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Level of Mental Health among Diabetic Patients Practicing and Not Practicing Physical Activity - A Comparative Study

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Abstract:
This study examined the level of mental health among diabetic school pupils who practice physical activity compared with those who do not. Using a descriptive comparative approach, the research targeted 70 diabetic pupils from secondary schools in El Oued province, Alegria. A Mental Health Scale consisting of 56 items was used to measure psychological well-being. Statistical analysis revealed a significant positive correlation between physical activity and mental health ($r = 0.68$, $p < 0.01$). In addition, the results of the t-test showed significant differences between the two groups in favor of pupils who practice physical activity ($t = 4.72$). Practicing students demonstrated higher mental health scores, indicating lower levels of anxiety and depression and better psychological adjustment. These findings confirm that physical activity plays an important preventive and therapeutic role in improving the psychological well-being of adolescents with diabetes. The study highlights the importance of integrating regular physical activity programs within school environments for students with chronic diseases. It also emphasizes the need for cooperation between educational and health institutions to support diabetic pupils. Overall, physical activity appears to be an effective strategy for promoting mental health and improving quality of life among adolescents with diabetes.

Keywords: Physical activity; Mental health; Diabetes; Adolescents; Psychological well-being.

1. Introduction

There is no doubt that diabetes is one of the chronic diseases suffered by most countries of the world, and it is among the major challenges facing societies in achieving their social order. Since the human element is of great importance in comprehensive development, which begins with man and ends with him, countries have devoted all efforts to caring for diabetic patients by improving their health, social, and legal status.

Human beings may know much about diabetes, and this knowledge has increased as the prevalence of the disease has risen year after year. Given the impact of this disease on both the individual and society, the World Health Organization adopted the slogan *"A normal life for diabetics"*, aiming to raise health awareness about the disease, its causes, prevention, and treatment methods. Thus, a diabetic patient can live a happy life full of activity, no different from other people.

Diabetes is considered one of the most important chronic diseases affecting individuals in this era, often referred to as a "lifestyle disease," similar to hypertension and other chronic conditions linked to technological development, industrial societies, and sedentary lifestyles. It is a metabolic disorder widespread across all countries and social levels (Abu Al-Ala Ahmed Abdel Fattah, 1998, p. 173).

Therefore, physical activity in educational and recreational settings is the most widespread form of activity across all environments. Sports activity is considered a factor of positive relaxation, an important means of investing leisure time, and a practice that enhances physical health, providing good posture, joy, relief from fatigue, and enabling individuals to work and produce effectively.

From this perspective, most physical activities benefit the individual through practice and their reflections on psychological, physical, social, and health aspects. While all types of physical activities are useful -whether recreational or competitive- other forms are equally beneficial, such as morning exercises (requiring large spaces or long durations), therapeutic exercises offered in treatment centers for different groups, and fitness exercises for health, etc. As Charles Bucher (1999, p. 28) sees it, physical activity is an integral part of general education and an experimental field aimed at forming a citizen who is physically, mentally, emotionally, and socially fit, through its various forms.

This activity has great importance in eliminating pathological symptoms related to emotional deficiency and feelings of inferiority when compared to others. A diabetic patient experiences reactive sensitivity that leads to self- depreciation, discomfort, and distress during interaction with others. It also plays an effective role in eliminating depression, whose symptoms are characterized by hopeless mood, withdrawal behavior, lack of interest in activity, reduced motivation, loss of vitality, and tendency toward suicidal thoughts, all traits that physical activity can help overcome (Ali Askar, 2003, p. 242).

Since individuals with diabetes suffer from poor health and psychological conditions, or from mental illness considered a functional disorder of personality of psychological origin, this appears in various psychological and physical symptoms. It affects the person's behavior, hinders his psychological adjustment, and prevents him from living a normal life in the society in which he resides (Hamed Abdel Salam Zahran, 1997, p. 9).
On this basis, this study was undertaken, as we see great importance in it, especially since this group has not received sufficient attention in research. Accordingly, we pose the following questions:

2. General Question:

- Do mental health levels differ among diabetic patients between those who practice and those who do not practice physical activity?

2.1. Specific Questions:

- Is there a statistically significant relationship between practicing physical activity and the level of mental health?
- Are there differences in mental health levels between patients who practice and those who do not practice physical activity?

3. General Hypothesis: Mental health levels differ among diabetic patients between those who practice and those who do not practice physical activity.

3.1. Specific Hypotheses:

- There is a statistically significant relationship between practicing physical activity and the level of mental health.
- There are differences in mental health levels between patients who practice and those who do not practice physical activity.

4. Research Objectives:

- To pursue the effectiveness of practicing physical and sports activity in achieving psychological balance and peer adjustment among diabetic patients in the educational environment.
- To attempt to identify the effectiveness of physical activity and its role in achieving mental health among students with diabetes.

5. Research Significance: This research carries great importance both theoretically and practically. It contributes to filling the knowledge gap regarding the impact of physical activity on mental health among diabetic students in Algeria, particularly in El- Oued province, where the school environment lacks specialized therapeutic sports programs.

- **Theoretical significance:** It enhances understanding of the relationship between physical fitness and psychological balance in the context of chronic diseases, enriching the scientific literature in physical education and mental health, and providing a foundation for future multivariate studies.
- **Practical significance:** It offers practical recommendations for educational and health policymakers, such as integrating sports activity into school curricula for diabetic students, training teachers in safe recreational programs, reducing national health costs, and promoting social inclusion of affected adolescents. It also fulfills the World Health Organization's slogan *"A normal life for diabetics."*

Furthermore, it highlights the role of the school as a preventive institution and opens prospects for cooperation between educational and medical bodies to combat depression and anxiety associated with the disease, thereby contributing to comprehensive human development in the face of modern health challenges.

6. Definition of Terms:

6.1. Physical Activity (Sports): It is that integral part of general education, and an experimental field whose goal is to form a good citizen who is fit physically, mentally, emotionally, and socially, through various forms of physical activity chosen to achieve these tasks (Mohamed Awad Bassiouni et al., 1992, p. 9).

6.2. Mental Health: Mental health, as a psychological state, is similar to physical health, viewed as the ultimate goal an individual seeks through his behavior and interaction with life around him. It is the opposite of mental illness. A mentally healthy individual is one who understands the motives of his behavior, influences his environment effectively and constructively, directs various stimuli toward others, and provides them with opportunities to respond appropriately when life circumstances require it (Mostafa Al- Sharafawi Khalil, n.d., p. 120).

6.3. Diabetes: The word *diabète* is derived from a Greek verb meaning "to pass through," referring to the kidney filtering substances that pass through it (Parcaud Gerard, 1995, p. 11). According to the World Health Organization (WHO), diabetes is defined simply as "hyperglycemia," meaning an increase in blood glucose levels. It is a chronic and hereditary disease, dependent on genetic factors, and is the most common (Parcaud Gerard, 1995, p. 12).

6.4. Adolescence: Adolescence represents the stage of growth that follows childhood, during which the body grows at high rates and physiological and glandular changes occur, having a major impact on the adolescent's life. Intellectual abilities also develop and differentiate.

Adolescence is thus a stage of growth characterized by gradual differentiated changes in physical, mental, emotional, and social aspects (Stephen Hard, 2009, p. 135).

7. Previous Studies: Reviewing previous studies is an essential stage in solving the research problem, as it guides planning, controls variables, and enables the researcher to judge, compare, confirm, or refute, with the aim of achieving the study's objectives and discovering facts.

7.1. First Study – Bouarouri Djaafar (University of Algiers 3, 2011–2012): *The effect of the personality traits of the physical education teacher and his educational competence on improving the mental health of the schooled rescuer.* Problem: What is the effect of these traits and competence? Hypotheses: They confirm their positive role. Objectives: To identify their impact on dimensions of mental health and communication. Method: Descriptive approach using personality, health, and competence scales. Findings: Positive effect of both traits and competence.

7.2. Second Study – Bachir Houssam (University of Algiers 3, 2010–2011): *Effectiveness of recreational sports activity in achieving mental health and integrating the physically disabled.* Problem: To what extent is it effective? Hypotheses: Confirm its positive impact and differences in favor of practitioners. Objectives: To identify the reality of practice and its role in health and integration. Method: Experimental approach using health and adjustment scales with pre- and post-tests. Findings: Demonstrated effectiveness in psychological improvement and social integration.

7.3. Third Study - Mourad Qiyal (University of Algiers 3, 2013–2014): *A sports training program to alleviate diabetes.* Problem: Does it affect physiological and anthropometric variables? Hypotheses: Expect significant differences between measurements. Objective: To encourage diabetic patients to practice sports. Method: Experimental approach with interviews and tests. Findings: Significant differences and positive impact of the program.

7.4. Fourth Study – Alaa Samir Moussa Al-Qutnani (Al-Azhar University, Gaza, 2011): *Relationship of psychological needs and self-concept with the level of ambition among university students.* Problem: What is the relationship? Hypotheses: Expect differences according to gender, faculty, and study, and an effect of interaction. Objectives: To identify levels, relationships, and differences. Method: Descriptive approach using scales of needs, self-concept, and ambition. Findings: Differences in belonging between literary and scientific faculties only.

7.5. Fifth Study – Abdelmadjid Ayed Al-Rashidi (Imam Muhammad bin Saud University, 2010): *Relationship of social intelligence with the level of ambition among university students.* Problem: What is the nature of the relationship? Hypotheses: Confirm a positive correlational relationship. Objectives: To define the two variables, reveal the relationship, and provide recommendations to improve ambition. Method: Descriptive approach using intelligence and ambition scales. Findings: Significant relationship, ambition increases with social intelligence.

8. Research Methodology:

8.1. Study Method: Given the nature of the research topic and the researcher's pursuit of a scientific solution to the problem posed in the study, the problem to be studied is chosen according to a scientific method appropriate to its nature and to analyzing its dimensions (Aziz Reda et al., 1991, p. 29).

Therefore, in this study we adopted the descriptive method as the most suitable approach for the topic. It is considered as "an investigation focusing on an educational phenomenon, aiming to diagnose it, reveal its aspects, and quantitatively describe it by collecting standardized information about the research problem, classifying and analyzing it, and subjecting it to rigorous study."

It is also the method that seeks to determine the relationship between two or more measurable variables, with the purpose of identifying whether a relationship exists or not, in order to predict and generalize. It involves comparative causal study of variables related to a main variable (Mohamed Hassan Allawi & Osama Kamel Rateb, 2003, p. 122).

8.2. Research Sample and Its Characteristics:

8.2.1. Research Population: The statistical population is defined as the total number of individuals, items, or units that share the same characteristics and traits present in the phenomenon or problem under study. Every individual who possesses the characteristics of that phenomenon is considered an element of the statistical population (Mohamed Sobhi Abu Saleh, 2010, p. 18).

For example, the population of a study on the weakness of secondary school students in mathematics in a given country includes all secondary school students in that country. The study population usually consists of elements and items. In our case, the original population is all secondary school students in El- Oued province who are diabetic.
Therefore, we used the comprehensive survey method, which is a way of collecting data and information from and about all elements or items of the study population using different techniques (Rabi Mustafa Alean & Othman Mohamed Ghoneim, 2000, p. 138).

This method aims to obtain comprehensive data and information about each unit of the population, whether the unit is a person, family, institution, or any other unit. It is used when detailed data about all units of the population are required, especially when the researcher is unfamiliar with the nature of the population, particularly if no previous studies have been conducted, or when the researcher cannot take a random sample representative of the population.

The original study population was determined to consist of 76 students distributed across all secondary schools in El- Oued province. A total of 76 questionnaires, including the *Mental Health Scale*, were distributed to all members of the population (100%). Of these, 70 valid questionnaires were retrieved for study and analysis.

Table showing the distribution of students practicing and not practicing physical activity

	Practicing students	Non-practicing students
Number of students	51	19
Percentage	73%	27%

9. Research Tools

9.1. Mental Health Scale

9.1.1. Description of the Scale: The scale was developed by Dr. Salah Fouad Mohamed Makawi, Lecturer in Mental Health, Faculty of Education in Arish, Suez Canal University,

Egypt (see appendix). This scale was prepared after reviewing the theoretical psychological literature related to the field of mental health.
The scale is used to provide an evaluative measure of the level of mental health among individuals of different age groups. It estimates various levels of mental health, low, medium, and high, across different age categories and for both genders. When the scale is applied to a specific age group, the raw score obtained by the respondent indicates the corresponding level of mental health. Thus, this scale is considered suitable for application across different age groups and for both genders (Mohamed Ben Hammouda, 2006, p. 8).

9.1.2. Scale Key: To correct the Mental Health Scale, each item is scored based on a three- point response format (*Agree, Somewhat Agree, Disagree*). For positive items, the scoring follows the direct order, while for negative items, the scoring is reversed, as illustrated in the following two tables.

Table 2. Positive and Negative Triple Responses on the Mental Health Scale

Positive responses		Negative responses	
Degree	Alternative	Degree	Alternative
3	I agree	1	I agree
2	I somewhat agree	2	I somewhat agree
1	I disagree	3	I disagree

Table No. 4 shows the positive and negative statements of the mental health scale

Positive statements	Negative statements
1-2-3-5-6-9-24-21-20-16-30-29-43-44-47-52-38-25-26-12-13	15-45-46-31-32-33-17-18-19-4-34-48-35-49-7-50-51-36-37-22-23-8-10-11-39-53-40-54-41-55-42-56-28-27-14

9.1.3. Scale Correction:

Table No. 4 shows: the distribution of categories according to the scale used in the research instrument

Description	Range Level
Low	93-56
Medium	130-93
High	168-130

9.2. Psychometric Properties of the Mental Health Scale:
To ensure the validity of the tools used for data collection, we calculated validity and reliability using the following methods:
9.2.1. Validity: The validity of a test means that it actually measures what it was designed to measure, and does not measure something else or in addition to it. The validity of the tools was estimated using the following methods:
9.2.2. Discriminant Validity of the Mental Health Scale: The validity coefficient of the scale was estimated using the method of extreme group comparison, also known as discriminant validity, by calculating the differences between the means of the two groups on the scale using the *t- test*. We obtained the following results:
Table No. 07 shows: the value of *t* indicating the significance of differences between the upper and lower extremes of the Mental Health Scale

Comparison Groups	Sample	Arithmetic Mean	Standard Deviation	Degree of	Calculated "t"	Tabulated "t"	Level of Significanc

			n	Freedom			e
Upper third 27%	19	98.47	5.22	36	13.167	2.042	0.05
Lower third 27%	19	125.42	5.10				

It is clear from the above table that the value of the *t*-test reached (13.167) at a degree of freedom (36) and a significance level (0.05), which is greater than the tabulated value (2.042). Therefore, it is statistically significant, and accordingly, there are differences between the two groups. The scale has the ability to discriminate between its extremes, thus it is valid and suitable for use in the study.

9.2.3. Reliability: The term reliability means stability. This implies that if we repeat the test multiple times on the same individual, the results would show a certain degree of consistency, meaning that the test would yield the same results if used more than once under the same conditions and with the same individuals.

9.2.4. Calculating Reliability Using Internal Consistency (Cronbach's Alpha): This method is used when the test is applied only once, in order to calculate the homogeneity coefficient that the test enjoys.

9.2.5. Calculating the Reliability Coefficient by Internal Consistency for the Mental Health Scale:

Table No. 10 represents the reliability coefficient of the Mental Health Scale using Cronbach's Alpha formula

Sample	Number of Items	Cronbach's Alpha Value
70	56	0.66

It is evident that the test enjoys a high reliability coefficient and can be trusted.

9.2.6. Calculating Reliability by the Test–Retest Method: In this method, reliability is calculated by re-administering the test, where the test is applied with a time interval of (15) days between the first and second administration. Then, Pearson's correlation coefficient is calculated between the test scores in the first administration and the test scores in the second administration.

- Calculating the reliability coefficient of the Mental Health Scale by the test–retest method:

Table No. 11 represents the reliability coefficient of the Mental Health Scale through re-application of the test

	Sample	Correlation	Degree of Freedom	Critical Value	Significance
First application	70	0.889	68	0.3060	Significant at 0.01
Second application	70				

From the table, it is clear that the result of the correlation coefficient between the scores of the first and second administration is estimated at (0.87), which is statistically significant. Accordingly, it can be said that the Mental Health Scale has a very high reliability.

10. Presentation, Analysis, and Discussion of Results:

10.1. Presentation and Discussion of the First Hypothesis:

Text of the hypothesis: There is a statistically significant positive relationship between the practice of physical activity and the level of mental health among school pupils with diabetes.
This hypothesis was analyzed based on a sample of 70 pupils (51 practicing, 19 non-practicing). The table shows Pearson's correlation coefficient between the scores of practicing physical activity (independent variable: 0 = non-practicing, 1 = practicing) and the scores of the Mental Health Scale (56 items):

Table No. 12 shows the correlation relationship between practicing physical activity and mental health

Practice Variable	Mental Health Variable	Correlation Coefficient	(df)	P.v	Significance
Mean: 0.73 (percentage of practitioners)	Mean: 132.4	0.68	68	0.01	Significant

Reading the Results of the Table

The strong positive correlation coefficient (r = 0.68) indicates a moderately strong positive relationship between the practice of physical activity and the level of mental health. The mean of mental health (132.4) increased with practice, which means accepting the first hypothesis stating that there is a correlational relationship between practicing physical activity and mental health.

10.1.1. Discussion of the First Hypothesis This result strongly supports the first hypothesis, as it reveals a clear positive correlational relationship between the practice of physical activity and the level of mental health among school pupils with diabetes. Physical activity contributes to the secretion of positive hormones such as endorphins and serotonin, which reduce symptoms of depression and anxiety resulting from chronic illness, and enhance feelings of satisfaction and emotional balance during the sensitive stage of adolescence. This correlation reflects how activity functions as a regulatory mechanism for stress, especially with hormonal and social changes, and is consistent with the psychological balance model that links physical fitness to emotional stability. It also improves control over blood sugar levels, thereby enhancing self-confidence and reducing feelings of helplessness.

In the context of diabetes, social interaction during group activities supports school integration and reduces social withdrawal. However, the strength of the correlation (0.68) indicates other influencing factors such as family support or medical care, which calls for multivariate models in future studies to separate effects and determine causality. The result also highlights the importance of integrating sports programs into school curricula in El-Oued province, to achieve a "normal life" as advocated by the World Health Organization, and to strengthen prevention against secondary psychological complications such as despair and fear of the future, with a proposal for longitudinal studies to measure long-term changes. In addition, research could be expanded to include the impact of different types of activity (recreational, competitive, therapeutic) to identify the most effective in improving mental health, especially given the limited sample size (70 individuals), which may reduce the generalizability at the national level in Algeria. (Bouarouri Djaafar, 2012; Bachir Houssam, 2011; Mourad Qiyal, 2014)

10.2. Presentation and Discussion of the Second Hypothesis: Text of the hypothesis: There are statistically significant differences in the level of mental health between pupils practicing and non-practicing physical activity, in favor of the practitioners.

Table No. 13 shows the value of the *t*-test to identify the differences between practitioners and non-practitioners of physical activity

Group	Sample	Arithmetic Mean	Standard Deviation	Calculated "t"	Tabulated "t"	Level of Significance
Practitioners	51	142.5	12.3	4.72	2.64	Significant
Non-practitioners	19	105.8	15.7			

Reading the Results: The table reveals a statistically significant superiority of the practicing group (M = 142.5) compared to the non-practicing group (M = 105.8), where the *t* value (4.72) is higher than the tabulated value (2.64 at df = 68 and 0.01). This confirms the existence of significant differences in favor of the practitioners and supports the second hypothesis.

10.2.1. Discussion of the Results of the Second Hypothesis

The results decisively confirm the validity of the second hypothesis, as they show clear differences in the level of mental health in favor of those practicing physical activity. This reinforces the idea that sport functions as both preventive and therapeutic treatment for psychological disorders associated with diabetes, especially in the school environment where adolescents face additional pressures from physical and social changes and chronic illness.

This superiority is attributed to biological mechanisms such as increased blood flow to the brain and improved nervous system functions, in addition to psychological benefits such as enhancing the sense of achievement and control over the illness, which reduces depression by up to 30-50% according to similar studies, and improves social adaptation through peer interaction.

In the Algerian context, particularly in El-Oued province, this reflects an urgent need to integrate physical activity into diabetes care programs, where schools can become therapeutic spaces that promote psychological and social adjustment, and reduce school absenteeism caused by psychological fatigue or obsessive-compulsive tendencies. These differences are consistent with the "physical activity as therapy" model linking fitness to mental health, but they also highlight the limitation of the sample (70 individuals), which requires cautious generalization. Future research is suggested in the form of longitudinal studies to measure changes over time or randomized controlled trials to establish causality, while considering mediating variables such as gender or disease severity.

Finally, the results emphasize the role of teachers in encouraging safe practice and developing tailored programs adapted to the condition of diabetes, to achieve maximum psychological and physical benefit, thereby contributing to building a psychologically healthy generation capable of facing life's challenges. (Mourad Qiyal, 2014; Rabouh Saleh Said, 2009; Bachir Houssam, 2011).

11. General Conclusion

The study conclusively proved the validity of the two proposed hypotheses, as statistical analysis revealed a strong and statistically significant positive correlation ($r = 0.68$, $p < 0.01$) between regular physical activity and the level of mental health among school pupils with diabetes. The *t-test* also revealed significant differences in favor of the group practicing

physical activity ($t = 4.72$, $p < 0.001$), reflecting a notable improvement in mental health indicators such as reduced anxiety and depression and increased life satisfaction.

These results support the scientific effectiveness of physical activity as a preventive and therapeutic tool in facing psychological challenges resulting from chronic diseases during adolescence, and are consistent with the ecological systems theory that links school and health factors. Based on this, it is recommended to integrate physical activity into Algerian school programs as a fundamental component, through: (1) allocating daily sports periods specifically for pupils with diabetes, with teacher training; (2) partnerships with health authorities to develop joint monitoring programs; and (3) family awareness campaigns to strengthen environmental support. These interventions will contribute to building a healthy educational environment, achieving sustainable development goals in the Algerian context.

Conclusion

This research represents a pioneering step toward understanding the role of physical activity in enhancing the mental health of school pupils with diabetes. The results highlighted its significant importance in facing the psychological challenges associated with chronic illness during the sensitive stage of adolescence. By relying on a precise descriptive methodology and a reliable scale for measuring physical activity and mental health, the study confirmed the strong positive relationship between regular exercise and reduced levels of anxiety and depression, in addition to strengthening self-confidence and social adaptation among this group of pupils.

The importance of these findings lies in emphasizing the urgent need to integrate physical activity as a fundamental element in educational and health policies within Algerian schools. It is recommended to develop specialized school programs that include daily sports periods dedicated to pupils with diabetes, in partnership with health and educational authorities, with teacher training on how to integrate sport as a preventive tool for psychological and social balance. Future studies are advised to expand the scope to include larger samples from rural and urban schools, and additional variables such as cultural influences, family support, and digital interventions for monitoring physical activity.

In conclusion, this research calls for a genuine school revolution that links physical education with integrated health care, to build a healthier and fitter Algerian society. By investing in youth as strategic capital, comprehensive sustainable development can be achieved, where physical activity becomes not merely an additional activity, but a fundamental pillar for the health of future generations, fulfilling the Sustainable Development Goals in Algeria.

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