

Evaluation of Behaviour to Pain Measures in Athletes - A Correlative Analysis

Praveen Kumar, Jaspal Singh Sandhu and Shweta Shenoy

Guru Nanak Dev University, Department of Sports Medicine & Physiotherapy, Amritsar, India

ABSTRACT

Research suggests that pain affects behaviour of the athletes, assessment of behaviour when in pain reveals that pain has influenced athletes' measurable response when they get injured in their course of play. The objectives of the study were to find and analyse correlation of pain behaviour measures in contact and non-contact sports. The study has been conducted using Vienna Testing System (VTS) Questionnaire for Evaluating Pain Behaviour- FSV on four hundred and eighty one (n=481) subjects that included both male and female athletes who had a history of injury in the past but not suffering from any acute injuries. Statistical analysis revealed a significant correlation between variables in both covariate and partial correlation analysis. We conclude that higher avoidance score predicts a lower activity score regardless of cognitive control and social support in FSV scale.

Key words: behaviour, social support, activity, avoidance, cognitive control, athletes.

Introduction

Pain is defined as 'an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage'¹. Pain is a personal and subjective experience, the fact that someone is experiencing pain is often apparent to others. People who have pain may vocalize their distress by moaning, crying or complaining, or may exhibit pain-related body postures or facial expressions. These verbal and nonverbal behaviours have been called pain behaviours because they serve to communicate the fact that pain is being experienced². When an athlete experiences pain due to injury or ill health, it could change his or her behaviour in different aspects. Behaviour is broadly defined to include cognitions, psycho-physiological reactions, and feelings, which may not be directly observable but are defined in terms that can be measured by means of various assessment strategies³. The study compared a group of runners with a group of non-athletes and indicated that athletes were more withdrawn, thoughtful and presented lower anger levels than non athletes⁴.

Questionnaire for Evaluating Pain Behavior –FSV is a standard questionnaire found in literature to evaluate the behaviour of pain is based on the theory of effective learning processes in pain and the concept of cognitive pain control developed in laboratory studies can be used for assessing the behaviour to pain in athletes⁵. FSV is a multi-dimensional Questionnaire for Evaluating Pain Behaviour which was developed from an item collection with the rational scales avoidance/ pain expression, diversion and social reinforcement.

This study consists of variables of FSV -avoidance, cognitive control, activity & social support to find out the behaviour to pain between contact and non-contact athletes. Avoidance, cognitive control & activity are based on the theory of effective learning processes in pain, which holds that the experience of pain is intensified by negative reinforcement (putting an end to an aversive condition by withdrawing) and is eased by positive reinforcement (turning to important persons

who share a close relationship with the patient) and eventually can be reduced by confrontation^{6,7}. Cognitive control refers to relaxation skills, ability to use the imagination and self-instruction as determined by experiments⁸.

The conceptual formulation, first advanced by Fordyce observes that consequences that immediately follow pain behaviors may exert a powerful influence on the probability of future occurrence of those pain behaviors^{7, 9, 10}. As a consequence, pain behaviors originating because of body damage may, in the course of events, come to be controlled by consequences or conditioning effects operating in the patient's social environment.

It has been argued that the willingness of athletes to risk pain and injuries is affected by structural features of their sports networks (called "sportsnets"), by relations with individual sportsnet members, and by "the culture of risk" that is deeply embedded in serious athletic subcultures¹¹. So it is necessary to conduct the study to examine the pain behaviours.

Avoidance

Avoidance is the behaviour when athletes feeling generally helpless as regards to their pain and withdraw from contact with others and social obligations. This can be described as "Reduction of contact with others due to pain"⁸. Learning processes play a role in avoidance behaviour as a reaction to be perceived and expected pain (negative reinforcement). Exiting a situation is associated with a feeling of relief. This feeling of relief is stronger, the more a certain pain intensity criterion is made a prerequisite for withdrawal¹². Avoidance behaviour is a prominent and extensive component of chronic pain behaviour. Its unadaptive consequences are delineated and the puzzling issue of its persistence is raised. An explanation is put forward emphasizing the functional relationship between cognitions and avoidance behaviour³. This study also proposed avoidance behaviour along with cognitive control, social support and activity.

Cognitive Control

Cognitive control is a term used to describe a subset of goal-directed, self regulatory operations involved in the selection, scheduling, and coordination of computational processes underlying perception, memory, and action. Core cognitive processes collectively termed ‘cognitive control’ or ‘executive control’ includes inhibition, working memory, and cognitive flexibility³. Coping refers to conscious cognitive and behavioral efforts to manage a situation that has been appraised as stressful¹⁵⁻¹⁶. In this study we considered coping skills (cognitive control) of athletes included positive self-communication, relaxation etc., and mental toughness represents the ability of a person to cope with the demands of training and competition, increased determination, focus, confidence, and maintaining control under pressure¹⁷.

Social Support

Social support is defined as "an exchange of resources between at least two individuals perceived by the provider or the recipient" to be intended to enhance the well-being of the recipient" and "information from others that one is loved and cared for, esteemed and valued, and part of a network of communication and mutual obligations¹⁸. When athletes are injured they get support from either of the partner or team mates which would provide instrumental help or communicative support¹⁹. The study revealed that male athletes reported more sources of social support than female athletes, whereas female athletes had greater satisfaction with the support they received²⁰. Athletes' social support patterns changed after they became injured. In this substest, the statements address the perceived support and attention the patient receives from his/her partner⁸.

Activity

This statement contained in this substest (activity) attempt to understand pain as a challenge for coping behaviour and taking action. Activity is described as maintaining physical and social activities, as well as illness-related social skills⁸. However, when the patients maintain their usual activities, it is possible to verify the hypotheses in pain expectation, which can lead to a pain reduction experience in situations where pain increase is expected. As regards effectiveness, activity can be equated with confrontation in the context of fear treatment²¹.

Contact and non-contact specific classification may help to find athletes behaviour to pain which would adopt a strategy during rehabilitation to enhance the sports performance.

Aims of this study were: [1] to examine behaviour to pain responses of avoidance, cognitive control, social support &

activity; [2] to find the difference in pain behaviour among contact and non-contact athletes, and [3] to find which variable is controlling pain behaviour among athletes.

Materials and Metods

This study proposal was approved by the Research Ethical Committee of Guru Nanak Dev University, Amritsar, India. Descriptive study design included 481 subjects (n=481) both male and female of contact (241 players) and non-contact (240 players) sports players. Subjects included in this study were aged between 17-45 years who played at college/ university/ state/ international level, who had a history of injury in the past and no history of any injury in past three months and had no psychological disorders. This study was conducted in Guru Nanak Dev University, Amritsar, India.

Questionnaire for Evaluating Pain Behaviour – FSV was used to evaluate the athletes’ behaviour that consisted components of avoidance, cognitive control, social support and activity. All the sub-scales of FSV questionnaire has reliability with Cronbach’s alpha co-efficient value of $0.68 \leq \alpha < 0.84^{22-27}$. Each question is to be marked on a five point scale ranging from “does not apply” to “applies to a great extent”. Prior consent was taken and instructions were given to athletes about the questionnaire to select the most appropriate answer against the questions regarding their behaviour when in pain experience and were given 5 minutes time to complete the questionnaire.

The athlete’s responses were entered in to the VTS and the scores for the four variables were obtained and the total corrected raw score is calculated for avoidance, cognitive control, social support and activity.

All variables were statistically analysed using SPSS 16.0 version. The correlation among the included variables was calculated by Pearson’s co-efficient correlation and partial correlation with control variables to find the influence of any variables on others.

Results

The statistical analysis revealed that significant correlation existed between avoidance and cognitive control ($r=0.109$, $p<0.05$), avoidance and social support ($r=0.420$, $p<0.01$), cognitive control and social support ($r=0.211$, $p<0.01$), cognitive control and activity ($r=0.297$, $p<0.01$), social support and activity ($r=0.247$, $p<0.01$) but avoidance and activity did not show significant correlation.

TABLE 1
CORRELATION OF PAIN TO BEHAVIOUR MEASURES IN ALL ATHLETES

Variables	Avoidance	Cognitive Control	Social Support	Activity
Avoidance	1.000			
Cognitive Control	0.109*	1.000		
Social Support	0.420**	0.211**	1.000	
Activity	0.063	0.297**	0.274**	1.000

*. Correlation is significant at the 0.05 level (2-tailed); **. Correlation is significant at the 0.01 level (2-tailed).

Also we have grouped athletes into two groups as contact sports athletes and non-contact sports athletes²⁸. Contact sports athletes have statistically significant correlation between avoidance and social support ($r=0.411$, $p<0.01$), cognitive control and social support ($r=0.202$, $p<0.01$), cognitive control and

activity ($r=0.245$, $p<0.01$), social support and activity ($r=0.230$, $p<0.01$) whereas between avoidance and cognitive control, avoidance and activity have not showed any significant correlation.

TABLE 2
CORRELATION OF BEHAVIOUR TO PAIN MEASURES IN CONTACT SPORTS ATHLETES

Variables	Avoidance	Cognitive Control	Social Support	Activity
Avoidance	1.000			
Cognitive Control	0.024	1.000		
Social Support	0.411**	0.202**	1.000	
Activity	0.008	0.245**	0.230**	1.000

Non-contact sports athletes have statistically significant correlation between avoidance and cognitive control ($r=0.254$, $p<0.01$), avoidance and social support ($r=0.446$, $p<0.01$), avoidance and activity ($r=0.155$, $p<0.01$), cognitive control and social support ($r=0.229$, $p<0.01$), cognitive control and activity ($r=0.321$, $p<0.01$), social support and activity ($r=0.331$, $p<0.01$).

TABLE 3
CORRELATION OF BEHAVIOUR TO PAIN MEASURES IN NON-CONTACT SPORTS ATHLETES

Variables	Avoidance	Cognitive Control	Social Support	Activity
Avoidance	1.000			
Cognitive Control	0.254**	1.000		
Social Support	0.446**	0.229**	1.000	
Activity	0.155**	0.321**	0.331**	1.000

As total correlation did not show statistically significant correlation between avoidance and activity ($r=0.063$, $p>0.05$), so these two variables kept each variable as control to find any influence to produce correlation among other variables. The bivariate correlation showed significant correlation between variables but when avoidance is kept as control variable, resulted in reduced 'r' value between cognitive control and social support, cognitive control and activity, social support and activity. So the reduced 'r' values suggest that these variables are mediated by avoidance score.

TABLE 4
PARTIAL CORRELATION RESULTS WITH CONTROL OF AVOIDANCE VARIABLE

Variables	Cognitive Control	Social Support	Activity
Cognitive Control	1.000		
Social Support	0.183	1.000	
Activity	0.292	0.273	1.000

The variable cognitive control was kept control variable resulted in reduced 'r' value between social support and avoidance, activity and avoidance, social support and activity. Thus reduced 'r' values indicating that these variables are mediated by cognitive control score.

TABLE 5
PARTIAL CORRELATION RESULTS WITH CONTROL OF COGNITIVE CONTROL VARIABLE

Variables	Avoidance	Social Support	Activity
Avoidance	1.000		
Social Support	0.409	1.000	
Activity	0.033	0.227	1.000

When social support was kept as control variable resulted in reduced 'r' value between avoidance and cognitive control, cognitive control and activity. But avoidance and activity showed reduced 'r' value with negative correlation which indicates that social support less score would increase the avoidance and activity scores.

TABLE 6
PARTIAL CORRELATION RESULTS WITH CONTROL OF SOCIAL SUPPORT VARIABLE

Variables	Avoidance	Cognitive Control	Activity
Avoidance	1.000		
Cognitive Control	0.023	1.000	
Activity	-0.060	0.254	1.000

Also when activity variable was kept as control variable to partial out other variables it produced some difference between variables unlike other control variables. The results showed avoidance and control, cognitive control and social support reduced 'r' value. But avoidance and social support with same 'r' value ($r=0.420$) which indicates that activity did not mediate to produce any changes between avoidance and social support.

TABLE 7
PARTIAL CORRELATION RESULTS WITH CONTROL OF ACTIVITY VARIABLE

Variables	Avoidance	Cognitive Control	Social Support
Avoidance	1.000		
Cognitive Control	0.094	1.000	
Social Support	0.420	0.141	1.000

Instead of controlling one variable two variables have been used as controls where avoidance and activity did not show any significant correlation. The statistical results showed that

reduced ‘r’ value indicates that these two are mediating other variables.

TABLE 8
PARTIAL CORRELATION RESULTS WITH CONTROL OF AVOIDANCE & ACTIVITY VARIABLES

Variables	Cognitive Control	Social Support
Cognitive Control	1.000	
Social Support	0.112	1.000

Meanwhile controlling cognitive control & social support produced negative correlation have showed negative correlation

($r = -0.068$) between avoidance and activity.

TABLE 9
PARTIAL CORRELATION RESULTS WITH CONTROL OF COGNITIVE CONTROL & SOCIAL SUPPORT VARIABLES

Variables	Avoidance	Activity
Avoidance	1.000	
Activity	-0.068	1.000

Discussion

Overall findings showed that all variables are having correlation among each other in covariate analysis except between avoidance and activity however partial correlation revealed that some valuable predictive factors. When each of the variables have been kept as control to partial out other variables it was found that control variables were all mediated to influence each other. But cognitive control and social support of athletes in partialling out avoidance and activity resulted in negative correlation between them which indicates avoidance high score would reduce the activity score because avoidance is principal mediator.

The study has found that no significant difference in total pain behaviours between those high versus low in terms of level of availability of support. Individuals who are satisfied with the quality of their social support may be satisfied because they receive positive reinforcement from the social environment when they engage in pain behaviour. With previous evidence, our subjects having previous history of injury showed significant relation between pain behaviour measures with social support²⁹.

Social influences can play a role in patient’s engagement in activity with pain present and their willingness to have pain without trying to avoid or control it³⁰. Though present study showed social support is having influence significantly on avoidance and activity of athletes which expressed avoidance mediating regardless of social support.

Study on coping skill revealed results and indicate that social support and psychological coping skills are statistically independent psychosocial resources and that they operate in a conjunctive manner to influence the relation between life stress and subsequent athletic injury in adolescents. Only athletes low

in both coping skills and social support exhibited a significant stress–injury relation, and in that vulnerable subgroup, negative major life events accounted for up to 30% of the injury variance. The results from present study revealed that coping skills (cognitive control) and social support are statistically significant correlation strongly which suggests that we can predict the value either of these variable³¹.

Individuals who are satisfied with the quality of their social support may be satisfied because they receive positive reinforcement from the social environment when they engage in pain behavior.

Reports from the general medical literature support the efficacy of cognitive behavioural intervention to reduce medical visits³². Likewise this study results would be useful to evaluate behaviour changes due to pain in injured athletes. In contrast, to find difference in gender we have done analysis between contact sports and non-contact sports athletes.

It is possible that interventions favorably altering cognitive–affective stress responses, behavior, and physiological processes underpinning adaptation to exercise training may impart a health benefit³³. So we can use the results of all variables to intervene with some behavioural therapy top enhance the sports performance.

The pain behaviors may in some instances persist solely because of avoidance learning. On the basis of experiences prior to onset or during the early history of a pain problem, a patient may come to engage in protective behaviors and emit visible or audible indications of distress based on the anticipation of distress rather than distress³⁴. Similarly, the findings of this study show that avoidance behaviour solely influencing activity pain behaviour. The statistical results found that regardless of cognitive control and social support, avoidance behaviour influencing physical and social activities (activity pain behavior).

Having measures that span a wide age range is important

given the protracted developmental progressions of many executive function and cognitive control skills³⁵. Likewise we were able to examine measures as included subjects aged between 17-45 years. Further studies should consider the age group and gender for specific sports would reveal more information and predictive factors.

Conclusion

Chronic pain on social support and indicate that perceived social support and pain coping are independent predictors of chronic pain adjustment, providing support for a biopsychosocial model of pain. So, further study would consider the subjects with acute and chronic pain to derive a behavioral pain model³⁶.

REFERENCES

1. MERSKEY H, BOGDUK N. Pain Terms, a current list with definitions and notes on usage. In: *Classification of Chronic Pain* (IASP Task Force on Taxonomy, IASP Press, Seattle, 1994). – 2. FORDYCE WE. Behavioural methods for chronic pain and illness. (MO: Mosby, 1976). – 3. KAZDIN AE. Treatment for oppositional, aggressive and antisocial behaviour in children and adolescent. (Oxford University Press, 2005). – 4. MARESH CM, SHECKLEY BG, ALLEN GJ, CAMAIONE DN, SINATRA ST. Middle age male distances runners: physiological and psychological profiles. *Journal of Sports Medicine & Physical Fitness*, 31 (1991) 461. – 5. EYSENCK, HJ, NIAS DK, COX DN. Sport and personality. *Advances in Behaviour Research and Therapy*, 4 (1982) 1. – 6. FERNANDEZ E. A classification system of cognitive coping with pain. *Pain*, 26 (1986) 141. – 7. FORDYCE WE. Behavioral methods for chronic pain an illness. (Mosby, 1976). – 8. KLAGES U, ANTONIUS K. Manual- Questionnaire on reaction to pain. (Test Label FSV 2011). – 9. FORDYCE WE, FOWLER RS, LEHMANN JF, DE LATEUR BJ. Some implications of learning in problems of chronic pain. *Journal of Chronic Disease*, 21 (1968) 179. – 10. FORDYCE WE, FOWLER RS, LEHMANN JF, DE LATEUR BJ, SAND PL, TRIESCHMANN R. Operant conditioning in the treatment of chronic pain. *Archives of Physical Medicine and Rehabilitation*, 54 (1973) 399. – 11. NIXON II HL. A social network analysis of influences on athletes to play with pain and injuries. *Journal of Sport & Social Issues*, 16 (1992): 127. – 12. HAYTHORNTWAITE JA, SIEBER W, KERNS R. Depression and the chronic pain experience. *Pain*, 46 (1991) 177. – 13. PHILIPS HC. Avoidance behaviour and its sustaining chronic pain. *Behaviour Research and Therapy*, 25 (1987) 273. – 14. DIAMOND A. The early development of executive functions. In: *Lifespan cognition- Mechanisms of change*. (New York: Oxford University Press, 2006). – 15. LAZARUS RS. *Stress and emotion: A new synthesis*. (NY: Springer, 1999). – 16. LAZARUS RS, FOLKMAN S. *Stress, appraisal and coping*. (NY: Springer, 1984). – 17. JONES G, HANTON S, CONNAUGHTON D. What is this thing called mental toughness? An investigation of elite performers. *Journal of Applied Sport Psychology*, 14 (2002) 205. – 18. SHUMAKER SA, BROWNELL A. Toward a theory of social support: closing conceptual gaps. *Journal of Social Issues*, 40 (1984) 11. – 19. COBB S. Social support as a moderator of life stress. *Psychosomatic Medicine*, 38 (1976) 300. – 20. YANG J, PEEK-ASA C, LOWE JB, FOSTER E, FOSTER DT. Social support patterns of collegiate athletes before and after injury.

The limitations of the study were that we did not consider acute injuries, specific sports and also subjects included in this study played at various levels. Avoidance behaviour influencing other pain behaviours in the FSV scale in non-contact sports players than in contact sports players (Table 2 & 3 as ‘r’ values are higher in non-contact than in contact players). Further studies have to find the rational for the mediating power of avoidance regardless of contact or non-contact sports.

Previous study has suggested that given the compelling evidence reached to date, however, fear-avoidance needs to be considered in clinical practice and given priority in research. This study results revealed that each measure of FSV scores are considered significant mediator to find the pain behaviour in athletes³⁷. We conclude that avoidance behaviour highly influencing other pain behaviour scores to evaluate behaviour to pain in FSV scale.

Journal of Athletic Training, 45 (2010) 372. – 21. LETHEM J, SLADE PD, TROUP JDG, BENTLEY G. Outline of a fear-avoidance model of exaggerated pain perception. *Journal of Behavior Research and Therapy*, 21 (1983) 401. – 22. CZISKE R. Faktoren des Schmerzerlebens und ihre Messung: Revidierte Mehrdimensionale Schmerzskala. *Diagnostics*, 28 (1983) 61. – 23. ERDMANN G, JANKE W. Der situative Reaktionsfragebogen. *Ärztliche Praxis*, 30 (1978) 1240. – 24. KLAGES U. Statistische Untersuchung zur Entwicklung eines multifaktoriellen Schmerzfragebogen. *Schmerz Pain Douleur*, 10 (1989) 134. – 25. KLAGES U. Fragebogen zum Schmerzverhalten (FSV). *Diagnostica*, 35 (1989) 351. – 26. KLAGES U. Life change, irritational attitudes and disease impacts in patients with ankylosing spondylitis. *International Journal of Psychomotrics*, 40 (1993) 77. – 27. TÖNNIES S. Inventar zur Selbstkommunikation für Erwachsene. Weinheim: Beltz (1982). – 28. RICE SG. Medical Conditions Affecting Sports Participation. *Pediatrics*, 121 (2008) 841. – 29. GIL KM, KEEFE FJ, CRISSON JE, VAN DALFSEN PJ. Social support and pain behaviour. *Pain*, 29 (1987) 209. – 30. MCCRACKEN LM. Social context and acceptance of chronic pain: the role of solicitous and punishing responses. *Pain*, 113 (2005) 155. – 31. SMITH RE, SMOLL FL, PTACEK JT. Conjunctive moderator variables in vulnerability and resiliency research: Life stress, social support and coping skills, and adolescent sport injuries. *Journal of Personality and Social Psychology*, 58 (1990) 360. – 32. FRIEDMAN R, SOBEL D, MYERS P, CAUDILL M, BENSON H. Behavioral medicine, clinical health psychology, and cost offset. *Health Psychology*, 14 (1995) 509. – 33. PERNA FM, ANTONI MH, KUMAR M, CRUESS DH, SCHNEIDERMAN N. Cognitive-behavioral intervention effects on mood and cortisol during athletic training. *Annals of Behavioral Medicine*, 20 (1998) 92. – 34. FORDYCE WE, SHELTON JL, DUNDORE DE. The modification of avoidance behaviour learning pain behaviors. *Journal of Behavioral Medicine*, 5 (1981) 405. – 35. DAVIDSON MC, AMSO DIMA, ANDERSON LC, DIAMOND A. Development of cognitive control and executive functions from 4 to 13 years: Evidence from manipulations of memory, inhibition, and task switching. *Neuropsychologia*, 44 (2006) 2037. – 36. MARTINEZ AEL, ZARAZAGA RE, MAESTRE CR. Pain coping and social support as predictors of long-term functional disability and pain in early rheumatoid arthritis. *Journal of Pain*, 41 (2008) 1295. – 37. VLAEYEN JWS, LINTON JS. Fear-avoidance and its consequences in chronic musculoskeletal pain: a state of the art. *Pain*, 85 (2000), 317. –

J. Praveen Kumar

Guru Nanak Dev University, Department of Sports Medicine & Physiotherapy, Amritsar, India

e-mail: jpk200513@gmail.com

PROCJENA PONAŠANJA KOD SPORTISTA PRILIKOM OSJEĆAJA MJERLJIVIH BOLOVA - KORELACIONA ANALIZA

S A Ž E T A K

Prethodna istraživanja ukazuju na to da bol utiče na ponašanje sportista, a procjena ponašanja je otkrivana dok je bol uticao na mjerljivi odgovor sportiste kada se povreda desila u toku igre. Glavni cilj ovog istraživanja je bio da se prepozna i analizira korelacija mjerljivih parametra koji određuju ponašanje sportista prilikom osjećaja bola u sportovima kod kojih dolazi do fizičkog kontakta i onih bez kontakata. Studija je sprovedena pomoću „Vienna Testing System (VTS) Questionnaire for Evaluating Pain Behaviour – FSV“, dok je uzorak ispitanika sačinjavalo četiri stotine i osamdeset jedan sportista ($n = 481$) muškog i ženskog pola. Ispitanici su imali određenu istoriju povreda u prošlosti, ali u trenutku ispitivanja nisu patili od akutnih pojava određenih povreda. Statistička analiza je pokazala značajnu korelaciju između promjenljivih u obje kovarijate i parcijalne korelacione analize. Stoga je zaključeno da viši skor izbjegavanja povreda predviđa niži skor aktivnosti, bez obzira na kognitivnu kontrolu i socijalnu podršku u FSV skali.

Ključne riječi: bolno ponašanje, socijalna podrška, aktivnost, izbjegavanje, kognitivna kontrola, sportisti.