Educational Administration: Theory and Practice
2024, 30(9), 317-325
ISSN: 2148-2403
https://kuey.net/

Research Article

Psychological Variables And Pain Management In Neurodegenerative Diseases

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Citation: Kheraifia Amina (2024), Psychological variables and pain management in neurodegenerative diseases, *Educational Administration: Theory and Practice*, *30*(9), 317-325
Doi: 10.53555/kuey.v30i9.7691

ARTICLE INFO
Received:20/03/2024
Accepted: 02/08/2024

ABSTRACT

Neurodegenerative diseases represent a major public health challenge, leading to progressive degeneration of nerve cells, affecting cognitive, perceptual and motor functions, as well as causing chronic pain. Pain management is influenced by several factors, including the psychological state of the patient. Psychological variables such as locus of control and self-efficacy play an important role in the experience of pain. Neurodegenerative diseases also lead to a wide range of psychological and social problems. Chronic pain in these conditions affects daily life, increasing the need for comprehensive pain management strategies that take into account the psychological and behavioural aspects of the patient.

Keywords: Locus of control, pain, self-efficacy, neurodegenerative diseases.

Introduction

Neurodegenerative diseases represent a major public health challenge worldwide due to their increasing and compounding impact on patients. These diseases are characterised by the gradual degeneration and dissolution of nerve cells and neural circuits, leading not only to a decline in cognitive, perceptual and motor functions, but also to chronic pain that is difficult to manage. Pain management in patients suffering from these diseases remains a complex area of research, influenced by several factors, including the underlying pathological mechanisms and the psychological state of the patient.

Psychological variables play a crucial role in the experience of pain and response to treatment in patients with neurodegenerative diseases. Understanding these variables is essential for developing more effective pain management strategies. In fact, chronic pain cannot be fully understood without considering the psychological and behavioural dimensions that alter pain perception and coping mechanisms.

Neurodegenerative diseases pose many challenges to the psychological adjustment of patients, as these chronic conditions have long-lasting effects and create demands that require patients to manage and confront the stress caused by the disease and the pain they are experiencing. As a result, patients use different methods to manage symptoms and adapt to their condition, seeking balance and psychological comfort. This is influenced by their beliefs about coping with the disease and trying to control its course, as patients' beliefs play a fundamental role in maintaining their health and coping with any illness.
In this article, we aim to explore the role of certain psychological variables (locus of control and self-efficacy) in pain management in neurodegenerative diseases.

The concept of neurodegenerative diseases

Neurodegenerative diseases are a group of disorders characterised by the progressive degeneration of nerve cells in the brain and central nervous system. This degeneration leads to the loss of neurological function and results in a variety of physical, psychological and mental symptoms. Although neurodegenerative diseases differ in the area of the brain affected and the type of nerve cells damaged, they all cause a gradual loss of neuronal function and eventual cell death.

Some neurodegenerative diseases include:

- Alzheimer's disease: The most common form of dementia, characterised by progressive memory loss, cognitive decline, and changes in behaviour and personality.

- Parkinson's disease: affects movement and is characterised by tremors in the limbs, muscle stiffness, slowness of movement and problems with balance.
- Amyotrophic Lateral Sclerosis (ALS): Causes muscle degeneration due to damage to motor neurons, which are responsible for controlling movement.
- Huntington's disease: A genetic disorder that causes a decline in cognitive and motor skills, resulting in involuntary movements, thinking difficulties and psychological disturbances.
- Multiple Sclerosis (MS): The immune system attacks the protective sheath that surrounds nerves, leading to impaired communication between the brain and the rest of the body, with symptoms including muscle weakness, fatigue and difficulty moving.

Other notable conditions include Lewy body dementia, Charcot's disease and Creutzfeldt-Jakob disease.
The prevalence of neurodegenerative diseases varies by type. According to the Alzheimer's Association, approximately 50 million people worldwide are affected by dementia, with Alzheimer's disease accounting for 60-70% of cases (Alzheimer's Association, 2022).
Parkinson's disease affects approximately 6.1 million people worldwide, with prevalence increasing with age (Parkinson's Foundation, 2022).
Amyotrophic lateral sclerosis (ALS)Affects 2 to 5 out of every 100,000 people annually (ALS Association, 2022).
Multiple Sclerosis (MS): affects approximately 2.8 million people worldwide and is more common in women than in men (National Multiple Sclerosis Society, 2022).

Psychological and social effects of neurodegenerative diseases

Neurodegenerative diseases can lead to a range of psychological effects, including depression, anxiety and social isolation. The loss of independence can lead to feelings of helplessness and frustration, which can have a significant impact on the patient's social life. Patients may become heavily dependent on others for daily activities, increasing the stress on families and carers. In addition, patients may avoid social activities due to embarrassment or mobility difficulties (World Health Organization, 2021).

Psychological aspects of chronic pain management

The concept of pain management includes medical consultations, medication and hospitalisation with the aim of relieving pain. The management of chronic pain is one of the most challenging problems faced by health professionals. While many acute pain episodes respond to standard medical interventions, chronic pain can become resistant to any form of treatment. As patients struggle with the pain, they may become desperate for relief.
The understanding of chronic pain management has evolved in light of the recognition that chronic pain does not respond to one-dimensional approaches and that it persists due to multiple factors. In response to this awareness, a variety of therapeutic approaches have emerged. Here we will focus on the psychological aspects, which can be divided into components related to the behavioural and physiological aspects of pain (Wallston, 2004, p. 172).

Locus of pain control

The locus of pain control refers to beliefs about the management and control of pain, specifically the extent to which individuals believe they can influence the pain they experience. It has three dimensions: internal locus, locus of control and locus of happiness. An individual has an internal locus of pain control when they believe that their own actions and behaviours have a significant impact on their ability to manage pain.

The locus of influence represents the belief that people such as doctors, nurses, family members and spiritual leaders have a significant impact on pain management. In contrast, the locus of luck refers to the belief that pain control is largely dependent on chance or luck. The secondary dimensions related to the locus of control and the locus of luck fall under the broader dimension of an external locus of pain control (Keck, 2006).
Research has shown that chronic pain patients with an internal locus of control report lower pain frequency and intensity compared to those who rely on chance, fate or luck (external locus of control), who report significant psychological distress, increased depression, greater feelings of helplessness, and less ability to manage and reduce their pain. In addition, some preliminary evidence suggests that patients who believe they can manage their pain and avoid viewing their condition as catastrophic - along with those who do not perceive themselves as severely disabled - tend to do better than those who do not hold such beliefs (Paul & Lindsay, 2000).

Pain and neurodegenerative diseases

Pain is defined as an unpleasant sensory experience associated with actual or potential tissue damage. The World Health Organisation classifies pain syndromes as nociceptive and neuropathic. Nociceptive pain occurs as a physiological response that is transmitted to consciousness when nociceptors in bones, muscles or other tissues are activated, warning the individual of tissue damage. This in turn triggers specific reflexes

related to coordination and behavioural responses, such as quickly pulling a hand away from something hot (Solaro, 2007).

Self-efficacy

Social cognitive theory posits that individual behaviour, personal factors and social influences are highly interrelated. According to Bandura, human behaviour is determined by the interplay of three influences: personal factors, behavioural factors and environmental factors. This interplay is called "reciprocal determinism.

1. Personal factors: These refer to an individual's beliefs about their abilities and attitudes.

2. Behavioural factors: These include the range of responses exhibited by an individual in a given situation.

3. Environmental factors: These include the roles played by those interacting with the individual, such as parents, educators, and peers.

Bandura (1977) points out that there is no superiority between the three components of the reciprocal determinism model in determining the final outcome of behaviour. Each factor contains cognitive variables, including the so-called "expectations or judgments" that occur prior to an individual's behaviour, whether these expectations relate to the actions taken or their eventual outcomes. This concept is what Bandura called "self-efficacy".

Self-efficacy and its context

Specialist literature uses the terms efficacy expectancies, outcome expectancies and self-efficacy in the same context. Some programmes also use the concept of self-efficacy as a synonym for competence. Dovan and Walker (1997) define it as "the ability or capacity to perform the required behaviour and thereby influence processes and circumstances to bring about change and development".

Bharadway and Wilkening (1997) describe it as "the ability and capacity to actively influence and control environmental aspects, together with a positive attitude towards various events. These aspects contribute to an individual's sense of accomplishment and self-esteem".

Shell (1989) states that self-efficacy is "the mechanism by which individuals integrate and apply their cognitive, behavioural, and social skills to perform a specific task" and is characterised as a personal characteristic related to the ability to perform tasks successfully at a certain level.

Definition of self-efficacy

Schwarzer (1994) defines self-efficacy as "a dimension of personality that represents one's belief in one's ability to overcome the demands and challenges faced by the individual through self-directed action". Bandura (1997) elaborates on the concept by stating that self-efficacy refers to "an individual's judgments or expectations about his or her performance in situations characterised by uncertainty". These expectations are reflected in the individual's choice of activities, effort, ability to overcome difficulties, and completion of behaviours. In other words, self-efficacy refers to an individual's beliefs about their abilities.

Both researchers attribute a behavioural steering function to self-efficacy, emphasising its role in preparing, regulating and realistically planning actions. Thus, most previous definitions converge on the idea that self-efficacy is related to the perceptions and beliefs individuals have about their effectiveness in achieving goals, overcoming obstacles, coping with crises, and resisting temptations to engage in undesirable behaviours.

Nature and structure of self-efficacy

Self-efficacy is a distinct set of beliefs or perceptions that are interrelated, resulting in a range of functions related to:

- Self-awareness: This includes self-competence such as:
- Emotional awareness
- Accurate self-evaluation
- Self-confidence

- Self-Regulation: This includes the following competencies
- Self-control
- Trustworthiness
- Conscientiousness
- Adaptability
- Innovation

- Motivation: This includes the following competencies
- Achievement Drive
- Commitment
- Initiative
- Optimism

The theoretical classification of self-efficacy is closely related to attribution theory. A person with high self-efficacy in a particular area is likely to attribute his or her failures in that area to effort. In contrast, those with low self-efficacy tend to attribute their failures to their lack of ability.

Self-efficacy is also important for motivational processes and the development of volitional action. In the motivational phase, self-efficacy guides the choice of demands and decisions about coping strategies. In the volitional phase, self-efficacy influences the effort expended, the physical and mental resources used, and the persistence in overcoming a problem. Bandura notes that the nature of self-efficacy involves a productive capacity that organises a large number of goals, emphasising that the focus is not on the ability a person possesses, but on a specific task or situation. Therefore, self-efficacy is inherently specific, and Bandura states that judgments about self-efficacy influence the behavioural choices that individuals make, such as acquiring new behaviours or inhibiting existing ones.

Field Application Procedures

Study limitations

This study is considered one of the modest contributions to health psychology at a time when international organisations, particularly the World Health Organisation, are focusing on chronic diseases, including neurodegenerative diseases, which are chronic conditions that lead to disability. Specialists aim to reduce the obstacles posed by these diseases and contribute to delaying associated symptoms and disease progression. Algeria, as an affected country, is striving to address these diseases and ensure proper care by equipping neurology departments with the necessary equipment for comprehensive patient care. In this context, the topic of neurodegenerative diseases has become a focus for specialists worldwide, and it is high time that it receives the attention of specialists in Algeria.

Research Methodology

In this research, we adopted a descriptive approach to understand the role of locus of control and self-efficacy in the management of pain in neurodegenerative diseases. The sample consisted of thirty (30) people diagnosed with a neurodegenerative disease, including 9 men and 21 women. Some were hospitalised, others were attending medical appointments or rehabilitation sessions. All participants were adults, meaning that they had reached an age of maturity that allowed them to make decisions and take responsibility for their choices. In addition, most neurodegenerative diseases are diagnosed in adulthood. The sample was not determined by any specific criteria, but we wanted to include as many patients as possible. The sample was taken from patients in the neurology department of both the Mustapha Pasha Hospital in Algiers and the Franz Fanon Hospital in Blida.

Research tools

To gather information for this study, we used interviews and a number of scales, specifically the Health Locus of Control Scale and the Self-Efficacy Scale.

Interview

Colette Chiland defines an interview as “a dialogue method based on observing, talking and listening rather than on physical examination. The primary aim of the interview is to uncover the dynamics of the patient’s behaviour in order to understand the psychological factors that have led to the patient’s current state” (C. Chiland, 1985). The clinical interview includes the following essential elements

- A main objective: This defines the topics to be discussed and outlines the framework for the questions to be asked.

- Verbal exchange: relies on verbal communication.
- Confrontation element: Provides an opportunity for direct interaction.
The importance of the clinical interview lies in its dynamic nature, allowing the patient to express their feelings, opinions and attitudes, while at the same time aiming to diagnose their condition and observe their overall behaviour. The dynamism of the interview is achieved by building trust and mutual interaction between the professional and the patient.
The choice of the type of interview depends on two main criteria:

1. The timing of the research: exploratory research requires different techniques than studies with predefined variables.
2. Research style and type of information: Research requiring a larger number of cases usually uses structured interviews with closed questions, whereas studies focusing on narratives and personal experiences require more open and in-depth interviews (C. Chiland, 1985).
In this research we chose to use a semi-structured interview technique in order to control variables effectively.

Health Locus of Control Scale

The Health Locus of Control Scale was developed by Wallston in 1978 as a multidimensional scale consisting of 18 items presented in forms A, B and C. For this study, we used form C, which is designed to measure locus of control beliefs in specific medical conditions, making it the most appropriate choice due to the patient cases involved (Wallston, 2004).

Self-Efficacy Scale:

The Self-Efficacy Scale was developed by Sherer, Mercandaute, Maddox and others in 1982, as referenced in Barlow et al. (1984).

Statistical analysis:

Statistical techniques were used to provide quantitative indicators to aid analysis and interpretation. The study used the Statistical Package for the Social Sciences (SPSS), chosen for its ability to accurately enter and process information, thus saving time and effort.
The formula used to calculate the mean is:
$\bar{X} = \sum x / N$

Mean: $\bar{X}$
Values obtained: X
- Sample size: N

$$S = \sqrt{s^2} = \sqrt{{}^{n}\sum_{i=1} (xi - \bar{x}) / n-1}$$

Presentation of results for the first partial hypothesis

Hypothesis “We expect an increase in patients’ scores in the locus of control dimension of the Pain Control Scale”.

Table 1: Shows the mean scores of the sample members in the dimensions of the locus of pain control.

Dimensions of Pain Control Center	Mean	Standard Deviation
Internal Dimension	15.16	4.69
InfluentialDimension	18.56	4.36
Luck Dimension	20.67	4.55

The table shows that the dominant dimension of the pain control locus is the happiness locus, with a mean score of $M = 20.67$ and a standard deviation of $SD = 4.55$. In contrast, the mean score for the locus of influence dimension is $M = 18.56$ with a standard deviation of $SD = 4.36$. Following this, the internal locus of control dimension has a mean score of $M = 15.16$ and a standard deviation of $SD = 4.69$.

Presentation of results for the second partial hypothesis

Hypothesis: “We expect a decrease in patients’ self-efficacy scores and a difference according to gender”.

Table 2: Sample mean scores on the self-efficacy scale

Self-Efficacy	Mean	Standard Deviation
	47.50	7.05

Table 2 shows that the patients’ self-efficacy is low, with a mean score of $M = 47.50$ and a standard deviation of $SD = 7.05$.

Table 3 shows the percentages of mean scores for males on the self-efficacy scale.

Table 3: Mean scores of men on the self-efficacy scale

Self efficay	**Mean**	**Standard deviation**
	47.50	**7.05**

The table shows that male self-efficacy is low, with a mean score of $M = 49.44$ and a standard deviation of $SD = 8.54$.
Table 4 shows the percentages of mean scores for women on the self-efficacy scale.

Table 4: Women's mean scores on the self-efficacy scale

Self efficay	Females	Mean	Standard deviation
	70%	46.66	6.36

The table shows that female self-efficacy is low, with a mean score of \(M = 46.66 \) and a standard deviation of \(SD = 6.36 \).
Presentation of results for the third partial hypothesis
Hypothesis: "We expect an increase in female patients' scores on the locus of influence dimension of the pain control scale".
Table 5 shows the mean scores of women on the dimensions of the locus of pain control.

Table 5: Women's mean scores on the dimensions of the pain control locus

Female patients	Pain control locus dimensions	Mean (average	Standard deviation
70%	Internal locus	**14.42**	**4.66**
	Locus of luck	**18.71**	**4.40**
	Locus of influence	**20.71**	**4.85**

The table shows that the dominant dimension of the pain control locus for women is the happiness locus, with a mean score of \(M = 20.71 \) and a standard deviation of \(SD = 4.85 \). In contrast, the mean score for the locus of influence dimension is \(M = 18.71 \) with a standard deviation of \(SD = 4.40 \). Following this, the internal locus of control dimension has a mean score of \(M = 14.42 \) and a standard deviation of \(SD = 4.66 \).

Presentation of results for the fourth partial hypothesis

Hypothesis: "The fourth partial hypothesis states that there will be an expected increase in male patients' scores on the internal locus of control dimension of the Pain Control Scale".

Table 6: Men's mean scores on the dimensions of the locus of pain control

Male patients	Pain control locus dimensions	Mean (average	Standard deviation
30%	Internal locus	**16.88**	**4.56**
	Locus of luck	**18.22**	**4.49**
	Locus of influence	**20.88**	**4.01**

The table shows that the dominant dimension of the pain control locus for males is the locus of influence, with a mean score of \(M = 20.88 \) and a standard deviation of \(SD = 4.01 \). In contrast, the mean score for the locus of happiness dimension is \(M = 18.22 \) with a standard deviation of \(SD = 4.49 \). The internal locus of control dimension has a mean score of \(M = 16.88 \) and a standard deviation of \(SD = 4.56 \).

Discussion of results for the first partial hypothesis

Hypothesis: "We expect an increase in patients' scores in the locus of control dimension of the pain control scale".
Looking at the results for the first partial hypothesis as presented in Table 1, it is evident that the locus of control is the dominant dimension among patients, with a mean score of \(M = 20.67 \) and a standard deviation of \(SD = 4.55 \). This indicates that the first hypothesis was not supported.

This result can be interpreted as a reflection of the cultural and religious values prevalent in society, which reinforce the belief that pain and illness are tests from God and are largely determined by fate or luck. In addition, uncertainty about the course of the disease, pain and treatment makes self-control and the ability to manage the course or success of the disease difficult. This leads to a lack of self-efficacy and dependence on external factors.

These findings are consistent with a study by Tummy et al (1993) which showed that patients in pain clinics scored high on the locus of control dimension of the Pain Control Scale.

Discussion of the second sub-hypothesis

Hypothesis: "There are differences in patients' self-efficacy scores based on gender".
Looking at the results, it is clear that patients have low self-efficacy. This can be interpreted as a reflection of an individual's motivation and commitment to face the illness and its challenges. Self-efficacy plays a crucial role in overcoming the side effects of disease-related disability and in managing the progression of the disease. The results indicate that patients' self-efficacy is generally low, with only small differences between male and female scores. This minimal difference may be due to the significant impact of chronic illness on an individual's overall perception, regardless of gender. Despite social and cultural influences that often give

men a higher status, both sexes experience the serious consequences of illness. Furthermore, the onset of chronic illness typically occurs in adulthood, a critical time for women as they begin to plan for their future, including career and family considerations. The onset of illness at this time can be particularly disruptive.
The findings are consistent with Bandura's (2003) study of self-efficacy, which focused on "self-management of chronic illness". Bandura showed that patients who participated in self-management programmes showed improvements in perceived self-efficacy and reductions in pain. He concluded that higher self-efficacy was associated with improvements in independence, pain management and muscle function.

This is also consistent with the findings of Meland et al (1999), who examined the role of self-efficacy in changing harmful health behaviours, particularly those that pose a risk to health. In addition, Champli and Murray (1979) emphasised the importance of self-efficacy in health-related behaviours, highlighting the impact of perceived self-efficacy in this process.

Bandura (2003) noted that healthy individuals have a strong will that enables them to mobilise considerable physical and emotional energy to ensure successful performance and achieve desired outcomes. In contrast, patients may lack this strong will due to pain, illness and uncertainty about the future course of their condition.

Discussion of results for the third partial hypothesis

Hypothesis: "We expect female patients to score higher on the locus of control dimension of the pain control scale".
The results show that the predominant dimension of the pain control locus for female patients is the happiness locus, with a mean score of $M = 20.71$ and a standard deviation of $SD = 4.85$. This suggests that the hypothesis was not supported.

This finding is consistent with previous theoretical perspectives, as studies by Kathovsky et al. (1967) and Jad and Feka (1983) have shown that women tend to have a greater belief in external control. The lack of self-efficacy may lead women to lean more towards an external locus of control, as they perceive the difficulty and unlikelihood of changing their circumstances. This tendency may be due to cultural and religious values that emphasise illness and pain as tests or results of fate.

Discussion of the results for the fourth partial hypothesis

Hypothesis: "We expect male patients to score higher on the internal locus of control dimension of the pain control scale".
The results show that the dominant dimension of the pain control locus for male patients is the locus of influence, with a mean score of $M = 20.88$. Thus, the hypothesis was not confirmed.
This result can be interpreted through the influence of external factors, such as prevailing cultural norms. Individuals often resort to external beliefs when faced with ambiguity in their situation. Men may attribute their locus of influence to the belief that healthcare providers have the ability to control pain and have more experience and knowledge about their condition. This reliance on professionals may reduce their perception of self-efficacy to manage their pain independently.

Discussion of the findings

Studies by Cooper et al. (1981) and Kafafi (1982) on gender differences in locus of control indicated that men tend to have an external locus of control when perceiving sources of reinforcement. The third aim of this study was to identify the predominant locus of control in relation to pain in patients. The results indicated that the sample tended towards the happiness locus, so the hypothesis was not confirmed.

When the predominant locus of control was examined for both male and female patients, the results showed that males tended towards the locus of influence, whereas females tended towards the locus of luck. This suggests that the hypothesis was not supported. With regard to the patients' self-efficacy, the results showed that the sample had low self-efficacy, which confirmed the hypothesis.

These findings can be interpreted in the light of previous studies and field observations. Although not all of the research hypotheses were confirmed, the results were consistent with some studies while differing from others. This inconsistency may be due to several factors that were not taken into account, such as the duration of the disease and the type of disease (it should be noted that neurodegenerative diseases vary in severity, including benign and aggressive forms - this variable was not taken into account). One or more of these factors may have influenced the sample members' responses and their adoption of a particular locus of control, as well as the decline in their self-efficacy.

Recommendations and suggestions

Based on the results of the study, the following recommendations and suggestions can be made:
1. The need to combine organic care with psychological support in hospitals and all health care settings.
2. The need for doctors and the paramedical team to interact in a more psychological way to create a sense of trust in doctors and the hospital, as well as in the doctor-patient relationship.
3. The need to carry out awareness-raising sessions and campaigns to shed light on the subject of pain and its relationship with health and disease, and to establish therapeutic education sessions for this purpose.
4. The importance of relapse prevention strategies and long-term monitoring for this patient population.

Conclusion:

This article has examined the role of certain psychological variables (locus of control and self-efficacy) in pain management in neurodegenerative diseases. It was found that locus of control and self-efficacy play an important role in improving pain management in patients with neurodegenerative diseases. Locus of control increases an individual's sense of control, enabling them to better cope with and manage pain by adopting more effective strategies to adapt to the consequences of their disease and to manage the resulting pain. In addition, self-efficacy helps to increase self-confidence and the ability to overcome daily challenges and the obstacles posed by the symptoms of neurodegenerative diseases. It is therefore important to integrate these psychological factors into comprehensive treatment plans to alleviate the suffering of patients and their families.

References

1. Public Health Agency of Canada (2002). The health of the population: Healthy Living. Retrieved from www.phac-aspc.gc.ca/ph.sd/ddap/docs/sain/chaps1.htm.
2. Fogat-Largeault, A. (2002). Human diversity and quality of life. Conference at the University of Tous, Sorbonne.
3. Anne, F., et al. (2007). Quality of life of people with chronic diseases. Urmel, France.
4. Bandura, A. (2003). Self-efficacy. Translated by Jaques Lecoml. De Boeck, Paris.
5. Dubernard, J. M., Guérine, J. P., & Bouvenot, G. (2006). Multiple sclerosis. France: Guide to long-term conditions, Haute Autorité de Santé. Retrieved from www.has-ante.fr.Fischer, G. N., & Tarquinio, C. (2006). Basic concepts of health psychology. Paris: DUNOD.
6. Gustave, N. F. (2002). Treatise on Health Psychology. Dunod, Paris.K
7. Gonsette, R. (2004). Multiple Sclerosis. The Belgian League against Multiple Sclerosis, French Community, AWIPH.
8. Keck, S. D. A. (2006). Pain Locus of Control and Quality of Life Index Scores in Chronic Pain Patients. Greensboro: A thesis submitted for the degree of Master of Science in Nursing, University of North Carolina.
9. Kinugawa, K. (2008). Neurology. Masson, 11th edition, France.
10. Montel, S., & Bungener, C. (2008). Coping and quality of life in multiple sclerosis; Parkinson's disease: A Clinical Reflection. Paris: Laboratoire de Psychopathologie et de Neuropsychologie Cliniques, Institut de Psychologie, Université Paris Descartes.
11. Bruchon-Sweetzert, M. (2002). Psychology of health. Dunod, Paris.
12. Touba Nadia, P. (2013). Multiple sclerosis. In Santé Mag, Vol. 16, Algeria.
13. Salamagne, M. H. (1994). Cancer pain and its treatment: A global approach and palliative care. Paris: Éditions Frison Roche.
14. Schweitzer, M. B., & Dantzer, R. (2003). Introduction to health psychology. Paris: Presses Universitaires de France, 4th ed.
15. Sieber, L. (2004). My experience of pain counselling. Geneva, Switzerland: Swiss Association for Cognitive Psychotherapy, Info No. 16, free edition.
16. Verrier, P. (2003). Chronic pain.
17. Le Médecin du Québec, Vol. 38, No. 6.
18. Wallston, K. A., Ph.D. (2004). Multidimensional health locus of control scales. In Encyclopedia of Health Psychology. New York: Welcome Fellow Health Researchers, Kluwer Academic.
19. Arambid, Georgina (2011). Research into the diagnosis and monitoring of multiple sclerosis. Multiple sclerosis under the microscope. United Kingdom, Issue 17, pp. 16-17. Retrieved from www.msif.org.
20. Tyler, Shelley (2008). Health Psychology. Translated by Wisam Darwish Barak, Fawzi Shakir Dawood. Jordan: Dar Hamed Publishing.
21. Stoylb, Bernada (2007). Treatment, classification and control of pain. Multiple Sclerosis Under the Microscope, United Kingdom, Cambridge Publishers Ltd, Issue 10, pp. 08-10. Retrieved from www.msif.org.

22. Solaro, Claudio (2007). Neuropathic pain in multiple sclerosis. Multiple Sclerosis Under the Microscope, United Kingdom, Cambridge Publishers Ltd, Issue 10, pp 11-13. Retrieved from www.msif.org.
23. Costello, Lisa (2009). The different types of multiple sclerosis: benign and aggressive forms. Multiple Sclerosis Under the Microscope, United Kingdom, Cambridge Publishers Ltd, Issue 14, pp. 15. Retrieved from www.msif.org.
24. Maloney, Heidi Wynn (2007). Introduction to Pain and Multiple Sclerosis. Multiple Sclerosis Under the Microscope*, United Kingdom, Cambridge Publishers Ltd, Issue 10, pp. 04-07. Retrieved from www.msif.org.