The moderating factors of neuroticism and extraversion in pain anticipation

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Abstract:

This study investigates the moderator relationship between three psychological variables on pain threshold and tolerance: pain anticipation, neuroticism and extraversion. It is hypothesised that (a) a significant effect of anticipation on both pain threshold and tolerance will exist; wherein high-intensity pain anticipation will predispose lower pain threshold and tolerance, and (b) high neuroticism and low extraversion will moderate this relationship. The study was conducted using 76 participants who completed the cold pressor test under one of three conditions: control condition, intense-pain expectant condition or low-pain expectant. The results of the study showed no significant effect of anticipation and no significant moderator relationship for neuroticism or extraversion on pain threshold and tolerance, thus both hypotheses are not supported. Implications for future research are discussed providing new and unique findings, as no prior research into the moderator relationship between anticipation, personality traits and pain currently exists.

Introduction:

Nociception can be defined as the sensory nervous systems' response to internal or external physiological damage (Broom, 2001; Ashton, 2012). Moreover, pain sensation is impacted upon by both physiological and psychological states (Linton, 2004). Physiological factors that have been evidenced as significant influences on

nociceptive experiences include gender (Hellström & Lundberg, 2000; Wiesenfeld-Hallin, 2005; Aloisi & Bonifazi, 2006; Yan, Liu, Du, Eisenach & Tong, 2007; Paller, Campbell, Edwards & Dobs, 2009; Fillingim, King, Ribeiro-Dasilva, Rahim-Williams & Riley, 2009), ethnicity (Edwards, Fillingim, & Keefe, 2001; Shavers, Bakos, & Sheppard, 2010), age (Li *et al.,* 2001; Riley et al., 2002; Lariviere, Goffaux, Marchand & Julien, 2007; Rittger et al*.,* 2011) and genetic predisposition such as effects related to the *MC1R* gene mutation (phenotypically derived from naturally redheaded individuals; Liem et al., 2004; Mogil, 2003; 2005; Delaney, Keighren, Fleetwood-Walker & Jackson, 2010; Andresen, Lunden, Drewes & Arendt-Nielsen, 2011). Psychological factors too have been evidenced to determine how we cope with pain (Seminowitcz & Davis, 2006), pain intensity and individual differences in pain threshold/tolerance (Linton & Shaw, 2011; Newth & DeLongis, 2004). Thus a psychophysical approach is required to best understand individual differences in nociception.

Personality and Nociception

Individual differences in personality traits relate to specific constructs of pain experience. Specifically neuroticism and extraversion have been evidenced as impacting pain experiences (Paine, Worthen, Gregory & Aziz, 2009). High neuroticism correlates with high pain thresholds (Tajet-Foxell & Rose, 1995) and tolerance levels (Lynn & Eysenck, 1961; Schalling, 1971). Additionally, those high in introvesion have also been associated with higher pain thresholds/tolerances (Lynn & Eysenck, 1961; Schalling, 1971; Barnes, 1975). Thus high neuroticism and low extraversion independently predict higher pain thresholds/tolerances. Individuals who possess both these traits, termed ‘neurotic-introverts’ (Lynn & Eysenck, 1961), are therefore considered to have particularly high pain thresholds/tolerances and

differ significantly in their nociceptive experiences (Paine, Worthen, Gregory & Aziz, 2009; Paine, Kishor, Worthen, Gregory, Thompson, & Aziz, 2009). From this it can be inferred that this combination of traits produces a predetermined, specific pain response.

However, the relationship between neurotic-introvert personality types is more complex than simple correlational data; evidence suggests neurotic-introverts are less likely to report their pain due to relevant personality constraints (Bond, 1971; Walding 1999; Feldman et al*.,* 1999). Therein a true effect on tolerance/threshold may be masked or mediated by the likeliness to report a painful response. Moreover, evidence implies that high neuroticism and low extraversion influences the cognitive processes associated with pain meaning, which then effects threshold/tolerance levels (Harkins, Price & Braith, 1989; Newth & DeLongis, 2004). Thus cognition relating to nociception may mask the influence of personality on thresholds/tolerances. Thus more explicit research into the origins of such personality-pain relationships is required to better understand the independent impact of personality on pain.

Anticipation and Nociception

An important aspect of cognitive effects of nociception targeting the role of pain anticipation and expectation is prominent. If one anticipates an intense, painful experience this impacts the type and severity of the pain felt (Baker & Kirsch, 1991; Price et al., 1999; Sullivan, Rodgers & Kirsch, 2001; Porro et al., 2002), potentially leading to negative health effects such as chronic pain conditions (Moseley, Nicholas & Hodges, 2004). Support from physiological evidence also exists; intense-pain experiences are related to modulatory networks with afferent nociceptive input in the

contralateral nucleus cuneiformis (Keltner et al., 2006). This implies that pain-expectancy and anticipation of painful experiences directly impact brain regions associated with nociception. Moreover, Price (2002) found that anticipation exerts a strong influence on nociceptive experiences, including anticipation of pain itself, anticipation of pain reduction and anticipation of future suffering. Thus anticipation is a significant mediator of pain responses that requires further investigation.

Newth & DeLongis' (2004) findings suggest that cognitive processes implicated in detecting, categorising, reporting and experiencing pain are effected by personality traits. Thus it cannot be discounted that anticipation is predetermined by personality variables and does not exert a direct influence on nociception. Moreover, the role of personality traits directly implicates nociceptive pain anticipation and sensations; Coen *et al.* (2011) report that neurotic personality types have increased brain activity in pain-relevant brain regions, such as the parahippocampus, insula, thalamus and anterior cingulate cortex during pain anticipation. Moreover, these regions negatively correlated with neuroticism during pain sensation (Coen et al*.,* 2011) therefore implying that neurotic personality types have increased arousal during pain anticipation. However, it is important to note that in the same study no relationship was noted between neuroticism and thresholds/tolerances, thus the moderator relationship between anticipation, personality and pain needs further analysis.

The Present Study

Based on previous literature and relevant inconsistencies across findings, the present investigation aims to determine whether a significant effect of anticipation for pain tolerance and pain threshold exists. Furthermore, to investigate whether this relationship is moderated by the personality variables neuroticism and extraversion

and produce novel findings into a specific psychophysical model of nociceptive pain experience that is currently not addressed in literature.

Aims and Objectives

The aim of this study is to investigate how the role of anticipation, moderated by extraversion and neuroticism, impacts pain threshold/tolerance. This will address current inconsistencies in research regarding the roles of anticipation and personality as well as the interaction between the two.

Hypotheses

Two hypotheses were developed for this study:

Hypothesis 1

There will be a significant effect of anticipation on pain threshold and tolerance

Hypothesis 2

High neuroticism and low extraversion will independently moderate the relationship between anticipation and pain threshold/tolerance

Methodology

Design

The present study utilised an experimental design. This study comprised of two experimental conditions plus a control group, with participants randomly allocated to one condition. Anticipation of pain intensity was manipulated according to a false indication of average performance of participants on the cold pressor test, in which it was anticipated that a longer endurance indicated lower pain intensity. In the control condition, participants were required to complete the study without any indication of

average performance on the cold pressor test. In the first experimental condition, participants were informed prior to submerging their hand that the average performance on the cold pressor test was 30 seconds, whereas in the second experimental condition participants were informed the average time was 4 minutes. A paucity of research into average performance on the cold pressor test exists. Thus these two times were selected as a result of a pilot study conducted by the researcher, wherein the average duration was 2 minutes. Through this manipulation, it was believed that a significant effect of anticipation had been detected if the participants in the 4 minute (low-pain expectant) condition had higher pain thresholds/tolerances than those in the 30 second (intense-pain expectant) condition.

Participants

Exclusion criteria for participation included health conditions classed as risk factors regarding completion of the cold pressor test. In accordance with guidelines outlined by Von Baeyer *et al.,* (2005) participants were not eligible for participation if they suffered from the following conditions; cardiovascular disease, previous frostbite, chronic pain conditions, fainting or seizure conditions, Reynaud's disease, fractured limb (to be submerged) or any open cuts/wounds on the area to be exposed. In accordance with *a priori* power analysis based on an effect size of ___ taken from ___, the mimimum number of participants required for this sample was 76, thus sufficient participants were recruited to achieve statistical power (n=76). Participants were recruited via opportunity sampling, approached either in person or via email by the researcher. The study was promoted within the University community as well as externally via online social media platforms. The sample were local to Buckinghamshire as participants had to complete the experiment on the University

site. An optional entry into a prize draw to win a £50 shopping voucher as well as a certificate of completion were used as incentives for participation.

Participants were aged between 18-60+, with the modal age bracket being 18-25 years old. 58 participants were female and 18 were male. In total 14 ethnic groups were reported in the sample.

Materials

A medical exemption questionnaire was used to exclude participants according to at-risk health conditions, as outlined above. The neuroticism and extraversion subscales of the 50-item IPIP scale (Goldberg, 1992) was administered, creating a 26-item questionnaire (α=.91). Items such as *'I have frequent mood swings'* and *'I am the life of the party'* were rated via a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). In order to measure the extent to which participants were likely to be influenced by the misinformation regarding average performance on the cold pressor test, a measure of trait-suggestibility was required. No suitable measures of this variable could be located, and therefore the submissiveness section of the CAT-personality disorder scales static form (Simms *et al.,* 2011) was used. This included 6 items such as *'I let others' opinions effect my decisions'* and was rated on the same Likert scale (α=.85)..

The cold pressor test was conducted using a water bath that was set at 1.0°C (± 0.1°C variation) in accordance with Feldner & Hekmat (2001); Keogh & Herdenfeldt (2002); Keogh (2006) and Mitchell, MacDonald & Brodie (2004).

Procedure

In order to sufficiently manipulate pain anticipation, participants were deceived regarding the purpose of the study, and instead informed that the aim was to

investigate individual differences in pain responses. After consenting to the study and passing the medical exemption criteria, participants were instructed to answer a demographics questionnaire to allow for control of covariates, including age, gender, ethnicity, and natural hair colour. The participants were then required to complete the personality and submissiveness questionnaire measures.

After finishing both questionnaires participants completed the cold pressor test. Prior to submerging their hand, participants were given instruction in accordance with previous research procedures (Walsh, Schoenfeld, Ramamurthy & Hoffman, 1989; Hellström & Lundberg, 2000; Keogh, 2006). Participants were required to submerge their non-dominant hand into a circulated cold water bath which was set to 1.0°C (± 0.1°C variation). Participants were instructed to place their hand into the water up to an inch above their wrists and were not allowed to move their fingers or clench their hand during submersion. Participants were required to indicate verbally to the researcher when they first began to feel pain as a measure of pain threshold, and to remove their hand when they could no longer tolerate the pain to indicate pain tolerance. By means of experimental manipulation of pain anticipation, those in the intense-pain expectant condition were informed immediately before placing their hand into the water bath that the average time an individual can withstand the cold water is 30 seconds, whereas participants in the low-pain expectant condition were informed the average time was 4 minutes. Participants in the control condition were not informed of any average performance for the cold pressor test. A maximum duration of 5 minutes was imposed by the researcher for safety purposes. Although participants were made aware there was a maximum time, they were not informed prior to the test how long this would be.

After completing the cold pressor test, participants were finally debriefed and made aware of the true purpose and aims of the study.

Results

The data was skewed, therefore bootstrapping was necessary to allow for use of parametric measures. Effect sizes and their corresponding confidence intervals are presented and interpreted alongside traditional hypothesis testing methods in order to manage risk of Type I error (Garamszegi, 2006; Hedges, 2008).

The descriptive statistics (Table 1) demonstrate that the mean pain tolerance and threshold for the intense-pain expectant condition was lower than that of the low-pain expectant condition and the control group. This indicates two important findings; (a) those who anticipated an intense-pain experience tolerated the cold pressor test for less time than those who anticipated a low-pain experience, or those in the control group, and (b) those who expected an intense-pain experience reported feeling pain sooner than those in the other conditions. This infers that anticipation of pain did exert some effect over participants' pain thresholds and tolerances.

Moreover, three covariates exist in the data set; for pain threshold there was a significant gender difference, wherein males (M=59.0, SD=61.91) had a higher average threshold (in seconds) than females (M=28.22, SD=27.66). Thus for pain threshold, gender was a covariate that needed to be controlled for (r(74)=.33, p=.004, 95% CI [10.16, 51.39]). For pain tolerance, natural hair colour (r(74)=.30, p=.008, 95% CI [0.08, 0.49]) and ethnicity (r(74)=.35, p=.002, 95% CI [0.14, 0.53]) were significantly correlated with tolerance and were considered covariates. Therefore, it was necessary to control for these variables before conducting the moderator analysis.

Hypothesis 1: There will be a significant effect of anticipation on pain threshold and tolerance

Linear regression found no statistically significant effect of anticipation on pain threshold (F(1, 74) = .001, p = .977), with an r^2 value of <.001. Moreover, there was no significant effect of anticipation on pain tolerance (F(1, 74) = <.001, p = .999) with an r^2 value of <.001. Therefore, hypothesis 1 is rejected.

Hypothesis 2: High neuroticism and low extraversion will independently moderate the relationship between anticipation and pain threshold/tolerance

The average neuroticism and extraversion scores are recorded in Table 2. Participants tended to express higher extraversion scores compared to neuroticism scores, however there was a significant negative correlation between high neuroticism and low extraversion (r=.40, p<.001, 95% CI [0.19, 0.57]), thereby supporting the concept of 'neurotic-introvert' personality types. There was also a significant, positive correlation between trait-suggestibility, indicated via the submissiveness questionnaire, and neuroticism (r=.34, p=.003, 95% CI [0.12, 0.53]). In addition, there was a significant negative correlation between trait-suggestibility and extraversion (r=.26, p=.02, 95% CI [0.04, 0.46]). This supports the concept that trait-suggestibility is related to neurotic-introvert personality types. The relationship between trait-suggestibility and pain was not significant for either threshold (r=.037, p=.75, 95% CI [-0.19, 0.26]) or tolerance (r=.045, p=.70, 95% CI [-0.18, 0.27]), therefore trait-suggestibility was not a covariate of the relationship between anticipation, personality and pain.

After controlling for covariates, a moderator analysis was conducted to determine if the effect of anticipation upon pain threshold and tolerance is moderated by the two

personality variables. There was no significant moderator relationship between anticipation, the two moderators (neuroticism and extraversion) and pain threshold (r^2 = .014, F(5, 70) = .201, p = .96). Also no significant interactions occurred between anticipation and extraversion (b = .241, t(.19), p = .85, 95%CI [-2.27, 2.75]) or anticipation and neuroticism (b = -.102, t(-.09), p = .93, 95%CI [-2.43, 2.22]). Furthermore, no significant moderation between anticipation, neuroticism, extraversion and pain tolerance (r^2 = .041, F(5, 70) = .604, p = .70), (r^2 = .033, F(3, 72) = .82, p = .49) existed. The results also indicate that there was no interaction between anticipation and extraversion (b = -2.86, t(-.78), p = .44, 95%CI [-10.20, 4.49]) or anticipation and neuroticism (b = -.520, t(-1.52), p = .13, 95%CI [-12.00, 1.61]).

Upon inspection of the results, a statistical abnormality with the extraversion variable was noticed due to a severely weak model, thus a further moderation model was tested to prevent a masked true effect of neuroticism. The second model tested whether a moderation exists between pain tolerance and threshold, anticipation and neuroticism. The analysis shows that no significant moderation existed for tolerance (r^2 = .033, F(3, 72) p = .49). Additionally there was not a significant interaction between neuroticism and anticipation (b = -.362, t(-1.33), p = .19, 95%CI [-9.03, 1.80]). There was also no significant moderation for pain threshold (r^2 = .013, F(3, 72) p = .82) with no interaction between neuroticism and anticipation (b = -.22, t(-.24), p = .811, 95%CI [-2.07, 1.62]). Thus it can be concluded from the above analyses that no significant moderation occurred for both tested models; therefore the second hypothesis was also rejected.

Discussion:

The results of this study indicate that anticipation did not impact on participants' nociceptive experiences, as measured via pain threshold and tolerance. Additionally, after testing three moderator relationship models, it can be concluded that no significant moderation between the variables exists. Therefore, this study demonstrates evidence to suggest that (a) anticipation does not exert a significant effect on pain threshold or tolerance and (b) extraversion and neuroticism do not moderate the relationship between anticipation and pain threshold and tolerance.

Role of Anticipation in Pain Experiences

The results contradict research which implies that anticipation and expectation impact, determine and create pain sensation. Research implies that anticipation is in fact a significant cognitive influence on pain sensation (Pfingsten et al*.,* 2001; Mosely, Nicholas & Hodges, 2004) with evidence suggesting a top-down processing relationship wherein anticipation activates the brain regions associated with nociceptive sensation (Porro et al*.,* 2002). One possible explanation for why this study does not support the literature lies in the study design. It is notable that when observing the means of the data (Table 1), the average pain threshold and tolerance times are lower in the intense-pain expectant condition compared to the control and low-pain expectant condition. However, the low-pain expectant condition threshold and tolerance times were similar to the control group, implying no effect. This may be due to the lack of sufficient delay between the false average duration of the cold pressor indicated to participants (4 minutes) and the maximum time participants are able to submerge their hand (5 minutes). Thus the findings of this study demonstrate that although anticipation appeared to have some influence over the intense-pain expectant group, the lack of difference between the control and low-pain expectant condition may have masked this relationship and therefore explain why a non-

significant result was realised. It is possible that a shorter false average duration provided to the low-pain intensity group may have provided a different result.

Additionally, the participants in the low-pain expectant condition may not be anticipating 'low pain' sensation but were simply not anticipating pain at all. In particular, one factor that was not controlled for was previous experience with the cold pressor test. Relevant participants would therefore have pre-existing knowledge regarding the cold pressor pain experience. Thus the manipulated anticipation variable would likely have no effect on the participants' preconception during the experiment if they had previously experienced the test. This would explain why the average threshold and tolerance times were so similar between the control and low-pain expectant groups. The cognitive appraisal participants' make is beyond the control of the researcher, whilst the conditions aim to induce a particular response the actual cognition regarding pain anticipation is dependent on individual differences. Participants were informed in the pain-expectant conditions that the average time a person can withstand the water is (a) 30 seconds, or (b) 4 minutes. Thus, the participants in the intense-pain expectant condition would have likely expected the pain to get worse and thus reported pain or removed their hand from the water quicker than those in the other conditions.

Moreover, many participants reported that their hands went numb after a few minutes of enduring the cold pressor test. This has also been reported in other studies where the cold pressor test is used as a measure of pain (Provins & Morton, 1960; Williams & Thorn, 1986; Traynor & McDermid, 2008). On average, individuals' are likely to experience numbness after exposure to cold water (Heus, Daanen, & Havenith, 1995) and the time it takes for this to occur decreases the colder the water temperature (Williams & Thorn, 1986). Participants in the intense-pain expectant

condition were told the average withstanding time was 30 seconds; a duration much less than the required amount of minutes to experience numbness in their hand at 1°C (Williams & Thorn, 1986). Participants in the control and low-pain expectant condition were more likely to keep their hand in the water for a longer time period and consequently were more likely to experience numbness in their hand. Knuckle (1949) reported that an average exposure of five minutes in water above 1-2°C causes complete numbness which depletes sensation so extensively that it makes the cold pressor test ineffective. Once an individual experiences numbness, nociceptive sensation is depleted or eliminated (International Association for the Study of Pain, 1994). Therefore it is important to consider that whilst participants were able to withstand the cold pressor test this is not necessarily representative of them tolerating pain sensation, and could occur due to numbness.

Furthermore numbness would have impacted on participants' expectation of pain; after quickly learning that their hand would remain numb to pain sensation, any pain expectation is eliminated. Thus one reason as to why the threshold and tolerance scores in the low-pain expectant condition and the control group were so similar is as a result of the cold pressor test design; after participants in these conditions reached a state of numbness, their expectation in addition to sensation of pain was depleted significantly or eliminated entirely. A more appropriate design would be to use a method inducing heat pain to eliminate the confounding variable of numbness that occurs with the cold pressor test. Nonetheless, Mitchell, MacDonald & Brodie (2004) state that the cold pressor test is most effective method for measuring pain tolerance compared to other methods and it remains the most appropriate assessment of pain tolerance and threshold,. In future it is recommended that replications account for

numbness by asking participants to remove their hand at the point of numbness or ceasing of pain sensation.

Moderator Analysis

The second aim of this study was to produce novel findings into the moderator relationship between two personality variables shown to relate to nociception and anticipation. Four moderator models were assessed: (1) to test if the effect of anticipation upon pain threshold is moderated by extraversion and neuroticism, (2) to test if the effect of anticipation upon pain tolerance is moderated by extraversion and neuroticism, (3) to test if neuroticism alone moderates the relationship between anticipation and pain threshold and (4) to test if neuroticism moderates the relationship between anticipation and pain tolerance. All the moderator analyses were non-significant and consequently the results of this study show that neuroticism and extraversion do not moderate the relationship between anticipation and pain threshold or tolerance. Models 3 and 4 were conducted as additional tests after inspecting the original results and finding that the extraversion variable had a negligible effect size and produced an abnormality in the original moderation analysis. It was therefore necessary to determine whether the extraversion variable was masking a true moderation of neuroticism. The results indicate that no relationship exists and thus it can be concluded that in addition to the non-significant results of models 1 and 2, neuroticism alone does not moderate the relationship between anticipation and pain threshold or tolerance.

Newth & Delongis (2004) found that cognitive processes associated with pain are moderated by personality traits. One reason the current study did not support these findings is because this research tested one cognitive process only; pain

anticipation. One possible explanation for the complex interaction of the variables measured in the present study could be due to personality types impacting how likely an individual is to be 'suggestible' and open to pain anticipation itself. Trait-suggestibility can be defined as a personality trait determining the degree one is likely to be influenced by external information sources (Lang, Lazovik & Reynolds, 1965). Furneaux and Gibson (1961) postulate that neurotic-introverts are highly suggestible and are therefore open to factors such as anticipation, whereas those who are less neurotic or more extravert are less influenced by anticipation. However, Heilizer (1960) states that trait-suggestibility is not related to neuroticism. This study reported no significant relationship between trait-suggestibility and neuroticism/extraversion.

However it is important to note that for the present investigation a submissiveness scale was used and interpreted to measure 'trait-suggestibility' due to lack of an appropriate, specific trait-suggestibility questionnaire. Pre-existing measures such as the Gudjonsson (1983) Suggestibility Scales focus predominantly on suggestibility in relation to hypnosis and dissociative body experience (Eysenck & Furneaux, 1945) or interrogative suggestibility in forensic settings (Liebman et al., 2002). It is important to note that such scales do not explicitly measure trait-suggestibility without eliminating the mediation influence of trait-anxiety or hypnotisability and were therefore not suitable for use in this experiment. Kirsch (1997) highlights the issue of research into trait-suggestibility, with scales poorly defining between hypnotisability and 'wakeful-suggestibility', the closest definition relevant to this research. Thus it cannot be discounted that an effect of trait-suggestibility may have exerted an influence on the data and was simply not measured accurately as a result of having

to adapt a questionnaire designed to measure submissiveness as opposed to suggestibility.

Limitations

The cold pressor test, though standardised and used widely in pain research, is limited when measuring pain tolerance as it does not account for the impact of numbness on pain tolerance (Birnie, Petter, Boerner, Noel & Chambers, 2012; Birnie, Caes, Wilson, Williams & Chambers, 2014). A more appropriate measure of pain tolerance would be to ask participants to remove their hand when they can no longer stand the pain or they experience numbness, or alternative methods of pain induction, such as use of heat or electric shock. Furthermore, the lack of a suitable trait-suggestibility questionnaire measure impacted on the validity of this experiment. Development of a more explicit questionnaire measuring trait-suggestibility without reference to hypnosis/forensic suggestibility is required in future analyses.

Conclusion

In conclusion, this study examined a large sample and found that no significant effect of anticipation on pain threshold and tolerance existed. This opposes a large body of research and provides novel findings which undermine the idea of neurotic-introverts as a moderator of pain experience. Additionally, this study provides a platform for future research into the moderator relationship between cognitive and personality factors on pain. No previous investigations have assessed the moderator relationship between cognitive and personality facets upon pain threshold and tolerance. This study therefore provides understanding of the potential ways in which anticipation moderates the pain experience by suggesting this is not via personality. Further research into pain anticipation is required to advance our

understanding of factors affecting nociception and to increase our knowledge of how to combat these issues in relation to pain management, analgesia and general healthcare settings.

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Annex: Acceptance Information

-------- Original message --------

From: British Journal of Pain
<onbehalfof+Roger.Knaggs+nottingham.ac.uk@manuscriptcentral.com>

Date: 02/08/2017 16:46 (GMT+00:00)

To: jenna.gillett@hotmail.co.uk

Subject: British Journal of Pain - Decision on Manuscript ID BJP-17-0017

02-Aug-2017

Dear Miss Gillett:

It is a pleasure to accept your manuscript entitled "The moderating factors of neuroticism and extraversion in pain anticipation" in its current form for publication in British Journal of Pain. The comments of the reviewer(s) who reviewed your manuscript are included at the foot of this letter.

Thank you for your fine contribution. On behalf of the Editors of British Journal of Pain, we look forward to your continued contributions to the Journal.

Sincerely,
Dr. Roger Knaggs
Editor in Chief, British Journal of Pain
Roger.Knaggs@nottingham.ac.uk

Reviewer(s)' Comments to Author:

Reviewer: 1

Comments to the Author
I find the study methodologically well-conducted and with reasonable results. Personally, I always felt that personality factors could not have any influence on the threshold of pain, while for tolerance, perhaps personality aspects might be more relevant, though essentially mediated by motivational rather than structural elements.
The authors critically examine the results and fully recognize the possible limits. I therefore believe that work can provide a useful reflection in a complex and unclear field.