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Distinguishing Feigned From Sincere Performance in Psychophysical Pain Testing

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Abstract: Self-report, the most widely used, gold standard measurement of pain, is crucial for pain research, diagnosis, and management. However, there are no accurate, reliable methods for detecting dishonesty in self-reports when there is incentive for pain deception. We introduce a novel approach to detecting pain deception by analyzing performance patterns of honest and dishonest psychophysical pain testing. Warmth sensation threshold (WST) and heat pain threshold (HPT) were measured in healthy individuals (N = 37) under 2 conditions: standard instruction (ie, provide sincere reports) and instructions to simulate intense pain (ie, provide feigned reports) with the intention of deceiving. In the feigned compared with sincere condition, participants had significantly increased WST and decreased HPT. Repeatability and variability indices were indistinguishable between conditions. In a second, separate cohort (N = 24), measurements were repeated with the addition of a sensory interference to influence task performance. When sensory interference during HPT measurement was introduced, feigned pain reports had significantly higher variability and poorer repeatability compared with sincere reports and were distinguishable from sincere reports, with high sensitivity (83%) and specificity (84%). The statistical properties of psychophysical performance under sensory interference provide a method for identifying feigned performance and could be applied to evaluations of pain malingering.

***Perspective:** This article introduces a method to detect whether individuals are being dishonest in psychophysical pain testing. The method could help clinicians to detect chronic pain malingering in contexts in which there is incentive to deceive.*

***Key words:** Malingering, pain psychophysics, sensory interference, lie detection.*

The self-report is considered to be the most valid measure of pain perception.[20] In clinical settings, self-report is crucial for diagnoses of various chronic pain disorders, determinations of treatments, and tracking treatment effectiveness. However, in certain situations, such as when an individual is being evaluated for financial compensation for pain-related disability, there may be incentive for pain deception and malingering. In medicolegal contexts, the prevalence of malingered disability in patients with chronic pain and financial incentive to deceive has been estimated to be between 20 and 50%.[12] Health care, legal, and social service systems are significantly burdened with wasted/improperly distributed resources when exaggerated pain reports are treated as sincere,[21] but there are no accurate, reliable existing methods for detecting feigned pain reports.

Existing research on detection of pain malingering has concentrated mainly on the analyses of questionnaires, clinical examinations, facial expressions, and physical testing. Questionnaires, such as those evaluating personality, have been used with some success to distinguish between patients with chronic pain and simulators, as well as among patients without financial incentive to malinger, those with incentive, and those labeled by researchers as suspected malingerers.[2,4,18,22,29] Clinical examinations such as the test of Waddell "nonorganic

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signs" (eg, overreaction) that indicate malingering[27] have been proposed, but little research has supported their effectiveness.[19,21] Observers of pain-evoked facial expressions can discern with limited success whether these expressions are sincere or not,[13,14] but a computerized pattern recognition system has demonstrated greater success.[1] Tests of variability in strength exertion and range of motion can distinguish sincere from suspected feigned performance to some degree[5,23] and relate to chronic pain symptom magnification.[24] These studies have convincingly demonstrated some efficacy for detecting pain malingering. However, no approaches provide foolproof detection on an individual basis.

The aforementioned studies largely focused on measures of indirect consequences of pain or pain-related behaviors. Surprisingly, malingering in self-reports has scarcely been studied, and then only for innocuous sensations.[8,31] Because pain malingering is defined based on the intentionally feigned self-report as a necessary criterion,[6] methods that measure the differences between sincere versus feigned self-reports may enable direct and accurate detection of malingering. Quantitative sensory testing (QST) of pain, which relies on self-reports in response to physical stimuli, is widely used in experimental and clinical settings and is imperative for the detection and diagnosis of diseases such as neuropathy.[10] The pain threshold measurement in particular is commonly used for this purpose and provides valuable information on the individual's sensitivity to pain and on pathological processes underlying chronic pain such as sensitization.[30] In addition, pain threshold is found to be reliable and consistent both in healthy individuals and in patients with pain.[9,15] However, information on how QST in general and pain threshold specifically are altered when individuals provide deceptive self-reports is scarce. In visual acuity testing, behavioral responses to unexpected visual stimuli were shown to be indicative of ocular malingering.[11] Distraction tests have been proposed for pain malingering detection,[27] but it remains unknown how QST involving interfering stimuli during pain could alter one's ability to convincingly feign pain reports.

We therefore tested 1) the spontaneous patterns of feigned performance in warmth and pain threshold measurements, 2) the changes in statistical properties of performance when individuals are being dishonest, and 3) whether a sensory interference during such performance interferes with the ability to feign pain reports and thus enables differentiation between sincere and feigned measurements.

Methods

Participants

Participants were 61 healthy volunteers (27 men and 34 women, mean age 25.9 ± 6 years). The participants were university students who were recruited by way of advertisements placed throughout the campus. Exclusion criteria included acute or chronic pain, disease causing potential neural damage (eg, diabetes), systemic illnesses, skin lesions of any kind, language problems, hearing or speech disorders, and mental disorders. An additional exclusion criterion was a formal medical background (eg, medical students and health professionals), so that the participants were naive with regard to alterations in sensations in patients with pain. In addition, we refrained from providing participants with any information that could have affected their performance in the different tests. Testing took place in a quiet room in the university pain laboratory. The temperature in the room was maintained at 22 ± 2°C. The participants were seated in a comfortable armchair with their forearms resting on supporting structures. All participants were trained in the measurements before the experiments, and the results obtained in the training sessions were discarded. Written informed consent was obtained from all participants for all procedures. The protocols were approved by the institutional review board of Tel-Aviv University in accordance with the provisions of the Declaration of Helsinki. The participants received payment for their participation at the end of the experiment.

Equipment

Thermal Stimulator

Thermal stimuli were delivered using a Peltier-based computerized thermal stimulator (TSA II; Medoc, Ramat Yishai, Israel), with a 3 × 3-cm contact probe applied to the dorsal surface of the hand. A passage of current through the Peltier element produces temperature changed at rates determined by an active feedback system. As soon as the target temperature was attained, the probe temperature actively reverted to a preset adaptation temperature by passage of an inverse current. The stimulation parameters were constantly monitored by the computer. The adaptation (baseline) temperature was set to 32°C, and the rate of temperature change was set to 2°C/s in all tests. The range of stimulation temperature allowed by the device was 0°C to −51°C. The contact probe was attached to the skin by means of an elastic Velcro band.

Electrical Stimulator

Electrical stimuli were delivered using a transcutaneous electrical nerve stimulation (TENS) device (ComTens; Apex Medical, Medfit, Finland) with two 3 × 3-cm flexible electrodes. The TENS device was preset with the following current setting: pulse width of 250 microseconds and pulse frequency of 100 Hz. The intensity was adjusted for each participant; it gradually increased until the participant reported a nonpainful strong tingling sensation. These stimulation parameters are known to activate Aβ fibers, thereby producing sensory interference as well as an inhibitory effect on pain.[17,26]

Thermal Threshold Measurements

Warm sensation threshold (WST) and heat pain threshold (HPT) were measured with the method of limits. For WST, participants received 4 successive ramps of gradually increasing temperatures starting from a baseline temperature of 32°C, every 15 seconds. The