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The Relationship Between the Population's Perception of Herniated Intervertebral Disks and Their Known Physical Presentation

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by

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ABSTRACT

The second most common lumbosacral diagnosis in the United States is a herniation or prolapse of the intervertebral disc. Individuals with herniated discs can have a wide variety of clinical presentations, ranging from asymptomatic to severe spinal cord compression and pain. Studies suggest that an individual's pre-existing perception of a condition is likely to influence their course of recovery. Currently, perceptions the general public holds regarding the consequences of disc herniation is unknown. Therefore, the purpose of this study was to assess current views regarding disc herniations in the general population with their reported prevalence and clinical outcome. This was determined via an electronic Qualtrics survey. This survey included demographic questions, medical history questions, disk herniation perception questions, and coping/resilience questions. Upon conclusion of survey administration, data analysis was performed via JASP. A key finding of this study was that resilience levels play a major role in participant's views on herniated intervertebral discs ($p=0.040$). Participants with greater resilience levels had views on disc herniations that were more consistent with the findings in the literature ($p=0.018$). This may implicate low resilience levels in negative catastrophizing, which can impair the recovery process for patients. Due to this, healthcare providers should further consider a patient's mental characteristics such as resilience and coping style when discussing implications of this potential diagnosis. By further educating patients on their specific prognosis for a disc herniation, providers may be able to improve their overall perception of herniated discs, leading to a possible improvement in outcome.

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TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 1: INTRODUCTION

Herniation of the intervertebral disk is the second most common diagnosis of the back and neck among United States adults.[1] This common condition possesses a wide variety of symptoms and clinical presentations.[2] Back pain in general is very frequent, with about one quarter of all US adults reporting suffering from back pain.[3] Issues involving the spine have key financial implications on the general population because of their prevalence and high cost of treatment.[1] In a 2005 survey with 22,258 participants, respondents with spine problems spent about $2600 more on medical expenses than those without spine problems.[1] When symptomatic, herniated disks can be a significant source of chronic back pain and can cause a multitude of debilitating symptoms.[4] Individuals with herniated disks can have a wide variety of clinical presentations, ranging from being completely asymptomatic to experiencing severe spinal cord compression and the complications that come with it.[5] Many studies have shown that an individual's pre-existing perceptions of a condition that they suffer from is likely to influence their course of recovery.[6] Aside from managing the physical symptoms of a disease, healthcare providers must also manage the psychological aspects of the disease.[7] Cognitive coping and suppression (making a conscious cognitive effort to reinforce their attempts to overcome pain) , levels of helplessness, and diverting attention or praying, are three key factors that were found to be predictive of the behavioral and emotional changes observed in those with chronic low back pain.[8] Elevated levels of fear avoidance beliefs in patients with low back pain may contribute to the onset of disability.[9] This is primarily due to patients with high fear avoidance beliefs avoiding physical activity due to the fear of reinjury.[9] Additionally, high levels of resilience were found to have a positive impact on pain acceptance and active coping.[10]

Herniated intervertebral disks have the potential to negatively affect the mental health of patients, and impair their ability to carry out daily activities.[11] Despite any negative connotation that they may have gained due to their association with clinical symptoms, herniated disks also have the potential to be completely asymptomatic.[12] Currently, the perceptions of the general population regarding consequences of having a disk herniation is unknown. Therefore, the purpose of this study is to assess the current views regarding disk herniations in the general population with their reported prevalence and clinical outcome.

CHAPTER 2: LITERATURE REVIEW

Risk factors

Herniated disks are a common condition with a wide variety of risk factors. Disorders of the intervertebral disks are some of the most common diagnoses for the back.[1] The risk factors for herniated disks are many and varied. As an individual grows older, their intervertebral disks become progressively disordered and degenerated.[5] Consequently, greater age is associated with an increasing presence of intervertebral disk abnormalities.[12] Over 90% of asymptomatic individuals, age 60 or older have been found to have degenerated intervertebral disks.[13] Though those with higher age may be at a greater risk for a disk herniation, they can still potentially develop in young children, especially those with a family history of disk herniations.[14] Various single genetic polymorphisms may have an effect on someone's predisposition to developing a herniated disk.[15] Environmental factors such as exercise, obesity, and smoking may play a key role in the molecular basis of the development of herniated disks.[16] An important risk factor for hospitalization due to herniated disks is strenuous occupational physical activity.[17] Advanced height was found to be associated with disk herniations.[17] Being considered overweight according to BMI was correlated with the risk of developing a herniated disk that requires surgery.[18] Overall, there is a wide variety of endogenous and exogenous risk factors that may increase a person's risk for developing a herniated disk.

Variation in clinical presentation

Despite any potential preconceived notions that the population may have about the prognosis of herniated disks, their clinical presentation can vary dramatically. As a part of their study, Jensen et al[12] defined and identified three separate classes of intervertebral disk

abnormalities. These three classes were bulges, protrusions, and extrusions, each with increasing severity and association with the clinical presentation of symptoms.[12] Participants with herniations that were found to compress nerves on MRI scans were more likely to experience sciatica than those that did not.[4] It has even been proposed that the term "disk herniation" is too vague to be clinically relevant because of the vast differences in symptom severity among the forms of disk herniations.[12] A herniation has the chance to regress spontaneously, potentially leading to a decrease in symptoms without medical intervention.[19] Herniated disk patients can have a variety of factors including symptom severity and surgical risk that a physician must take into account when considering recommending surgical or non-surgical treatment.[20]

Herniated disk severity

Some individuals that suffer from herniated disks experience severe symptoms. Herniated disks can be the cause of high levels of back pain sciatica, numbness, bowel symptoms, and bladder symptoms.[4] Patients with herniated disks can experience extreme amounts of sciatica due to nerve root compression caused by the disk herniation.[21] Patients have reported that sciatica has had a devastating impact on their quality of life.[11] In cases of intense sciatica or other neurological symptoms, surgical treatment is recommended to improve symptoms rather than a conservative approach.[20] In extreme cases, herniated disks can also lead to a patient developing cauda equina syndrome.[22] Cauda equina syndrome is caused by high amounts of pressure being placed on the cauda equina in the lowest portion of the spinal cord.[22] Cauda equina syndrome is a medical emergency that can result in long-term bladder, bowel, and sexual dysfunction.[22] Herniated disks already belong to at least grade three of five among the classifications of internal disk disruptions (IDD).[5] If left to progress to becoming a

grade five IDD, the disk material can spill out and become sequestered in the epidural space.[5] Sequestered disk herniations are extremely difficult to diagnose and treat and are often confused for other serious conditions such as spinal tumors.[23] Along with the severe physical symptoms that are associated with herniated disks, patients with chronic low back pain often experience significant levels of emotional distress.[24]

Asymptomatic herniated disks

Individuals may have a completely asymptomatic clinical presentation despite having a disk herniation. Though herniated disks are the leading cause of sciatica, they can be found in asymptomatic people upon undergoing imaging.[20] Jensen et al[12] found that 64 percent of their 98 asymptomatic subjects had spinal disk abnormalities at some level. An identical but expanded study confirmed those results, finding that 68 percent of 200 subjects had spinal disk abnormalities at some level.[25] A systematic review by Brinjiki et al[13] found that more than 50% of asymptomatic individuals from ages 30 to 39 have degeneration, height loss, or bulging of their intervertebral disks. Brinjikji et al[13] have suggested that the results of their systematic review indicate that when degenerative spine findings are seen upon imaging, those findings should be considered as regular age-related changes instead of pathologic processes. Since spinal disk abnormalities may be coincidentally found upon giving an MRI scan, healthcare providers should attentively evaluate their patients prior to coming to a conclusion on a diagnosis.[12] Giving a detailed evaluation for low back pain patients is vital since back pain may actually be misattributed to disk herniations that are coincidentally found on MRIs.[2]

Impact of perceptions

An individual's pre-existing perception of the outcome of a condition that they have been diagnosed with is likely to influence their course of recovery.[6] Coping style was found to be related to a patient's ability to adjust to chronic pain.[8] Factors such as having a passive coping style, low self-efficacy, a more severe perception of pain intensity, and low social support are associated with increased levels of emotional distress in patients with chronic low back pain.[24] A study by Roberts et al[26] found that self-efficacy score was a positive predictor of occupational outcome for military members after rehabilitation. Patients often identified single inciting events that caused their herniated intervertebral disks. Contrary to their belief, the majority of herniated intervertebral disks occur without an inciting event.[27] If they believe that their back pain was caused by a specific physical activity, patients may be hesitant to remain active due to fear of injury.[7] A lack of physical activity due to fear of injury may negatively affect pain levels, mood, and level of disability among patients.[9] To avoid unnerving patients, it is highly recommended that providers reassure them that the prognosis of a disk herniation is often positive.[2] Despite this recommendation, reassurance may prove difficult, depending on the patient's pre-existing perceptions of their condition.[6] Reassurance is an integral part of medical consultations, but research has indicated that the reassurance provided by doctors is often unsuccessful in lessening patient's concerns about their symptoms.[6] Petrie et al[6] have asserted that a patient's pre-existing ideas about their symptoms and illness may not allow them to make sense of their diagnostic result, influencing their course of recovery.

CHAPTER 3 : AIM/HYPOTHESIS

Aim 1: To evaluate whether perceptions of herniated disks and their prognosis correlate with reported outcomes in the literature.

Hypotheses:

- There is a correlation between perceived herniated disk severity and perceived herniated disk chronicity.
- The population's perception of the symptomaticity of herniated disks is correlated with a more severe level of concern associated with a herniated disk diagnosis.
- Prior history of back or leg pain and/or herniated disks can predict a more negative perception of the disability associated with the condition.
- There is a correlation between a low physical activity level and inclination to avoid physical activity after a herniated disk diagnosis.
- There is a negative correlation between education level and the belief that herniated disks are most often caused by single inciting events.
- Age is correlated with a decreasing level of concern regarding the potential of injury associated with herniated disks.
- There will be a significant difference in the belief that herniated disks are permanent between respondents with "moderately" or "very" active jobs and those in less physically intensive jobs.
- Severity of low back or leg pain suffered is correlated with an increasing belief that herniated disks will always require surgical treatment.

- There will be a significant difference in the belief that herniated disks can occur in those under the age of 20 between respondents that are under the age of 30 and those that are over the age of 30.

Aim 2: To evaluate the effect of differences in coping style and resilience on perceived disability associated with disc herniation.

Hypotheses:

- There is a correlation between having a more active coping style and self-efficacy related to the prognosis of herniated disks.
- There is a correlation between having a high resilience score and the perceived quality of life impact of herniated disks.
- There will be a significant difference in resilience scores between respondents with and without college degrees.
- There will be a significant difference in the belief that herniated disks can become better over time without medical intervention between high resilient copers and low resilient copers.

CHAPTER 4: METHODS

A comprehensive Qualtrics survey was developed for this study. This survey included demographic questions, medical history questions, disk herniation perception questions, and coping/resiliency questions. The demographics section of the survey included questions on age, sex, education level, and occupational physical activity level. The medical history portion of the survey had questions on the respondent's history of past low back pain or herniated disks. The disk herniation perception section of the survey included questions to evaluate the respondent's perception of herniated disks. The demographic questions, medical history questions, and disk herniation perception questions were developed specifically for this study. The questions on coping style and resiliency were from the Brief Resilient Coping scale and the Brief Resilience Scale (BRS).[28,29] The survey was administered in a trial run to ensure its efficacy. The target audience for the survey was members of the general public over the age of 18. There was no requirement for respondents to have a prior history of low back pain or herniated disks. Possible participants for the survey were recruited via two main methods. First, possible participants from various backgrounds were be recruited through social connections. People who agree to take the survey were also encouraged to share it with others. The second method of recruitment for the survey was through social media. Electronic flyers and posters were created to recruit participants in the general population. Prospective participants were provided with the link to our comprehensive survey. Survey takers were screened for eligibility in the survey, with exclusionary criteria being those from vulnerable populations including: pregnant women, minors, prisoners, and any person unable to provide informed consent. All data collected in the survey was de-identified. No names or birth dates were collected. The components of the survey were scored by the research team. A total of participant's disc herniation perception questions

was obtained from the results of the survey. This total had a possible range from 14 to 70. With 14 signifying a less severe perception of herniated discs and 70 signifying a more severe perception of herniated discs. Resilience level from the Brief resilience scale was separated into low, normal, and high resilience levels. Coping style from the Brief resilient coping scale was separated into low, medium, and high resilient copers. The data was exported from Qualtrics and saved in an Excel file. The data was cleaned in Excel, removing incomplete responses. The final data file was uploaded into the statistical software, JASP. Correlational and difference in group analysis was preformed based on the hypothesis that were formed prior to survey administration. Due to the nature of the information that was gathered from the survey, the data was ordinal and non-parametric. For correlational analysis it was determined that the Spearman's Rho analysis was appropriate. To determine the difference in groups, Mann Whitney U tests were used. The analyses between the responses to questions in the survey were used to determine relationships between patient perceptions of herniated disks and the reported literature. The relationship between disk herniation perception and coping style/ resilience level was also be determined.

CHAPTER 5: RESULTS

Descriptive statistics:

A total of 115 responses to the survey were initially gathered. This number was brought down to 81 after removing incomplete responses. The final sample size of 81 valid responses was determined to be adequate for the study. The mean age of participants in the study was 26.5 years with a standard deviation of 11.1 years. Figure 1 shows the age distribution of survey respondents. There were 26 male responses, 50 female responses, 3 responses from non-binary/3rd gender, and one participant that preferred to not say their gender. The average height and weight among male participants was 70.5 inches and 180 lbs. The average height and weight among female participants was 64.3 inches and 142.2lbs. 40% of respondents have at least a bachelor's degree. One third of survey participants had “active” occupations while two thirds did not. 16% of participants had predominantly sedentary lifestyles. 32% Had slightly active lifestyles. 33.33% had moderately active lifestyles. 18.5% had very active lifestyles. 55.6% of participants have previously suffered from low back pain while 44.4% have not. Out of the sample of 81 participants, 7 have previously been diagnosed with a lumbar herniated disc. Table 1 contains the study population characteristics.

Table 1: Study population characteristics (n=81)

Variable	Category	n	%
Gender	Male	26	32.09
	Female	50	61.72
	Non-binary/ 3rd gender	3	3.70
	Prefer not to say	1	1.23
	No response	1	1.23
Age, years	18-29	61	78
	30-39	6	7.7
	40-49	4	5.13
	50-64	7	8.97
	65+	0	0
College degree	Yes	32	40
	No	48	60
“Active” occupation	Yes	26	33.33
	No	52	66.67
Physical activity level	Predominantly sedentary	13	16
	Slightly active	26	32
	Moderately active	27	33.33
	Very active	15	18.5
Suffered from low back pain	Yes	45	55.6
	No	36	44.4
Diagnosed with a lumbar herniated disc	Yes	6	7.4
	No	75	92.6

Data analysis results:

Data analysis was initially performed to directly address the hypotheses that we formed prior to data collection. Out of the original hypotheses, only one was confirmed with a statistically significant result. This hypothesis was that there would be a correlation between having a high resilience score and having a lower perceived quality of life impact caused by a herniated disc diagnosis. There was a correlation coefficient of -0.200 with a p value of 0.037 (Table 2). A correlation was not found between the perceived severity of herniated disks and the perceived chronicity of herniated discs. Additional analysis was performed to obtain more significant results. Among study participants, there was a significant difference in resilience score in those with and without "active" jobs (Table 3). A significant correlation was found between occupation activity level and having been diagnosed with a lumbar herniated disc (Table 2). Score on the Brief Resilience scale was positively associated with self-reported occupation activity level (Table 2). In the data that was gathered, a negative correlation was found between BRS score and the belief that a herniated disc is a debilitating condition (Table 2). A negative correlation was also found between BRS score and the total score form the herniated disc perception questions (Table 2). We found a correlation between the time participants believe a herniated disc lasts and the belief that herniated discs are a debilitating condition (Table 2). According to the data analysis, there was a correlation between the belief that one should avoid strenuous physical activity after a herniated disc diagnosis and the belief that herniated discs are always a serious condition (Table 2).

Table 2: Spearman's rho correlations from data analysis

Variable 1	Variable 2	Spearman's rho	p
Brief Resilience scale (BRS)	Belief that herniated discs would have a significant impact on a person's quality of life	-0.200*	0.037
Brief Resilience scale (BRS)	Self-reported occupation activity level	0.309**	0.006
Brief Resilience scale (BRS)	Belief that herniated discs are a debilitating condition	-0.263*	0.018
Brief Resilience scale (BRS)	Total of herniated disc perception questions	-0.229*	0.040
Self-reported occupation activity level	Previous herniated disc diagnosis	0.249*	0.028
Length of time that participants believe herniated discs last	Belief that herniated discs are a debilitating condition	0.282*	0.011
Belief that one should avoid strenuous physical activity due to a herniated disc diagnosis	Belief that a herniated disc is always a serious condition	0.298**	0.007

* p < .05, ** p < .01, *** p < .001

Table 3: Significant difference in those with and without self-reported active occupations

Independent Samples T-Test				
	W	**df**	**p**	**Rank-Biserial Correlation**
Brief Resilience Scale (BRS)	480.000		0.038	-0.290

Note. For the Mann-Whitney test, effect size is given by the rank biserial correlation.

Note. Mann-Whitney U test.

Group Descriptives					
	Group	**N**	**Mean**	**SD**	**SE**
Brief Resilience Scale	0 (non-active occupation)	52	3.285	0.794	0.110
	1 (active occupation)	26	3.750	0.728	0.143

CHAPTER 6: DISCUSSION

Conclusion

Being a condition with a wide variety of symptoms and severities, herniated intervertebral discs can be a dubious condition. Herniated discs typically only last a limited amount of time, with few patients opting for invasive treatment options like surgery.[30] Herniated discs have even been found on accident and been known to regress and become better without any intervention.[12,19] Though herniated discs often have a positive prognosis, they have also been known to cause a variety of negative symptoms that could require surgical treatment.[20] The purpose of this study was to assess the current views regarding disk herniations in the general population with their reported prevalence and clinical outcome. This was done by distributing a survey on the perceptions of herniated discs through the general population. Once the responses were collected, the data was analyzed via the statistical software, JASP.

Through data analysis, a negative correlation was observed between participant's Brief Resilience scale score and their total herniated disc perception score, in which a higher number indicates a more severe perception of herniated discs. Participants with higher resilience abilities tended to have a more positive perception of the impact of a herniated disc diagnosis than those that had lower resilience. This indicates that those with higher resilience levels may find it easier to have a more optimistic outlook on herniated discs and their prognosis. Positive psychology and the benefit of high levels of resilience have been explored in the literature. This sentiment has been previously indicated in a study on patients undergoing total knee arthroplasties.[31] Higher resilience levels have been associated with better quality of life in musculoskeletal patients following treatment.[31,32]

A correlation was found between the time that participants believe that herniated disks last and the belief that herniated disks are "debilitating". Participants who believed that herniated discs last for longer amounts of time typically viewed them as a more debilitating condition. This result could indicate that those who view herniated discs as a less severe condition in the short term may have a more positive long-term outlook on the condition. Only 10% of those who are diagnosed with herniated discs have significant pain over 6 weeks, causing them to consider surgical intervention.[30] Many people may have herniations which are completely asymptomatic and are found coincidentally.[13] The specific level of progression that a herniation has undergone may be a more accurate indicator of a patient's prognosis rather than using the umbrella term, "herniation".[12] Indicating the specific type of herniation that a participant has may help those with less serious herniations have a greater and more satisfying course of recovery in the long term.

There was a positive link between the belief that one should avoid strenuous physical activity after a herniated disk diagnosis and the belief that herniated discs are always a serious condition. This result highlights an aspect of treatment that may be particularly problematic for healthcare providers when treating a chronic musculoskeletal disorder like herniated discs. It has been suggested that the avoidance of high physical activity levels is not associated with the prevention of herniated discs.[27] If patients believe that they must avoid physical activity either because it triggered or may exacerbate their disc herniation, they may not comply with treatment plans that call for increased activity levels.[7,27] Physical activity levels can not only improve physical functioning in low back pain patients, but also mental functioning.[9] To avoid this, healthcare providers may need to put forth a great amount of effort to educate patients on the prognosis of disc herniations and their impact.

Via correlational analysis, it was concluded that score on Brief Resilience score was associated with self-reported occupational activity level. This result indicates that those with more intense occupations show higher resilience. According to the data this indicates that, someone like a construction worker may tend to have a greater ability to recover quickly from difficulties than someone who works an office job. This may be due to increased physical activity levels associated with more intense labor or those with higher levels of resilience may self-select into more physically intense jobs. It has been previously proposed that physical activity levels are associated with an increase in mental health status, including resilience level.[33] A patient's mental health status and attitude around recovery may have an impact on their sense of well-being following an injury.[7]

According to the data, occupational physical activity level was also found to be correlated with having been previously diagnosed with a herniated disc. This may implicate physical labor in the development of herniated discs. High levels of self-reported occupational physical activity was also found to be a significant risk factor in a study by Saftic et al[18] In one retrospective study, 38 percent of diagnoses had a reported inciting event that triggered a disc herniation.[27]

Limitations

There were several limitations to this study. The average age of survey respondents was 26.5 years, which is lower than the average age of 38.1. This may be due to the fact that this project utilized peer-to-peer recruitment, opening the door to bias in the sample population. Likewise, 61.72% of participants were female. Recruitment of more elderly participants would have been ideal in order to get a clearer view on the perceptions that one of the most vulnerable populations to herniated discs holds. Recruitment of more male participants would have been

beneficial to obtaining a greater understanding of the sentiments of the general population. With a final number of 81 participants after data cleaning, the sample size was sufficient but could have been improved on. A greater number of participants may also contribute to a more normalized distribution of participant age and gender. Due to the inequalities in the sample population, this study's results may not be generalizable to the population. Utilizing a 5-point Likert scale may have limited the response choices that participants had. An opportunity to allow for qualitative answers may have been beneficial for allowing more freedom with regards to answer choice. There were several survey respondents who began the survey but did not finish. For this study, a new survey had to be created, incorporating standardized tools alongside new, study specific questions. Though it was found to be sufficient after pilot testing, the validity and reliability of the survey could be reinforced with further testing.

Future Implications

In the future, research should be conducted to further examine the perception that the general population has on herniated discs. Recommendations for a future study include further evaluation and testing of the survey used, recruiting a larger and more representative sample, and adding a qualitative component to the evaluation. This study highlights the impact that resilience level has on participants perceptions of herniated discs. Due to this, healthcare providers should further consider a patient's mental characteristics when recommending and administering treatment. Since herniated discs are such a varied condition, even greater focus should be placed on this condition. By focusing on educating patients on their specific prognosis for a disc herniation, providers may be able to improve their overall perception of herniated discs, leading to a possible improvement in outcome.[7,9]

APPENDIX: SURVEY QUESTIONS

Demographic questions

- Q1. Age: _____
    - Age was associated with an increasing prevalence of disk abnormalities [12]
- Q2. Biological Sex:
    - Male
    - Female
- Q3. What is your highest level of education?
    - (High school, trade school, some college, bachelor's degree, masters or doctorate degree)
    - Those with lower levels of education are more likely to report suffering from low back pain [3]
- Q4. Height:
    - _____ feet
    - _____ inches
    - Increasing height was found to be a significant predictor of disk herniation requiring hospitalization (Sørensen et al., 2011)
- Q5. Weight:
    - Approximately how much do you weigh? (lbs)_____
    - High weight is associated with an increasing risk of disk herniation requiring surgery [18]
- Occupation:
- Q6. Which classification best describes your job
    - 1- predominantly sedentary

    - 2- slightly active
    - 3- moderately active
    - 4- very active
    - Frequent strenuous physical activity at work is the number one predictor of hospitalization due to herniated disks (Sørensen et al., 2011)
- Q7.Which classification best describes your physical activity level
    - 1- predominantly sedentary
    - 2- slightly active
    - 3- moderately active
    - 4- very active
    - A decreased amount of physical activity due to a patient's fear avoidance beliefs can contribute to the chronicity of their symptoms [9]

Medical History Questions

- Q8. Have you ever had low back pain and or sciatica (a radiating pain along one or both legs from the lower back)?
    - (yes/no)
    - Herniated disks are the leading cause of sciatica [2]
- Q9. At its worst, how bad was your back or leg pain?
    - (0 - 10)
- Q10. Have you ever been diagnosed with a lumbar herniated disc?
    - (yes/no)

Disk Herniation perception questions

- Q11. Disk herniations will always present with clinical symptoms.

- 1-strongly disagree

  2-moderately disagree

  3-neither agree nor disagree

  4-moderately agree

  5-strongly agree

- Many disk herniations can go unnoticed and be completely asymptomatic [12].

- Q12. A herniated disk is always a serious condition.
  - 1-strongly disagree

    2-moderately disagree

    3-neither agree nor disagree

    4-moderately agree

    5-strongly agree

  - Disk herniations can be asymptomatic and not cause any problems for a person's entire life [2,12]

- Q13. A disk herniation cannot be an innocuous (harmless) condition.
  - 1-strongly disagree

    2-moderately disagree

    3-neither agree nor disagree

    4-moderately agree

    5-strongly agree

  - Herniated disks can be harmless and are often not the cause of any symptoms [13]

- Q14. Herniated disks can develop in those under the age of 20
  - 1-strongly disagree

2-moderately disagree

3-neither agree nor disagree

4-moderately agree

5-strongly agree

- Those under 20 have been found to make up 3.5% of lumbar disk herniations [14]

- Q15. One should avoid strenuous physical activity due to a herniated disk diagnosis.
  - 1-strongly disagree

    2-moderately disagree

    3-neither agree nor disagree

    4-moderately agree

    5-strongly agree
  - Structured physical activity is recommended one a patient reaches an adequate level of functioning [2]. A physical activity program is important for regaining spinal stability and strength, especially in athletes [30].
- Q16. A herniated disk is a permanent condition.
  - 1-strongly disagree

    2-moderately disagree

    3-neither agree nor disagree

    4-moderately agree

    5-strongly agree
  - Herniated disks can spontaneously regress or they can be removed surgically [19] [20]
- Q17. How long do you believe the pain from a herniated disk will last?
  - 1- Under six weeks

2- Six weeks to one month

3- Three months to one year

4- Two to five years

5- Lifelong

- Q18. A herniated disk will always require surgical treatment
    - 1-strongly disagree

      2-moderately disagree

      3-neither agree nor disagree

      4-moderately agree

      5-strongly agree
    - Conservative treatment is recommended for patients without long-term and severe pain or neurological issues [20]
- Q19. Herniated disk symptoms cannot become better over time without medical intervention
    - 1-strongly disagree

      2-moderately disagree

      3-neither agree nor disagree

      4-moderately agree

      5-strongly agree
    - Herniated disks can spontaneously regress or disappear, occasionally leading to a partial or complete reduction of symptoms [19]
- Q20. A disk herniation is a debilitating condition
    - 1-strongly disagree

2-moderately disagree

3-neither agree nor disagree

4-moderately agree

5-strongly agree

- Disk herniations can cause spinal compression leading to cauda equina syndrome, which can have detrimental impacts on quality of life [22]

- Q21. The majority of disk herniations are caused by a specific inciting event
  - 1-strongly disagree

    2-moderately disagree

    3-neither agree nor disagree

    4-moderately agree

    5-strongly agree
  - The majority of disk herniations are not caused by one specific event [27]
- Q22. It would be concerning to be diagnosed with a herniated disk
  - 1-strongly disagree

    2-moderately disagree

    3-neither agree nor disagree

    4-moderately agree

    5-strongly agree
- Q23. A herniated disk would have a significant impact on a person's quality of life
  - 1-strongly disagree

    2-moderately disagree

    3-neither agree nor disagree

4-moderately agree

5-strongly agree

- Q24. The course of a herniated disk diagnosis cannot be improved by a person's own actions
    - 1-strongly disagree

      2-moderately disagree

      3-neither agree nor disagree

      4-moderately agree

      5-strongly agree

Total score 14-70
14- least severe perception of herniated disks
70- most severe perception of herniated disks

Coping questions/personality questions

Q25. Brief Resilience Scale (BRS)

- I tend to bounce back quickly after hard times.
    - 1- Strongly disagree
      2- Disagree
      3- Neutral
      4- Agree
      5- Strongly agree

- I have a hard time making it through stressful events.
    - 5- Strongly disagree
      4- Disagree
      3- Neutral
      2- Agree
      1- Strongly agree

- It does not take me long to recover from a stressful event.
    - 1- Strongly disagree
      2- Disagree
      3- Neutral

4- Agree
5- Strongly agree

- It is hard for me to snap back when something bad happens
  - 5- Strongly disagree
    4- Disagree
    3- Neutral
    2- Agree
    1- Strongly agree

- I usually come through difficult times with little trouble
  - 1- Strongly disagree
    2- Disagree
    3- Neutral
    4- Agree
    5- Strongly agree

- I tend to take a long time to get over setbacks in my life.
  - 5- Strongly disagree
    4- Disagree
    3- Neutral
    2- Agree
    1- Strongly agree

Scoring: Add the value (1-5) of your responses for all six items, creating a range from 6-30.

Divide the sum by the total number of questions answered (6) for your final score.

BRS Score Interpretation

- 1.00 - 2.99 Low resilience
- 3.00 - 4.30 Normal resilience
- 4.31 - 5.00 High resilience

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Q26. Brief Resilient Coping scale

- I look for creative ways to alter difficult situations.
  - (1) Does not describe me at all
  - (2) Does not describe me
  - (3) Neutral
  - (4) Describes me
  - (5) Describes me very well

- Regardless of what happens to me, I believe I can control my reaction to it.
  - (1) Does not describe me at all
  - (2) Does not describe me
  - (3) Neutral
  - (4) Describes me
  - (5) Describes me very well

- I believe I can grow in positive ways by dealing with difficult situations
  - (1) Does not describe me at all
  - (2) Does not describe me
  - (3) Neutral
  - (4) Describes me
  - (5) Describes me very well

- I actively look for ways to replace the losses I encounter in life.
  - (1) Does not describe me at all
  - (2) Does not describe me
  - (3) Neutral
  - (4) Describes me
  - (5) Describes me very well

Sinclair, V. G., & Wallston, K.A. (2004). The development and psychometric evaluation of the Brief Resilient Coping Scale. Assessment, 11 (1), 94-101.

https://www.ncbi.nlm.nih.gov/pubmed/14994958

BRCS Interpretation

- Low resilient copers 4-13 points
- Medium resilient copers 14-16 points

- High resilient copers 17-20 points

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