



A Theory Based Study Predicting Factors of Physical Activity Behavior among Chronic Low Back Pain Patients Referred to Pain Clinic in Yazd, Iran

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Background: Low level Physical Activity (PA) among Chronic Low Back Pain for (CLBP) has been reported in many studies. The aim of this study was to predicting factors for physical activity behavior among CLBP patients referred to pain clinic in Yazd, Iran.

Methods and Materials: This cross sectional study was conducted on 182 eligible patients with CLBP who referred to pain clinic in Yazd, Iran from October to December 2016. A socio-demographic questionnaire as well as a 14-item researcher-made questionnaire regarding physical activity predictors based on Theory of Reasoned Action (TRA) were used to collect data. Data were inserted into SPSS v.23 and AMOS v. 23 and analyzed using descriptive/analytical tests including linear regression analysis.

Results: Totally 182 individuals with mean age of 42.18 ± 13.12 completed the study. The results showed behavioral beliefs and evaluation of behavioral outcome of PA were predictors of patients' attitudes towards PA ($P < 0.001$). Normative beliefs and motivation to comply were also predictors of subjective norm ($P < 0.001$). Subjective norm was predictor for intention to perform the PA behavior ($P < 0.001$) that in turn was predictor for PA behavior ($P < 0.001$). However, attitudes towards PA was not predictor for intention to do PA ($P = 0.085$).

Conclusion: This study showed the individuals who had positive beliefs and evaluation regarding outcomes of PA were more likely to do this behavior.

Keywords: Physical Activity, Chronic Low Back Pain, Predictor Factors

Introduction

Chronic Low Back Pain (CLBP) is a global prevalent and costly health problem could lead to disability, lower social and mental health (Griffina, Harmonb & Kennedy, 2012). Although, there are several approaches to improve CLBP, to date, no treatment seems definitely to be more effective than others in CLBP management (Wand & O'Connell, 2008).

However, it has been argued that Physical Activity (PA) has a potential effect on the prevention/management of CLBP (Schaller,

Dejonghe & Haastert, 2015). For years, increasing daily activities among CLBP has been noticed in rehabilitation of these patients just due to this reason that inactivity or lower PA could leading to longer and persistent pain (Weering, 2009).

Despite, the benefits of PA for CLBP, a lower level of this behavior among these patients was argued in literature (Van den Berg-Emons, Schasfoort & de Vos, 2007). Sokunbi and co-workers investigated CLBP sufferers from having limitation for physical function and daily activity due to their pain (Mullen, McAuley & Satariano, 2012).

However, existed literature discussed bio-psycho-social factors might have influence on developed and persistent CLBP and disability (Forbes & Davis, 2008). In addition, individuals' beliefs due to CLBP have key role on chronicity process of this disease and its due disability (Forbes & Davis, 2008). For instance, threatened

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beliefs regarding CLBP, in which the pain is a symptom of serious threat, can cause fear of movement, lowered physical activity, and subsequently maintenance chronic pain and disability (Forbes & Davis, 2008).

Theory of Reasoned Action (TRA), as a theory for prediction of behavioral intention verifies that individuals' health behaviors are determined by their attitudes toward the behaviors. According this theory, attitudes toward the behaviors are affected by individuals' behavioral belief and individuals' evaluation of behavioral outcome (Figure 1) (Glanz, Rimer & Viswanath, 2008). It means the individuals who have positive beliefs and evaluation regarding outcomes of PA are more likely to do this behaviors. Furthermore, this theory verifies that the healthy behaviors could be predicted by

subjective norm. Subjective norm composed of individuals' normative beliefs regarding what significant people recommend multiply by the individuals' motivation to comply with these significant people as key persons (Sheldon, 2016). Currently published evidences indicated that patients' perceptions of the neighborhood social environment effected on PA (Allison & Sweeney, 2017). These documents verified that neighborhood social relationships, social supports, social connections and interactions between individuals could be leading to greater levels of walking behavior (Fisher & Li, 2004).

Social Cognitive Theory (SCT) also proposed that an individual's behavior occurred while both individual-level cognitive factors interacted with the environmental factors (MacAlister, Perry & parcel, 2008).

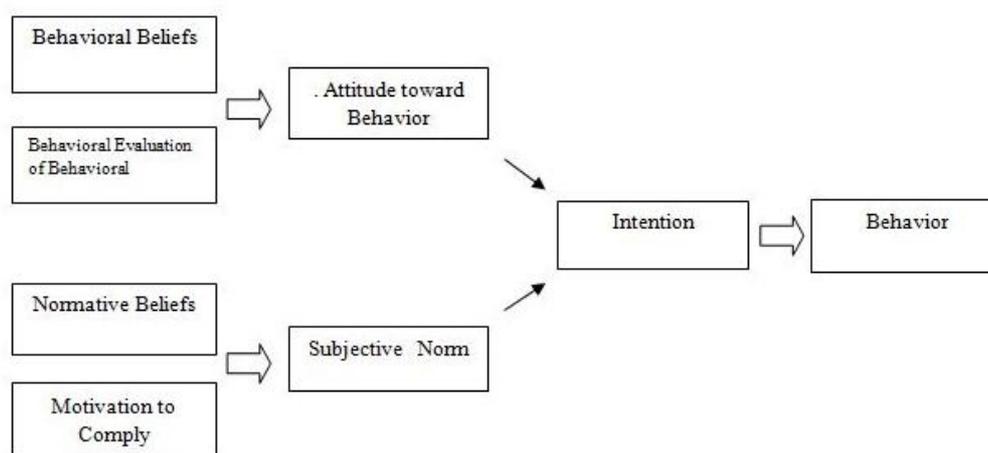


Figure 1. Theory of Reasoned Action.

In the studies that were conducted in Iran the bio psychosocial predicting factors for doing preventive behavior by CLBP patients were reported (Tavafian, Gregory & Montazeri, 2008). Although, the factors like patients' negative beliefs and low social support perception regarding regular PA behavior among CLBP patients were considered as barriers for further PA (Tavafian, Jamshidi & Mohammad, 2011). These influencing factors were not assessed through applying theories and modes which themselves could predict the predicting factors on doing healthy behaviors. To our knowledge, it seems this study is the first research in Yazd, Iran.

Methods and Materials

This cross sectional study was done on 182 patients with CLBP who referred to pain clinic in Yazd, Iran from Oct to Dec 2016. Sample size

calculation was based on considering 30 samples for each constructs of TRA, Therefore, for six constructs of TRA, 182 eligible patients were assessed. Pain clinic was affiliated to Shahid Sadoogy University of Medical Sciences that was geographically located in around center of Yazd city in province of Yazd, which is a central province of Iran. The referents to this clinic were from different socio demographic characteristics that were representative of Yazd population. All ethical principles considered in this study. The ethics committee of Tarbiat Modares University approved the study.

To sampling, all referents to the pain clinic who suffering from CLBP were recruited if they obtained inclusion/exclusion criteria. Inclusion criteria included as having minimum level of reading/writing ability in Farsi language, living in Yazd province, and suffering from CLBP for at

least 12 weeks and referred to pain clinics in Yazd. However, patients who were mental retarded, patients who had history of vertebral fracture/inflammation in their spine, patients who suffering from tumor or congenital abnormalities in their vertebra were excluded from the study. To entering the eligible patients to the study, all referred CLBP patients to pain clinic were visited by an orthopedic physician and if the patients obtained the inclusion/exclusion criteria and signed the consent form, were entered into the study. All participants were visited by the same physician throughout the study. All eligible patients after becoming informed about the objectives and procedures of the study, signed the consent form and entered into the study. If someone was not satisfied to be studied, he/she excluded from the study. Of the 215 patients who were visited by the physician 182 patients were eligible for the study. All these patients were provided with the aims and procedures of the study and were satisfied to be entered into the study. Therefore, the response rate was 100%.

A socio-demographic questionnaire as well as a 14-item researcher-made questionnaire regarding PA predictors based on TRA were used to collect data. The structure of the recent named questionnaire was based on the TRA that was invent by Ajzen (Ajzen, 2011).

To assess the content validity of the questionnaire, both qualitative and quantitative methods were used. For qualitative method an expert panel consisting of 10 experts including five experts in health education/health promotion, two pain specialists, two general practitioners and one person who was health psychologist evaluated the questionnaire for 'grammar', 'wording', 'item allocation', and 'scaling' indices. The expert panel inserted their recommendations into the all items of questionnaire.

For assessing quantitative content validity, we used the Content Validity Ratio (CVR) and the Content Validity Index (CVI). The necessity of an item was assessed using a 3-point rating scale including a) essential, b) useful but not essential and c) unessential in order to calculate the CVR. According to the Lawshe's table, items with CVR value of ≥ 0.4 obtained acceptable rate. For the CVI, based on Waltz & Bausell's recommendation, the same experts were requested to evaluate the items based on a 4-point Likert scale including a) simplicity, b) relevancy, and c) clarity. The CVI value of ≥ 0.79 was considered acceptable for each item.

The questions of the questionnaire were as follows: two questions for behavioral beliefs with 7-point rating scale from completely unlikely to completely likely ranged from one to seven (completely unlikely = 1, unlikely = 2, somewhat unlikely = 3, no idea = 4, somewhat likely = 5, likely = 6, completely likely = 7), two questions for evaluation of behavioral outcomes with 7-point rating scale from completely bad to completely good (completely bad = 1, bad = 2, pretty bad = 3, no idea = 4, good = 5, pretty good = 6, completely good = 7), two questions for normative beliefs with 7-point rating scale, ranged from (completely should not = 1, should not = 2, pretty should not = 3, no idea = 4, pretty should = 5, should = 6, completely should = 7), two questions for motivation to comply with significant people with 7-point rating scale, ranged from (completely disagree = 1, pretty disagree = 2, disagree = 3, no idea = 4, agree = 5, pretty agree = 6, completely agree = 7), one questions for intention to behavior with 7-point rating scale, ranged from (completely unlikely = 1, unlikely = 2, somewhat unlikely = 3, no idea = 4, somewhat likely = 5, likely = 6, completely = 7), one questions for behavior with 7-point rating scale, from false to correct from (completely false = 1, more unlikely = 2, somewhat unlikely = 3, no idea = 4, somewhat likely = 5, more likely = 6, completely likely = 7).

To obtain reliability of the questionnaire the internal consistency of the questionnaire was evaluated by the Cronbach's alpha coefficient for the entire questionnaire. The Cronach's alpha coefficient of 0.7 or above was though satisfactory. Nineteen patients suffering from CLBP completed the questionnaire to calculate Cronbach's alpha and it was obtained as 0.79.

Data were inserted into SPSS v.23 (IBM company, United State) and AMOS v. 23 (IBM company, United State) and analyzed using linear regression analysis. Furthermore, the descriptive tests were used to calculate mean /standard deviation and frequency rate.

Results

In this study, 182 patients were assessed. Patients were aged between 18 and 79 years with mean age of $42/18 \pm 13/12$. The majority of the studied patients (56.6%) were women (N = 103) and 38.5 % of patients (N = 70) were housewives. Table 1 shows the socio demographic characteristics of the studied patients.

Table 1. Socio demographic characteristics of the studied patients.

		Frequency	Percent
Job	Housewife`	70	38.5
	Manager	3	1.6
	Employed	31	17.0
	Non-employed	36	19.8
	Farmer	9	4.9
	Worker	20	11.0
	Retired	5	2.7
	Others	8	4.4
Total		182	100.0
	Women	103	56.6
Gender	Men	79	43.4
	Total	182	100.0
Marital status	Married	149	81.9
	Wife died	12	6.6
	divorced	2	1.1
	Single	19	10.4
Total		182	100.0
	Primary	21	11.5
	Guidance	60	33.0
Literacy	High school	51	28.0
	Collegiate	50	27.5
	Total	182	100.0

The predicting factors for physical activity were determined through linear regression analysis. Table 2 shows the results. As this table shows, the subjective norms was predictive for physical activity intention ($P < 0.001$). Both patients' normative beliefs regarding PA and also their motivation to comply with social norms were predictors of intention to doing PA behavior ($P < 0.001$).

To determine predictors of physical activity based on TRA, analysis through AMOS software version 23 was done. Table 3 shows the results. According this Table, patients' behavioral beliefs ($P < 0.001$) and patients' evaluation of PA outcome ($P < 0.001$) were predictors of attitudes of patients towards PA. However, patients' attitude itself was not predictor of PA behavior ($P = 0.08$).

Furthermore, this Table shows patients' normative belief ($P < 0.001$) and patients' motivation to comply with significant people ($P < 0.001$) were predictors for subjective norm and subjective norm in turn was predictor for intention to PA behavior ($P < 0.001$).

Table 2. Linear regression analysis regarding predictors of physical activity behavior.

variables	Variables predictors	B	Standard deviation	Beta	t	Significant
Intention	behavior	1/457	0/442	0/249	3/296	< 0.001
Attitude	Intention	0/010	0/006	0/142	1/734	0/085
Subjective norms	Intention	0/027	0/006	0/35	4/286	<0.001
Behavior beliefs	Attitude	3.074	.143	.487	21.463	< 0.001
Evaluation outcome behavior	Attitude	4.437	.171	.590	26.013	< 0.001
Normative beliefs	Subjective norms	5.680	.188	.810	30.208	< 0.001
Motivation to comply	Subjective norms	3.034	.247	.329	12.260	< 0.001

Discussion

As previous study has shown low rate of PA is associated with an increased risk of CLBP disability (Hussain, Urquhart & Wang, 2016). and high level of PA behavior could be preventive factor for CLBP (Shiri, Solovieva & Husgafvel-Pursiainen, 2013). However, there are many barriers that may prevent the CLBP patients from doing PA. The major aim of this investigation was to predict the factors could influence PA among patients with CLBP. First of all, this study revealed that the structure of TRA could be eligible to predict PA among Iranian CLBP patients.

The present study showed the subjective norm was significant predictor for doing PA. Subjective norm means perceived social pressure to doing or not to doing a behavior. This study verified that

Iranian CLBP patients did PA if their respectful/significant persons were doing this behavior themselves or recommended it to them. The patients' subjective norm is constituted by their normative beliefs-regarding the important referent persons confirm or disconfirm doing PA-weighed by their motivation to adherence with these referents. Thus, the patients who believe that special referents think they should perform PA and they are also motivated to obtain all the expectations of these referents, will hold a positive subjective norm towards PA and so they do PA. Conversely, if the patients believe that these significant people think they should not perform the behavior, will have a negative subjective norm and the patients who are less motivated to comply with those referents, will

have a relatively neutral subjective norm and may do not accomplish PA (Monatano & Kasprzyk, 2008). The previous study conducted in Iran showed that Iranian CLBP patients were strongly effected by social environment like their physician, family/friends and neighborhoods due to their back pain. These patients believed their relatives and health professionals could have been more helpful in their pain prevention (Tavafian,

Gregory & Montazeri, 2008). This finding is consistent with the literature that verified those with a positive social environment and high social support engaged in greater minutes of PA per week (Shiri, Solovieva & Husgafvel-Pursiainen 2013). Moreover, Allison and co-workers in their longitudinal study indicated that positive social life was significant predictor of longitudinal PA (Allison, & Sweeney, 2017).

Table 3. Predictors of physical activity based on regression weights on physical activity.

			Estimate	S. E.	C. R.	P
Attitude PA	<---	Behavioral belief PA	3.074	.111	27.567	***
Attitude PA	<---	Evaluation outcome PA	4.437	.133	33.410	***
Subjective norm PA	<---	Normative beliefs PA	5.680	.183	31.070	***
Subjective norm PA	<---	Motivation to comply PA	3.034	.241	12.610	***
Intention PA	<---	Subjective norm PA	.027	.005	4.965	***
Intention PA	<---	Attitude PA	.010	.006	1.708	.088
Behavior PA	<---	Intention PA	.308	.093	3.324	***

S. E = Standard Error C. R = Critical Ratio P = Significance Level. ***< 0.001.

As it was mentioned above, subjective norm determined with individuals normative belief weighed by individuals' motivation to comply with these social norms. Therefore, if there is no motivation for the CLBP patients to obey the positive social norms regarding PA, this behavior will not be done. The existed evidences also confirmed the key role of motivation for performing PA (Glanz, Rimer & Viswanath, 2008).

In present study it was verified that behavioral beliefs regarding physical activity behavior could predict patients' negative attitudes regarding this behavior. This result is supported by previous study that indicated people with higher self-concept for PA engaged more in PA than people with a lower self-concept. Carvalho and co-workers verified that CLBP patients who had fear of movement beliefs were less likely to accomplish PA (Hurkmans, Maes & De Gucht, 2010). These negative beliefs among Iranian CLBP patients were noticed in previous studies (Tavafian, Jamshidi, & Mohammad, 2011).

Furthermore, in present study, it was verified that the patients' evaluation of physical activity outcome could be predictor of patients' attitude towards PA. In this regard, Self-Determination Theory (SDT) claims that behavior would be more likely to be done when individuals' autonomous motivation is shaped rather than by controlled means (Milne, Wallman & Guilfoyle, 2008). That is, individuals are more motivated to perform PA

when they themselves evaluate PA as helpful, enjoyable, and consistent with their values, rather than an obligated and controlled manner (Carvalho, Maher & Franco2017). Significant physical, social and mental health benefits of engagement in regular PA for patients suffering from CLBP were confirmed by many researchers (Teixeira, Carraça & Markland, 2012). A recently longitudinal study recommended that participants should have self-directed choice in performing PA in order to be successful for increasing PA (Ryan, & Deci, 2000).

In summary, the present study showed both patients' beliefs about PA and their self-evaluation regarding the outcome of PA as well as the social norms regarding this behavior and the motivation of the patients to comply with the significant people could predict doing PA behavior. With consistent this finding, social cognitive theory proposes that an individual's behavior interacts with both individual-level cognitive factors as well as obtained influencing factors from the environment (Hansen, Daykin & Lamb, 2010). Thus, the results of this research could help the researchers set up a proper training program that includes significant predictors of PA behavior.

Although this study had acceptable eligibility so that its results were supported by many valid current evidences, there are some limitations as follows that may interfere the results. First of all, this study was a cross sectional study that

predicted the influential factors on physical activity through linear regression analysis. To confirm the results of this study, the authors suggested in future, further causative or longitudinal studies will be done to determine the predicted factors more precisely. Furthermore, doing qualitative researches in order to obtain deep beliefs and attitudes of CLBP patients in order to know how these patients evaluate the PA behavior in their pain context is strongly recommended. This study was a self-reported study in which the studied patients stated their views through responding to the questionnaires, As it was suggested before, doing deep interviews with the patients who experienced CLBP for many years cause to obtain deeper data regarding this issue that why they avoid to do physical activity despite its' benefits. Although we assessed 182 eligible CLBP patients, the relationship between patients' attitude towards PA and PA behavior was near significant level ($P = 0.08$) not definitely significant ($P < 0.05$) whereas in context of TRA, attitude is predictor of behavior. Therefore, it seems doing more researches with larger and multi central sample are needed to be confident about this result. However, despite these limitations, the results of this study are in consistent with existed currently evidences.

Conclusion

This study indicated that among Iranian CLBP patients, those with a positive beliefs and evaluation regarding PA behavior engaged in greater PA than those with a negative beliefs. However, performing future interventions with larger sample from different settings are strongly recommended to confirm the results.

Conflicts of Interest

There is no conflicts of interest for this manuscript.

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Author contribution

GH. A. H. designed the research and conducted all stages of the study and drafted the manuscript.

SST supervised the study and verified the manuscript.

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References

- Griffina, D. W., Harmonb, D. C. & Kennedy, N. M. (2012) Do patients with chronic low back pain have an altered level and/or pattern of physical activity compared to healthy individuals? A systematic review of the literature. *Physiotherapy*. 98, 13-23. doi: 10.1016/j.physio.2011.04.350. Epub 2011 Jun 8.
- Wand, B. M. & O'Connell, N. E. (2008) Chronic non-specific low back pain-subgroups or a single mechanism?. *BMC Musculoskelet Disord*. 9, 11. doi: 10.1186/1471-2474-9-11.
- Schaller, A., Dejonghe, L. & Haastert, B. (2015) Physical activity and health-related quality of life in chronic low back pain patients: a cross-sectional study. *BMC Musculoskelet Disord*. 16, 62. doi: 10.1186/s12891-015-0527-0.
- Van Weering, M. G., Vollenbroek-Hutten, M. M. & Tönis, T. M. (2009) Daily physical activities in chronic lower back pain patients assessed with accelerometry. *Eur J Pain*. 13 (6), 649-54.
- Van den Berg-Emons, R. J., Schasfoort, F. C. & de Vos, L. A. (2007) Impact of chronic pain on everyday physical activity. *Eur J Pain*. 11 (5), 587-93. doi: 10.1016/j.ejpain.2008.07.005. Epub 2008 Aug 26.
- Mullen, S. P., McAuley, E. & Satariano, W. (2012) Physical Activity and Functional Limitations in Older Adults: The Influence of Self-Efficacy and Functional Performance. *J Gerontol B Psychol Sci Soc Sci*. 67 (3), 354-361. doi: 10.1093/geronb/gbs036. Epub 2012 Apr 3.
- Forbes, A. & Davis, S. (2008) Negative beliefs about low back pain are associated with high pain intensity and high level disability in community-based women. *BMC Musculoskelet Disord*. 9, 148 doi: 10.1186/1471-2474-9-148.
- Glanz, K. Rimer, B. K. & Viswanath, K. (2008) Health behavior and health education: theory, research, and practice: John Wiley & Sons.
- Sheldon P. (2016) Facebook Friend Request: Facebook Friend Request: Applying the Theory of Reasoned Action to Student-Teacher Relationships on Facebook. *Journal of Broadcasting & Electronic Media*. 60 (2), 269-85.
- Allison, M. & Sweeney, K. (2017) Longitudinal relationships between self-concept for physical activity and neighborhood social life as predictors of physical activity among older African American adults. *Int J Behav Nutr Phys Act*. 14, 67. doi: 10.1186/s12966-017-0523-x.

- Fisher, K. J. & Li, F. (2004) Neighborhood-level influences on physical activity among older adults: a multilevel analysis. *J Aging Physc Act.* 12, 45-63. doi:10.1123/japa.12.1.45.
- MacAlister, A. L., Perry, C. L. & parcel, D. S. (2008) How individuals, environments and Health behavior interact; Social Cognitive Theory. In Glanz K, Rimer BK, Viswanath K. Health behavior and health education: theory, research, and practice: John Wiley & Sons.
- Tavafian, S. S., Gregory, D. & Montazeri, A. (2008) The Experience of Low Back Pain in Iranian Women: A Focus Group Study. *Health Care Women Int.* 29 (4), 339-348. doi: 10.1080/07399330701876356.
- Tavafian, S. S., Jamshidi, A. R. & Mohammad, K. (2011) Treatment of Chronic Low Back Pain. A Randomized Clinical Trial Comparing Multidisciplinary Group-based Rehabilitation Program and Oral Drug Treatment With Oral Drug Treatment Alone. *ClinJPain.* 27 (9), 811-818. doi: 10.1097/AJP.0b013e31821e7930.
- Ajzen I. (2011) Constructing a theory of planned behavior questionnaire. Unpublished manuscript Retrieved. 1.
- Hussain, S. M., Urquhart, D. M. & Wang, Y. (2016) Associations between television viewing and physical activity and low back pain in community-based adults: A cohort study. *Medicine (Baltimore).* 95 (25), e3963. doi: 10.1097/MD.0000000000003963.
- Shiri, R., Solovieva, S. & Husgafvel-Pursiainen, K. (2013) The role of obesity and physical activity in non-specific and radiating low back pain: the Young Finns study. *Seminars in arthritis and rheumatism.* 42 (6), 640-650. doi: 10.1016/j.semarthrit.2012.09.002. Epub 2012 Dec 25.
- Monatano, D. E. & Kasprzyk, D. (2008) Theory of reasoned action, Theory of Planned behavior and the integrated behavioral Model.
- Glanz, K., Rimer, B. K. & Viswanath, K. (2008) Health behavior and health education: theory, research, and practice: John Wiley & Sons.
- Carlson, J. A., Sallis, J. F. & Conway, T. L. (2012) Interactions between psychosocial and built environment factors in explaining older adults' physical activity. *Prev Med* 54, 68-73. doi:10.1016/j.ypmed.2011.10.004.
- Milne, H. M., Wallman, K. E. & Guilfoyle, A. (2008) Self-determination theory and physical activity among breast cancer survivors. *J Sport Exerc Psychol.* 30, 23-38. doi: 10.1123/jsep.30.1.23.
- Hurkmans, E. J., Maes, S. & De Gucht, V. (2010) Motivation as a determinant of physical activity in patients with rheumatoid arthritis. *Arthritis Care Res.* 62, 371-7. doi: 10.1002/acr.20106.
- Carvalho, F. A., Maher, C. G. & Franco, M. R. (2017) Fear of movement Is not associated with objective and subjective physical activity levels in chronic nonspecific low back pain. *Arch Phys Med Rehabil.* 98 (1), 96-104. doi: 10.1016/j.apmr.2016.09.115. Epub 2016 Oct 3.
- Ryan, R. M. & Deci, E. L. (2000) Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *Am Psychol.* 55, 68-78. doi:10.1037//0003-066x.55.1.68.
- Teixeira, P. J., Carraça, E. V. & Markland, D. (2012) Exercise, physical activity, and self-determination theory: a systematic review. *Int J Behavl Nutr Phys Act.* 9, 1-30. doi: 10.1186/1479-5868-9-78.
- Ryan, R. R., Williams, G. C., & Patrick, H. (2009) Self-determination theory and physical activity: the dynamics of motivation in development and wellness. *Hell J Psychol.* 6, 107-24.
- Hansen, Z., Daykin, A. & Lamb, S. E. (2010) A cognitive-behavioural programme for the management of low back pain in primary care: a description and justification of the intervention used in the Back Skills Training Trial. *Physiotherapy.* 96, 87-94. doi: 10.1016/j.physio.2009.09.008. Epub 2010 Jan 15.