Ilkogretim Online - Elementary Education Online, 2021; Vol 20 (Issue 6): pp. 3532-3545
http://ilkogretim-online.org
doi: 10.17051/ilkonline.2021.06.333

Dominance, Arousal, Valence And Pain Perception: Functional And Dysfunctional Aspects Of Emotions And Expectations Of Software Engineers

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Abstract

The present study is aimed to understand the relationship between various aspects of pain and its relationship with emotional burnout and expectation, in the life of a young software engineers. For this purpose, a sample of 200 young adults in the age group of 25-40 years was taken. The sample specifically included only working professionals working in the area of software engineering. The variables under study give an in-depth view of how coping with pain and stress management lead to functional and dysfunctional aspects of emotions and expectations. Descriptive and inferential statistics were applied to analyze the data. Findings in the study reveal a positive correlation between dominance, arousal, and valence aspects of human emotions and Pain Perception. Also, the role of the Expectation factor is important concerning Valence as well. The study leaves strong implications for the Software industry to improve the mental health of young engineers.

INTRODUCTION

Pain is a series of unpleasant sensations within an emotional experience with a tissue damage level potential. It can be described in terms of similar damages as well. It is always unpleasant, feels like a sensation in the body, and is a maladaptive emotional experience. Here, psychology evolves as a supplement to medicinal help and its role is auxiliary. It acts as an aid to the patient experiencing actual pain, the physicians evaluating the patient, and the caregivers namely who can be family members or professional guardians among significant others. Psychology at each stage of treatment including diagnostic and therapeutic offers help in terms of both behavioral and cognitive guidance (Cohen M, Quintner J, van Rysewyk S, 2011).

Similar to any other neurobiological activity, emotions and emotional feelings vary from high to low levels in intensity. The modulation of emotional feelings may be done by the autonomic nervous system but it does not vary its valence or quality. Also, neither a moderate nor a high level of activity in the autonomic nervous system is necessary for emotional feelings and their emergence. The minute changes in neurobiological activity can be detected by our conscious mind and the resultant emotional feelings as well (Tomkins, Edelman, 2016).

Researches show that often pain is related to the induction of negative emotions, in the sense of leading a pathway for them but less research is available on the fact of what happens when that essence or pain is removed. A term stated as Emotion Utilization can be seen as a better way of emotion regulation where different forms of the regulation mechanism affect the utilization factor (Carroll E. Izard, 2009). In this way, the articulation of the view of emotions can be done in two types namely emotional processes and emotional states (Lumley, 2010). A study where the adults who had current Post Traumatic Stress Disorder or childhood abuse or neglect(alone) have fewer chances of pain in the next 30 years down the line but on the other hand neglect/child abuse along with current Post Traumatic stress disorder, both, increased the risk of inducing pain in the subsequent years (Raphael & Widom, 2011). From the understanding of this previous research mentioned, we can see that unresolved issues and stress points throughout life can trigger persistent pain. While the conduction of the research, patients who were willing to participate and who had some presence of pain and no issue with the disclosure of the same were recruited without the presence of unresolved stress points, and the motivation level of the patient was asked to disclose the emotional pains (Lumley et al., 2012). A study on the patients with fibromyalgia, who were compared with a wait-list control group showed that mindfulness exercises and exercises related to writing with intensive tests showed the implications in emotional and cognition processes, for instance, decision-making, examples can be an aim-directed behavior, and the choice of adaptation of better alternatives concerning risky behaviors (Ji G, Fu Y, Adwanikar H, 2013). Research by Franklin and colleagues measured emotions concerning loud noises. They used electrodes that were used to measure the positive and negative emotions of participants, for instance, muscle activities behind the ear and eye blink startle response for the former and the latter respectively. Sometimes, only the loud noise was presented and other times, after a shock varying from low to high intensity with the interval of 3.5, 6, or 14 seconds (J. C. Franklin, K. M. Lee, E. K. Hanna, M. J. Prinstein, 2013). The findings are providing clear insight into the fact why some people prefer self-injurious behavior and seek relief from the same. They examined the fact that when the physical pain is removed, a self-relief measure is induced

automatically while the ones who indulge in the self-injurious behaviors seek the same linking both the mechanism and their relief inductance explanation. The participants who did not have a history were checked for self-injurious behavior, psychiatric disorders, and emotional reactivity along with emotional regulation (J. C. Franklin, M. E. Puzia, K. M. Lee, G. E. Lee, E. K. Hanna, 2013). A case-control study was conducted to investigate the relationship between emotion processing and CLBP. 110 Participants took part in the study with a history of CLBP in 55 of the patients with chronic pain assessed and the rest without a history of CLBP and they were tested on EPS-25 (Emotional Processing Scale – 25). CLBP Patients when tested scored significantly higher in the EPS-25 ($p<0.001$) with an effect size of 0.33. The study thus suggested that abnormal emotional functioning and processing especially with suppression of emotions and their experiences are correlated to CLBP (Esteves JE, 2013). The clinical implication between pain and emotions is the main aim of the trans-diagnostic approach. This approach in the clinical context can be used easily where treatment and assessment can focus on mechanisms related to the transdiagnostic approach (Steven J Lynton, J Appl Biobehav 2015). Musculoskeletal pain along with the impact of physiological alterations in any individual concerning pain modulatory pathways and pain transmission causes a non-explainable scenario where central pain amplification cannot be explained with neuropathic or somatic processes. The perceived stress response system and perceived stress have a major contribution to chronic pain. Many individuals have displayed a relationship between the former and the latter symptoms (Leslie J. Crofford, 2015). A study by a group concerning pain inhibitory responses and winning rewards suggested that more winning behavior was observed in the participant more pain inhibition was induced which suggested that motivational behaviors eventually help to inhibit pain (Wiebke Gandhi, Saskia Kwan, 2015). In studies, it was visible that when a successful treatment for back pain or headache like chronic pain conditions was given, grey matter in the patient's reduction was reversed where the impacted region was dorsolateral ACC and PFC, an implication in pain modulation. The findings also suggest that the reductions in the grey matter can be caused by changes in neuronal tissue like reduced synaptic density, changes in non-neuronal tissue, or reductions in dendritic density and not necessarily by neuronal death (M. Catherine Bushnell, 2015). A strong association is found among post-traumatic stress disorder, substance abuse, obsessive-compulsive disorder, phobias, panic disorder, depressive episodes, bipolar disorder, and anxiety disorders with regards to fibromyalgia(FM). A study was conducted with 108 participants and 228 ones without fibromyalgia, the results were as a ratio of odds in the patients with FM having anxiety disorder 6.7, major depression 2.7, substance abuse 3.3, and bipolar disorder with 153 (Leslie J. Crofford,

2016). There have been numerous studies to understand the relationship between emotional constructs and alexithymia. A study that underwent the understanding of this research found a relationship in 97 fibromyalgia women who had a moderate effect of alexithymia with regards to pain inductance and emotional distraction and distress with a control group. Everyone was provided with a self-report which examined sleep quality, emotion-cognitive distress, pain experience along with alexithymia, especially in women. This finding was identified as correlated to low sleep quality, depressive symptoms, and higher anxiety along with difficulty in the description of feelings and identifying them, thus increases the level of fear and high-intensity pain. This in turn came out to be correlated with a high level of painful experience. Thus it was concluded in the study that there is a relationship between describing along with identifying feelings with pain intensity level and a high level of anxiety in patients with a high level of difficulty in expressions (Martinez MP et al., 2015). A low level of hope has been linked with the secondary pain symptoms of stress and traumatic injuries, distress, physical weakness, and decline in the functional ability of an individual thus to be accepted (Nalini Vadivelu, MD & Alice M, 2017). The review suggests that as more pain acceptance is seen in the patients, more the optimism they incur and the lesser they experience pain-associated disorders along with distress, and makes life more meaningful (Matthew M. & Karine B, 2017). A thirty-day study where the relationship among fatigue, valence aspect of human emotion-cognitive behavior, and pain was observed which provided evidence that there is a high level of inter-relation between the physical and emotional aspects of an individual's life. A day-to-day basic scoring over for 30 days using mobile technology which recorded physical and emotional modifications and calculated the difference in the daily level of emotions. The findings suggest that if these methodologies are adapted on a regular day-to-day basis an individual can predict an individual's level of health and its proper management (Wade JB, Prince 2017). Many of the observed brain structures are involved in cognition, sensory, and pain processing as well along with other areas specific to emotional and motor activities, specific attention to painful feelings, processes, and pain inhibition which is collectively termed as pain catastrophizing are researched using MRI. Nonetheless, with fMRI, data proves that there are specific brain regions that are reserved for pain-related activities and their activation which shows an inter-relation with emotion-cognitive aspects of human behavior (Malfliet A, 2017). Fear-avoidance is linked to the intensity of pain according to the moderator effect of somatosensory amplification link in a study where 256 patients with back pain were analyzed (Le Borgne M, 2017). The importance of the hypothalamic-pituitary-adrenal axis is still a point of non-understandable description in pain physiology. The critical components

in the learning process i.e. amygdala, hippocampus, and ventromedial prefrontal cortex i.e. limbic brain an important part of the process. The process of decision-making is dependent upon the limbic system in the sense that these areas collect the stress or pain signals along with the internal state and collectively generate common learning signals to facilitate the process. That is, in depression, chronic pain, and post-traumatic stress disorder, this learning circuitry is often observed to be re-structured and modeled in terms of physiological aspects which can hint at the onset of these conditions (Chadi G Abdallah, 2017). Within the span of the last five years, 9 studies were conducted and completed which suggested that ER along with stress-pain is a new line of research. Clear results were indicating the relationship between pain and maladaptive ER which were measured as response-focused. But on the other hand, studies that focused on antecedent-focused ER usage did not show a direct relation with pain (Koechlin H, Coakley R, 2018). Among variables namely, disability, anxiety, the intensity of pain, and depression, significant correlations were found in a study of pain assessment (Fisher E et al., 2018). A study was conducted on 445 children aged 6-10, a nonclinical population to check the relationship between emotional awareness, pain, and somatization using CSI (Children's Somatization Inventory). The results were indicating that over two weeks, a very high percentage of the sample complained of feeling pain at least over one area in the body which was measured as 84.07% (M. Rossy, 2018). The requirements which might help an individual in reaching goals, attaining aims, motivation, and priority are replaced by pain-focused information when the individual persists in pain. It often leads to maladaptive behavior, impacted functionality, fear, and anxiety along with avoidance and escapes behaviors. Various studies in terms of neuroimaging have shown that the activation in mesolimbic and cortical regions of the brain is different in chronic pain patients as in the control ones, especially during the acute pain observation period in subjects (Susanne Becker et al., 2018). Evidence-based research from several databases such as PubMed, Science Direct, MEDLINE, and ProQuest research was published with multi-collinearity among pain and depression-based variables. It indicated that patients with depression with pain and without pain differ significantly showing response to illness-related stimuli while non-pain depression patients showed response to depression-based stimuli (Rusu AC, Gajsar H, et al., 2019).

There is a rising level of painful experiences in the life of Engineers in India and the struggles of their family. Which impacts their overall well-being in terms of physical as well as mental pain levels of the entire family. Their expectations are one of the major factors in this socially distant world which have given rise to these kinds of situations. The focus of this research is the determination of an existing relationship between the human level of pain perception specifically in the young adults between

the age group 25-40 years concerning the expectation they have of the people around them. Using this area of research, it can be determined how the mental along with physical well-being of an individual is impacted based on aspects of human expectations along with the factors which are linked to emotions of a person to reveal them to further reduce the level of pain felt by a person in the upcoming times.

METHOD

AIM

The present research aims to study the relationship between the Perception of Pain with Emotional Burnout and Expectations among young software engineers.

OBJECTIVES

1) To study the effect of dominance, valence and arousal factors on the experience of physical and mental pain.
2) To study the effect of dominance, valence and arousal factors on the experience of expectations.
3) To study the difference between emotional factors and expectation factors experienced by a person on the basis of gender differences.

HYPOTHESES

H1. There will be no effect of dominance, valence and arousal factors on the experience of physical and mental pain.
H2. There will be no relation between dominance, valence and arousal affecting expectations.
H3. There will be no gender difference on emotional factors and expectation factors experienced by a person.

SAMPLE: The sample comprises young software engineers in the age group of 25-40 years. A sample N=200 was taken consisting of both males and females through the process of purposive sampling.

DESCRIPTION OF TOOLS

Self-Assessment Manikin – Emotion Measurement Tool

SAM is a pictographic scale to assess emotion in three independent affective spaces which are valence, arousal, and dominance on a 9-point scale across three dimensions of emotional measurement.

West Haven-Yale Multidimensional Pain Inventory (MPI) – Pain Measurement
The Multidimensional Pain Inventory (MPI) is a self-report instrument that measures the impact of pain on an individual's life, quality of social support, and general activity with 52 rated on a 0-6 scale and added a score with division by the number of items in the dimension of measurement gives an overall score. The higher the score, the greater the intensity of pain and vice-versa.

PROCEDURE

To investigate the effect of emotions on pain experiences, the research was initiated. The objective of the study was stated to the participants (males & females) & data collection was done through the soft copy of the questionnaires after taking the consent of the participants. After conduction of both the tests which were used to measure emotional effects in a person including his or her daily life activities to cope up or expectations which were related to the significant other along with the painful experiences experienced by a person in his life tenure till date of conduction over which the questions were based.

RESULT AND DISCUSSION

The findings of the present study suggest a significant correlation between Perception of Pain, Expectations, and Emotional Burnout among Young Software engineers. The research findings reveal that there is a positive correlation between dominance, arousal, and valence aspects of human emotions and pain perceptions along with expectations from significant others. The painful experiences affect two variables out of three measured through the pictographic scale i.e. dominance and valence while expectations affect arousal and valence factors denoting a significant relationship between them.

Overall, the study highlighted the relationship between Perception of Pain, Expectations, and Emotional Burnout among Young Adults. Implications like Randomizing the order of questions on different scales into a single one to prevent the participant from deducing the purpose of the scale and assuring the scale is not a performance test but an assessment tool so that the participant might not feel the need to act in a socially desirable or appropriate manner.

The main aim of this study was to understand the various aspects of emotions and their relationship with pain. It majorly focused on young adults and the main area was working professionals and how the variables are responsible for coping with pain, stress management, or other areas to assess the functional and dysfunctional aspects of emotions and expectations.

The results indicate Dominance, Arousal and Valence to be significant predictors of Pain (both Mental and Physical). Thus, the hypothesis that there will be no effect of dominance, valence and arousal factors on the experience of physical and mental pain is rejected.

According to the literature review of the data collection by standardized tests and further analysis through various variables (t-tests and different types of research methods regression discontinuity, cross-sectional studies, and many more) it can be stated that there is a significantly positive relationship between painful experience, dominance and valence factors of emotions among the sample. For instance, The results of the study of abnormal emotional functioning and processing concerning CLBP (Esteves JE, 2013) are visible here that pain experiences create abnormal emotional functioning. Apart from this, pain intensity level and high level of anxiety in the patients with a high level of difficulty in expressions (Martinez MP et al., 2015) study results are similar to the ones achieved in this research in the way that more anxious or painful experiences a person has, more level of difficulty in relationships displayed by a factor of dominance. The study where more optimism and lesser experience pain associated disorders (Matthew M. & Karine B, 2017) is depicted by the daily life activities factor in the sense that more inculcated and positive aspects improve the better emotional well-being of the person.

The second hypothesis that there will be no relation between dominance, valence and arousal factors affecting expectations. This hypothesis is also rejected as correlation was found to be significant at 0.01 and 0.05 levels (2-tailed). Thus, there is an impact of pain on expectation. The more painful experience a person is having, the more dominance is portrayed and thus bad-valence-inducing emotion is induced. They tend to experience negative emotions concerning the mental and physical pain encountered in their lives. Apart from this, the Expectation factor plays an important role concerning Valence as well. The more Painful experience a person has, the more often they feel neglected by their significant others and more negative perceptions are induced creating a dis-balance of emotions in terms of valence.

The third hypothesis is that there will be no gender difference on emotional factors and expectation factors experienced by a person. This hypothesis has been rejected

as a significant difference was observed between emotional factors and expectation factors experienced by a person on the basis of their gender.

The limitations of this study are that the sample size which has been used here is based on the people of Delhi/NCR Only which could be expanded to a wide level of people as India has a huge population. Also, more visual stimulation techniques could be used to check the emotional level of participants which can be fulfilled in future studies with more budget involved. Also, other factors such as situational ones could have been taken into account for more relevancy which could not be taken due to the limitation of time.

ACKNOWLEDGEMENTS

I would like to thank Dr. Ritu Sharma, Assistant Professor, Department of Psychology, Central University of Haryana, India; for guiding me towards this insightful research and her meticulous expertise provided during the research along with the valuable inputs. Also, I would like to show gratitude to all the people who participated in the research without whom the study could not even be thought to be conducted successfully. Then, also my family was supported throughout the research work along with the Almighty without whom nothing is possible.

DECLARATION OF INTEREST STATEMENT

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.
We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us.
We confirm that we have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including the timing of publication, concerning intellectual property. In so doing we confirm that we have followed the regulations of our institutions concerning intellectual property.
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TABLE 1: Correlation between Pain Experienced and Dominance, Valence and Arousal

s.no.		Pain Experience	Dominance	Valence	Arousal
1	Pain Experience	1	.198*	.205*	.137
2	Dominance	.198*	1	.306**	.596**
3	Valence	.205*	.306**	1	.300**
4	Arousal	.137	.596**	.300**	1

TABLE 2: Correlation between Expectations and Dominance, Valence and Arousal

s. no.		Dominance	Valence	Arousal	Expectations
1	Dominance	1	.306**	.596**	-.100
2	Valence	.306**	1	.300**	.210*
3	Arousal	.596**	.300**	1	.103
4	Expectations	-.100	.210*	.103	1

TABLE 3: Gender Difference

	t-value
Valence	-1.657
Arousal	-2.464**
Dominance	-1.179

Table 4 : Regression results for Pain experience

R	R Square	Adjusted R Square	Std. Error of the Estimate
.411[a]	.169	.145	.57997

a. Predictors: (Constant), Dominance, Valence, Arousal

Table 5 : Descriptive of the variables under study

Pain Experience Levels		Valence	Arousal	Dominance
1.00	Mean	13.00	15.00	21.00
	Std. Deviation	2.83	1.41	4.24
1.50	Mean	7.00	7.00	8.00
	Std. Deviation	.	.	.
2.00	Mean	3.50	19.00	12.00
	Std. Deviation	2.12	1.41	1.41
2.50	Mean	7.67	14.33	19.67
	Std. Deviation	1.16	4.51	5.13
3.00	Mean	11.00	13.75	9.75
	Std. Deviation	5.89	3.95	3.20
3.50	Mean	13.00	19.67	15.33
	Std. Deviation	4.36	2.89	3.79
4.00	Mean	8.00	10.00	9.00
	Std. Deviation	.	.	.
4.50	Mean	8.50	11.00	14.00
	Std. Deviation	3.54	5.66	4.24
5.25	Mean	14.00	15.00	15.00
	Std. Deviation	.	.	.
6.00	Mean	18.00	18.00	18.00

	Std. Deviation	.	.	.
Total	Mean	10.24	12.81	12.39
	Std. Deviation	4.870	5.285	5.523

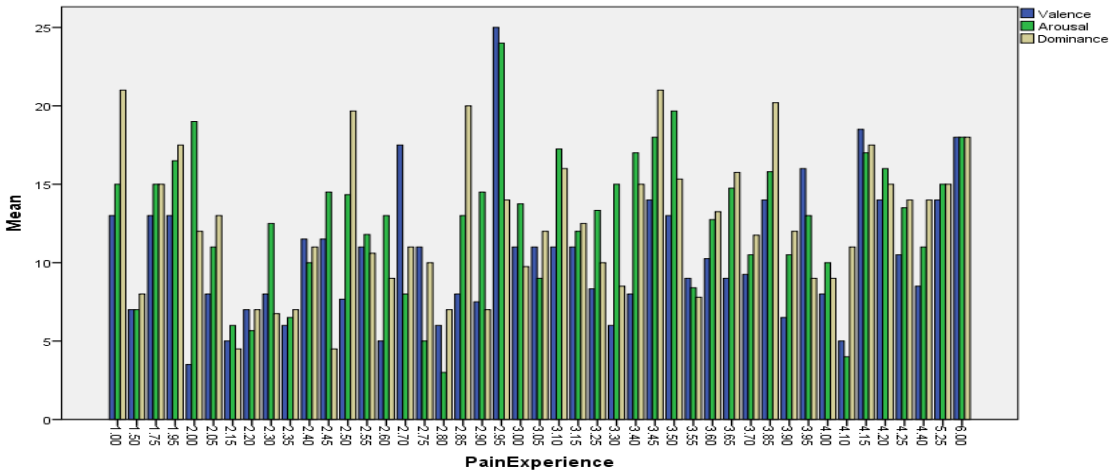

Figure 1: Relation between Pain Experienced, Dominance, Valence and Arousal

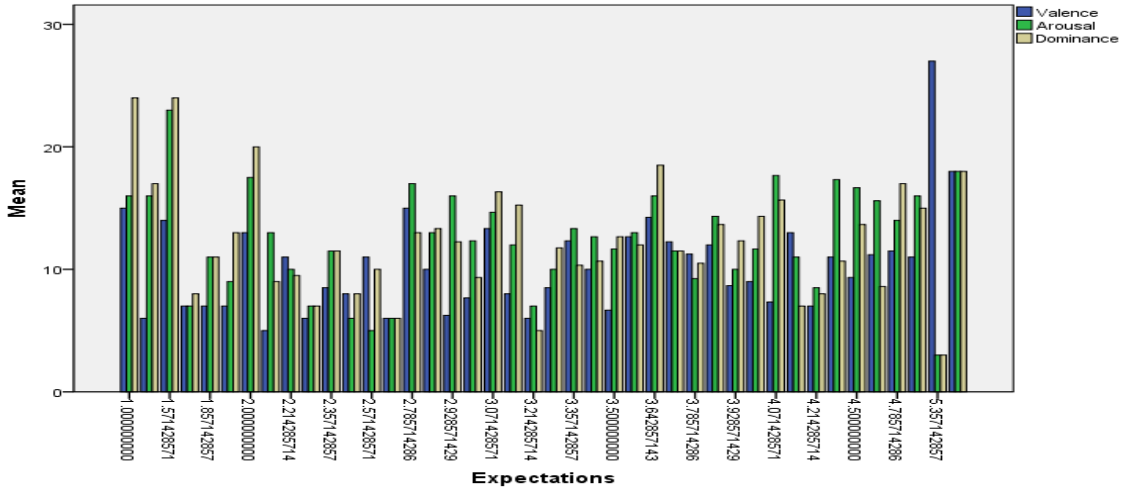

Figure 2: Relationship between Expectations, Dominance, Valence and Arousal