, x2, x3, x4, x5, x6, x7, x8). These scores represented the amount of characteristics each subject had to a given typology. The two dependent variables were represented by pain threshold time scores and pain tolerance time scores (Y). For each dependent measure, a multiple regression equation was determined.

The multiple regression equations yielded squared multiple correlation coefficients (R²) which indicated the proportion of variance in the dependent measure that could be explained by the eight predictor variables. Additionally, Pearson product-moment correlations (r) were computed between each independent measure and the dependent measures. A Pearson product-moment correlation (r) was also performed between pain threshold and pain tolerance time scores, as well as between the four dichotomies of personality characteristics.

RESULTS

Table 2 presents the means and standard deviations for the eight categories of personality characteristics. The pain threshold time is 21.42 sec (SD 12.77); the pain tolerance time is 76.91 sec (SD = 70.38). The correlation coefficients between personality types as determined from the Myers-Briggs Type Indicator ranged from r=0.85 to r=0.96 (Table 3). Time scores were recorded on all subjects for pain threshold and pain tolerance, as assessed by the CPT. The

Table 2
Personality Characteristic Raw Scores Values

| Personality characteristic | Mean | SD |
|----------------------------|-------|------|
| Extraversion | 14.57 | 5,44 |
| Introversion | 12.13 | 5,94 |
| Sensing | 14.13 | 6.57 |
| Intuition | 11.32 | 5.15 |
| Thinking | 15.38 | 6.73 |
| Feeling | 8,95 | 4.42 |
| Judging | 10.69 | 6.41 |
| Perception | 16.66 | 6.87 |

Table 3
Correlation Between Raw Score Personality Type

| Personality type | Correlation coefficient |
|---------------------------|-------------------------|
| Extraversion/Introversion | .95* |
| Sensing; Intuition | .87* |
| Thinking/Feeling | .85* |
| Judging/Perceptive | .96* |

*p < .01.

correlation coefficient between pain threshold and pain tolerance in all subjects was $r = 0.25$.

The correlation coefficients between the raw scores of the eight personality characteristics and pain threshold time scores ranged from $r = 0.00$ to 0.11 (Table 4) The correlation coefficients between the raw scores of the eight personality characteristics and pain tolerance time scores ranged from $r = 0.01$ to 0.15 (Table 5) The multiple-regression correlation coefficients for all eight personality characteristic scores and pain threshold and tolerance were $r = 0.26$ for pain threshold and $r = 0.21$ for pain tolerance.

DISCUSSION

The rationale for this investigation was to shed light on the relationship between personality characteristics and response to acute pain, using the MBTI (form G) and the CPT, in hopes of aiding health care professionals in their daily interactions with individuals who are experiencing acute pain. The major finding was that pain response was not clearly related to personality characteristics, as measured by the MBTI (form G),

Table 4
Correlation Between Pain Threshold Time Scores
and Personality Characteristic Raw Scores

| Personality type | Correlation coefficient |
|------------------|-------------------------|
| Extraversion | .07 |
| Introversion | .06 |
| Sensing | .11 |
| Intuition | .00 |
| Thinking | .01 |
| Feeling | .08 |
| Judging | .08 |
| Perception | .07 |

Table 5
Correlation Between Pain Tolerance Time Scores
and Personality Characteristic Raw Scores

| Personality characteristic | Correlation coefficient |
|----------------------------|-------------------------|
| Extraversion | .08 |
| Introversion | .06 |
| Sensing | .01 |
| Intuition | .01 |
| Thinking | .06 |
| Feeling | .06 |
| Judging | .15 |
| Perception | .12 |

Myers-Briggs Type Indicator

The MBTI (form G) is an abbreviated version of the MBTI that was designed to test personality typology and personal preference (16). The test has been used extensively in the fields of counseling, education, religion, and management, The MBTI examines instinctive, unconscious, observable differences in mental functioning. The test was employed in this study because of its ease of application and documented reliability and validity. It consists of 94 questions and can be completed in approximately 20 minutes, The test-retest reliability correlation coefficients range from $r=0.78$ to 0.88 (3, 9, 17), The correlations range from $r= 0.47$ to 0.68 with the Jugian Type Survey (JTS) and $r=0.74$ with the Eysenck Personality Inventory (EN) (for introversion and extraversion).

The mean scores for the eight personality characteristics are close to the

median of the available total points (Table 2), This indicates that the subjects in this investigation did not exhibit strong preferences toward personality characteristics, This caused a high correlation coefficient between the four dichotomies (Table 3). The MBTI (form G) measures personality by the amount of preference a subject has for a particular characteristic. For example, if a subject scores 15 for extraversion and 12 for introversion, it could be said that he/she has a preference for extraversion, however slight. This is a major limitation to the test and is the reason that preference characteristic scores were used rather than personality preference type.

Another limitation of any personality inventory is centered around self- concept and personal perception, For example, subjects may answer questions on a personality inventory the way they would like to be perceived rather than the way they would actually act. Empirical observation suggested that the subjects in this investigation answered the questions the way they would like to be perceived rather than the way they actually would act.

Pain Measures

The Cold Pressor Test (CPT) was used to induce pain and to measure pain threshold and pain tolerance responses. The pain threshold was the time required to elicit pain from the pain stimulus. Pain tolerance was the time required to elicit cessation from the pain stimulus. Pilot testing prior to data collection indicated test-retest intraclass correlation coefficients of 0.93 for pain threshold and 0.97 for pain tolerance. As such, the instrument was deemed to have an acceptable level of reliability for this investigation.

Table 2 presents the means and standard deviations for pain threshold and pain tolerance, The high standard deviation for pain tolerance indicated that there were large differences among subjects. In contrast, the pain threshold scores had comparatively lower standard deviations. Moreover, the low correlation coefficients between pain threshold and pain tolerance ($r=0.25$) suggested that subjects with low pain threshold scores did not necessarily have low pain tolerance scores, and vice versa. Therefore subjects with low pain threshold may have high pain tolerance. This observation may have an important clinical application. For example, the patient who complains about pain in high magnitude immediately following injury may indeed be able to withstand that pain to a greater degree than someone who doesn't complain about the pain until the day following trauma. This concept suggests a need for individualized treatment and care when dealing with people in pain.

Pain and Personality

The intricacy of the human psyche and the complexity of the individual patterning of pain response, although complicated, seems to have an empirical correlation. This study attempted to further investigate the conflicting area of personality and its relationship to pain, However, the findings of this study, utilizing the MBTI (form G) and the CPT, revealed no significant correlation between personality and pain response.

The findings of this study were in agreement with those from Ashton et al. (1), Davidson and McDougall (4), Levine et al. (8), and Schalling (18), who all reported no significant correlation between personality and pain, However, our-

findings differ from those of Lynn and Eysenck (11), who found a positive correlation ($r=0.69$) between pain tolerance and extraversion, and Shiomi (20), who found moderate correlations between extraversion and pain tolerance ($r= 0,55$).

In both of those studies, the extraversion was measured by the Maudsley Personality Inventory (MPI), which has a correlation coefficient of $r=-.63$ with the MBTI for extraversion (17). Lynn and Eysenck (11) used 30 subjects, inducing pain by means of radiant heat. The time limit in their study was set at 20 seconds, due to skin blistering. Therefore any subject who withstood the heat for 20 seconds was considered to have a high pain tolerance. This method of measuring pain tolerance contrasted with the CPT method. Pain tolerance, as measured by the CPT, is defined as the time when the pain can no longer be tolerated, These differences in method of estimating pain tolerance may be responsible for the discrepancy in the findings.

The difference between this investigation and Shiomi's (2) is less clear because the CPT was the pain assessment instrument in both studies. Shiomi evaluated pain tolerance at two temperatures (3°C and 4°C), The higher correlation was reported at the colder temperature. The major difference between these studies was the means of evaluating extraversion between the MBTI and the MPI. However, significant correlations have been reported between these two tests (17). Shiomi's subject population was different (28 males and 28 females), and this may have been a reason for the moderate correlations obtained in his investigation.

In summary, further investigation is needed to determine whether there is a relationship between personality and pain response, This study found no relationship between the preference scores on the MBTI (form G) and the pain threshold and pain tolerance Mites from the CPT. The findings further indicate that the MBTI (form G) may be an unacceptable instrument for measuring the personality characteristics that would correlate with pain response, The findings also showed no correlation between pain threshold and pain tolerance. Therefore the relationship between personality characteristics and pain response is a quandary that will continue to interest and perplex health care professionals.

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