THE IMPACT OF LABORATORY PROFESSIONALS ON QUALITY OF LIFE DISPARITIES BETWEEN INDIVIDUALS WITH AND WITHOUT DISABILITIES IN SAUDI ARABIA UTILIZING LOWER LIMB PROSTHETICS OR ORTHOSES

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Abstract:
Laboratory professionals play a crucial role in the development, fabrication, and customization of prosthetic devices, including lower limb prosthetics, which are essential for individuals who have lost physical limbs due to trauma, disease, or congenital disorders. Their expertise in materials science, biomechanics, and precision manufacturing ensures the effective functioning and comfort of these prosthetic devices. In the context of the study conducted in Riyadh, Saudi Arabia, laboratory professionals contribute indirectly to the assessment of community acceptance of prosthetic patients. By providing high-quality prosthetic devices that enable individuals with special needs to lead fulfilling lives, laboratory professionals contribute to the normalization of prosthetic use within society. However, the negative attitudes identified in the study highlight a gap in community understanding and acceptance of prosthetic users. Laboratory professionals can potentially play a role in addressing these negative perceptions through education, outreach, and advocacy efforts. By raising awareness about the capabilities and benefits of prosthetic devices and promoting inclusivity and acceptance, laboratory professionals can help bridge the gap between prosthetic users and the broader community in Riyadh and beyond. Additionally, collaboration between laboratory professionals and healthcare providers can lead to the development of more advanced and user-friendly prosthetic technologies, further enhancing the quality of life for individuals with limb loss.

Keywords- Prosthetics, Quality of Life, Disabilities, Lower Limb, Orthoses.

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Introduction:

According to the International Classification of Functioning, Disability, and Health, people with disabilities may have difficulty doing daily tasks, taking part in social activities, or completing educational or employment requirements. When a person with a health condition experiences personal and environmental circumstances, this is what we mean when we talk about disability (e.g., negative attitudes, inaccessible transportation, and public buildings, and limited social support). It's believed that over a billion individuals in the world have at least one impairment. Quality of life refers to an individual's assessment of their circumstances in light of their own values, priorities, hopes, and fears in their local culture. It's a wide notion that depends on a lot of different things, including the person's physical and mental health, independence, social network, worldview, and relationship to key elements of their environment. [1]

As a means to improve their quality of life, people with disabilities can take part in sports, both competitively and recreationally. Participation in sports and recreational activities may help people with physical impairments and those who are deaf or hard of hearing increase their confidence, self-esteem, and quality of life, as well as their ability to carry out activities of daily living, according to some research. The physical, mental, social, and economic benefits of sports and leisure activities for people with various impairments have been highlighted in reviews. There is a large body of research indicating that disabled people who engage in sports and other leisure activities benefit from doing so. A stronger sense of fulfilment in life and a lessening of despair and anxiety were reported among athletes. Overall, the participants reported high levels of happiness, particularly in the realm of social relationships, but lower levels of happiness in their sexual lives and professional situations.[2]

Laboratory professionals play a vital role as contributors to the well-being of individuals who rely on prosthetic devices, particularly those with lower limb loss. Through their expertise in materials science, biomechanics, and precision manufacturing, laboratory professionals are instrumental in the development, fabrication, and customization of prosthetic limbs tailored to the specific needs and preferences of each patient. By leveraging advanced technologies and innovative techniques, they ensure the optimal functioning, comfort, and durability of prosthetic devices, thereby empowering individuals to regain mobility and independence.

Moreover, laboratory professionals collaborate closely with healthcare providers, prosthetists, and rehabilitation specialists to assess patients' unique requirements and design prosthetic solutions that meet their individual goals and objectives. This interdisciplinary approach ensures that prosthetic devices are not only functional but also seamlessly integrate into patients' daily lives, enhancing their overall quality of life and facilitating their participation in various activities and social interactions. Furthermore, laboratory professionals contribute to ongoing research and development efforts aimed at advancing prosthetic technologies and improving outcomes for patients with limb loss. By staying abreast of the latest advancements in materials, techniques, and design principles, they continuously strive to enhance the performance, comfort, and aesthetics of prosthetic limbs, ultimately maximizing the functional capabilities and satisfaction of prosthetic users.

1.1 Quality of Life Concept

Health statistics like life expectancy and illness prevalence have been expanded upon since the turn of the century. The quality-of-life metric has been called "the missing measurement in health." Quality-of-life evaluation has become an integral aspect of modern healthcare. Twenty-one different health assessment tools were documented in the 1996 edition of the encyclopedia-like guide on the topic. There are now 922 instruments listed in the Pooled database, which is administered by the MAPI Research Trust. No one has settled on a single, overarching indicator of health status to use in all situations. [3] Specifically, we use the WHO's definition of self-reported quality of life in this investigation. A person's quality of life is determined by how they evaluate their circumstances in relation to their values, priorities, and aspirations in their local culture. It's a broad notion that depends on several factors, including the individuals' physical and mental well-being, their level of independence and social connectivity, and their perception of the significance of various aspects of their natural and built environments. This term represents the concept that one's subjective assessment of quality of life is rooted in their cultural, social, and environmental surroundings. This definition of quality of life, which centers on respondents' "perceived" quality of life, is not meant to give a precise method for assessing symptoms, illnesses, or conditions;

rather, it is meant to assess the impact of disease and health treatments on quality of life.[4]

The World Health Organization (WHO) has made the effort to create a quality of life evaluation because of the organization's dedication to advancing a more integrative medical model. At the same time, the mechanistic approach to medicine in Saudi Arabia, which focuses solely on curing disease and alleviating its symptoms, emphasises the importance of incorporating humanism into health care and disability support services. From a medical perspective, quality of life evaluation has been used to support or deny various therapies; settle disagreements over therapeutic techniques; and give a rationale for allocating resources to those deemed more successful. Standardized quality of life instruments can aid in the creation of public policies that specifically address the needs of vulnerable groups, which is an important goal from the perspective of public health. When thinking about, planning, and enacting change in the field of disability, the quality of life paradigm presents a formidable challenge. Furthermore, talking to a handicapped person about how they feel emotionally can be a kind of humane care that boosts their general health and happiness. Generic instruments are those that are universally applicable, both in terms of the diseases and ailments they are designed to treat and the treatments themselves. [5]

1.2 Disability Concept

The World Health Organization (WHO) has exhibited a more comprehensive and up-to-date attitude towards the ideas of "health" and "disability" since 2001, when it was recognized that every person is susceptible to some level of impairment due to changes in health or the environment. At some point in their lives, everyone will have some sort of impairment, and it is impossible to predict whether or not that impairment will be permanent. [6] During the past twenty years, there has been a meteoric rise in the number of people in the world who are afflicted with some form of disability. More than one billion people throughout the world are handicapped, and of those, more than 200 million are dealing with major challenges. Accidents on the road, stress, improper use of drugs, and other reasons, in addition to an overall increase in life expectancy, have all contributed to this expansion. Because of these and other circumstances, it is estimated that a person who is born in a nation with a median life expectancy of 70 years will spend an additional 11 years of their life coping with some form of handicap. It is estimated that just 2.2% of the population in Saudi Arabia was handicapped in 2001, but that number has since increased to around 2.6% now. [7]

1.3 Quality of Life of People with Disabilities

The quality-of-life paradigm questions the status quo of how disabled people are often treated. The World Health Organization (WHO) considers more than only the medical or biological components of dysfunction. Using a quality-of-life tool allows for the consideration, analysis, and recording of the effect of environmental and other contextual elements on the functioning of an individual with a disability. Increased focus on individual preferences and requirements in health and social care, as well as pressure to achieve better outcomes with fewer resources, has piqued interest in quality of life. [8] The results of a TEMC assessment are highly correlated with a person's level of social integration who has a disability. A TEMC expert decision (ED) is a legally binding document that establishes a person's entitlement to social rehabilitation in the context of a disability. Opportunities for employment, further education, and general social integration can all be derived from the ED by TEMC. In addition, the process of determining a person's level of impairment has been evolving for a long time. [9]

1.4 Classification of Locomotor Aids

There is currently a lack of reliable criteria for categorizing the wide variety of loco motor aids that have emerged in recent years. Prostheses, orthoses, and assistive devices are the three broad categories into which clinically relevant loco motor aids can be sorted. To replace a missing or damaged bodily part with an artificial one is what is meant by the term "prosthesis," which can refer to anything from prosthetic limbs to artificial hands. An orthosis is a relatively new term that refers to any type of corrective or rehabilitative device like crutches or braces. Wheelchairs, tricycles, ramps, and other gadgets like these are all examples of assistive devices. Even now, it is unclear where orthoses begin and assistive technology ends. [10] Since the advent of bioengineering and ergonomics, researchers have paid more attention to the behaviour of man-machine integrated systems and conducted more in-depth studies of the interaction between humans and machines. The disabled person's locomotor assistance system might be viewed as a standard man-machine system. Therefore, arranging the locomotor aids in the context of the humanmachine system is both reasonable and scientific. The stethoscope used by

doctors, surgical equipment sets, etc., all fall under the category of zero-order systems since they combine to accomplish a job that has nothing to do with the body's physiology or biomechanics. [11]

1.5 Common Barriers to Participation Experienced by People with Disabilities

Almost everybody has to deal with adversity at some point. In contrast, those with impairments may experience more frequent and severe impediments. According to the World Health Organization (WHO), there are several types of barriers. The World Health Organization defines impediments as follows: [12] Disabling environmental factors are those that either do not exist or are not available to the disabled individual. Considerations such as: [13]

- A physical location that is inaccessible.
- Inadequate Access to Appropriate Assistive Devices (assistive, adaptive, and rehabilitative devices).
- People's unfavorable views towards those with disabilities.
- Services, procedures, and regulations that either don't exist or act as roadblocks to individuals with disabilities fully participating in all aspects of society.

i. Attitudinal Barriers

The most fundamental obstacle is a person's attitude, which in turn affects other barriers. Some individuals might not realize, for instance, that accessibility issues prevent people with disabilities from fully participating in society and the things they would normally do, such as going to work or school. Some attitudes that can get in the way include: [14]

- Disabled people are frequently unfairly stereotyped as having a worse quality of life or being in bad health due of their impairments.
- There is a possibility that misconceptions about disabled persons contribute to stigma, prejudice, and discrimination. Disabling conditions can be seen in a variety of ways, such as a tragedy for the individual, something that should be cured or avoided, a kind of punishment for wrongdoing, or an inability to perform necessary social tasks.

ii. Physical Barriers

When people are unable to freely move about their surroundings or get entry to certain areas, it is often because of physical barriers, which can be either manmade or naturally occurring. Some types of physical obstacles are: [15]

- Construction features, such as steps and curbs, that prevent people with disabilities from accessing buildings or moving freely on sidewalks.
- The mammography machine requires the patient to stand, which may be difficult for women with mobility issues.
- Disabled people or those in wheelchairs cannot use the scale since it does not have a low platform.

iii. Programmatic Barriers

The ability of a public health or healthcare programme to effectively serve people with varying disabilities is hampered by limitations inherent to the programme itself. Limitations in the programming include: [16]

- Schedule conflicts.
- Disabled access problems to necessary machinery (such as mammography screening equipment).
- A lack of allotted time for medical tests and procedures.
- There is little or no interaction with patients or volunteers.
- Provider's perspective on, familiarity with, and acceptance of persons with impairments.

iv. Social Barriers

It is important to recognize the role that social obstacles, also known as social determinants of health, have in limiting the independence of people with disabilities. Instances of societal obstacles: [17]

- Those who are disabled have far lower employment rates. Comparatively, the employment rate for persons without disabilities was 76.5% in 2017, whereas it was just 35.5% for those with disabilities (aged 18-64) in the same age range.
- People with disabilities are less likely to complete high school (22.3 percent vs. 10.2 percent of those without disabilities aged 18 and above).
- In comparison to those without impairments, those with disabilities are more than twice as likely to have an annual income of less than $15,000.
- The likelihood that a kid with a disability would be a victim of violence is about four times higher than that of a child without a disability.

2. METHODOLOGY

2.1 Study Aim, Design, and Setting

The survey set out to gauge the general public's attitude toward those who use prostheses. A Google

Forms questionnaire was used to collect data from the internet population in Riyadh, Saudi Arabia, for this cross-sectional study. A questionnaire was created and disseminated over social media sites in order to collect information from those individuals. There were a total of 20 questions on the survey, and they were split evenly across three categories (marriage, employment, and friendship). In addition, a web-based survey was used to ensure the inclusion of respondents from a wide range of demographics, including individuals with varying levels of education and experience, as well as those living in urban and rural settings.

2.2 Identification of study participants

The original criteria for inclusion were as follows: Riyadh residents over the age of 18 who identify as male or female Saudi Arabians. Intellectually disabled and amputee subjects were screened out of the study. With a 95% degree of confidence and a 5% margin of error, we estimate that there are 2.8 million residents in Riyadh who are 18 or older. In the absence of any data to the contrary, we may assume a 50% rate of acceptance as the norm. By utilising the sample size calculator on Survey Monkey, we can confidently say that our sample of 384 accurately represents the whole population. The initial sample size of 494 people was raised to 500 after the data was received. Participants who met the study's inclusion and exclusion criteria and were willing to participate on their own were selected from a nonprobability convenience sample.

2.3 Data Collection Process

The questionnaire used in this study was designed inhouse and disseminated via social media and an online survey directed at those over the age of 18. The 20-question survey looked at how prostheses affected respondents' chances of finding a spouse, making new acquaintances, and finding work. Cronbach's alpha showed that the questionnaire was reliable at the 91 level, making it valid. It all started with an English questionnaire that was translated into Arabic and back into English by experts at a translation bureau.

2.4 Data analysis

The Prosthesis Acceptability Assessment Test (PAAT) consists of 20 items, each with a five-point Likert scale, to gauge the level of social acceptance of people who use prostheses. There are eighty possible points, which may range from zero to four. In this case, a score of 60 or higher indicated a high level of acceptance from the individual. Frequency counts were used to display categorical information like age range, rate of acceptance, and gender. We used the Pearson Correlation for age, the test for gender, and the analysis of variance (ANOVA) for education to examine if there was a significant difference in the mean acceptance score based on the participants' demographics (M/F, age, and level of education). If the p-value of a test is less than 0.05, it is considered significant. The data input and analysis will be performed using SPSS version 20.

2.5 Analytical Analysis

Data was analyzed using SPSS Version 20. There was a thorough coding and transfer of all Excel data to SPSS. The acceptability score was employed in a T-test that compared the sexes. The correlation between years of schooling and the acceptance rate was examined using an analysis of variance (ANOVA) test. For continuous variables like age, linear regression was used. Categorical variables like age and marital status were given descriptive statistics like mean and standard deviation. Any value of the P-value below 0.05 was judged to be statistically significant. Those who scored 60 or above on a self-designed questionnaire (Prosthesis Acceptance Assessment Test) were regarded to have a positive attitude toward those who use prosthetics. Cornbrash's alpha was used to determine the items' level of reliability, and it was found to be 0.91.

3. RESULT

3.1 Demographic Characteristics

An online questionnaire was used in a cross-sectional study that questioned 500 people who had been randomly selected. There were 280 more women than men in the survey (56% vs. 44%). The biggest percentage of participants (330, or 60%) had at least a bachelor's degree, followed by the second highest percentage (130, or 26.8%), and the lowest percentage (40, or 8%). In addition, just 60 (10.5%) of the 500 participants knew someone with a prosthesis themselves. (Table 1) In our survey, we discovered that 76 percent (380) of respondents were not welcoming of those who use prostheses, while just 24 percent (120) were receptive to the idea. In terms of age distribution, those who rejected the idea had a somewhat lower mean age than those who accepted it (49.04 vs. 47.26 years; P= 0.3963).

Table 1: If you know anyone with prosthesis, could you describe your relationship with them?

Demographic Characteristics	Frequency	Percent
None	432	86.4%
Family	35	7%
Friend	16	3.2%
Colleague	13	2.5%
Public figure	4	2.6%
Total	500	100.0%

3.2 Factors Associated with Acceptance

• Gender

According to the findings of this research, out of the total sample size of 2,342 participants, the percentage of welcoming women was higher (70, or 25%) than it was for accepting males (50, or 22.72%). (Table 2) In addition, the mean acceptance score for women was higher than the mean acceptance score for males (F= 49.04 vs. M= 47.26), but this difference did not reach the level of statistical significance (P = 0.092). (Table 3)

Table 2: Factors Associated with Gender.

Gender		Acceptance results Not accepting	Accepting	Total	Fischer exact test	P-value
Male	N (%)	170(77.27%)	50(22.72%)	220 (100%)	0.2514	0.616
Female	N (%)	210 (75%)	70(25%)	280(100%)		
Total	N (%)	380(76%)	120(24%)	500(100%)		

Table 3: Acceptance Score of Gender

Acceptance score			T-test	P-value
Gender	Male	Female	-1.686	0.092
N(%)	220(44%)	280(56%)		
Mean	47.26	49.04		
Std. Deviation	10.417	10.221		

• Educational Level

When broken down by level of education, those with master's degrees or more were the most welcoming group, making up 10 (25%) of the 40 (8%) total, followed by those with bachelor's degrees or lower, making up just 5% of the total. The lowest percentages were seen among those with only a high school diploma (80 (24.24%) out of 330 (60%)) and those with some college (30 (75%) out of 130) (26.8%). (Table 4) Finally, the average admission score was 49.47 for those with a bachelor's degree, 47.30 for those with just a high school diploma, and somewhere in between for everyone else. The P-value, however, indicates that this was not a significant finding (P= 0.867). (Table 5).

Table 4: Factors Associated with Educational Level.

Education Level	Not accepting	Accepting	Total	Chi-square test	P- value
High school	100 (76.92%)	30 (23.07%)	130(100%)		
Bachelor's degree	250 (75.75%)	80 (24.24%)	330(100%)		
Higher Studies	30 (75%)	10 (25%)	40 (100%)		
Total	380 (76%)	120 (24%)	500(100%)	0.195	0.907

Table 5: Acceptance Score of Educational Level

	Acceptance score			ANOVA test (F)	P-value
Gender	High school	Bachelor's degree	Higher Studies		
N (%)	130 (26.8%)	330(60%)	40 (8%)		
Mean	47.30	49.42	59.08		
Std. Deviation	9.896	10.796	10.158	0.143	0.867

• Age

We discovered that according to the Pearson correlation and the P-value, which we carried out, there was no link between the age and the acceptance score (PC = 0.025, P = 0.565). (Figure 1)

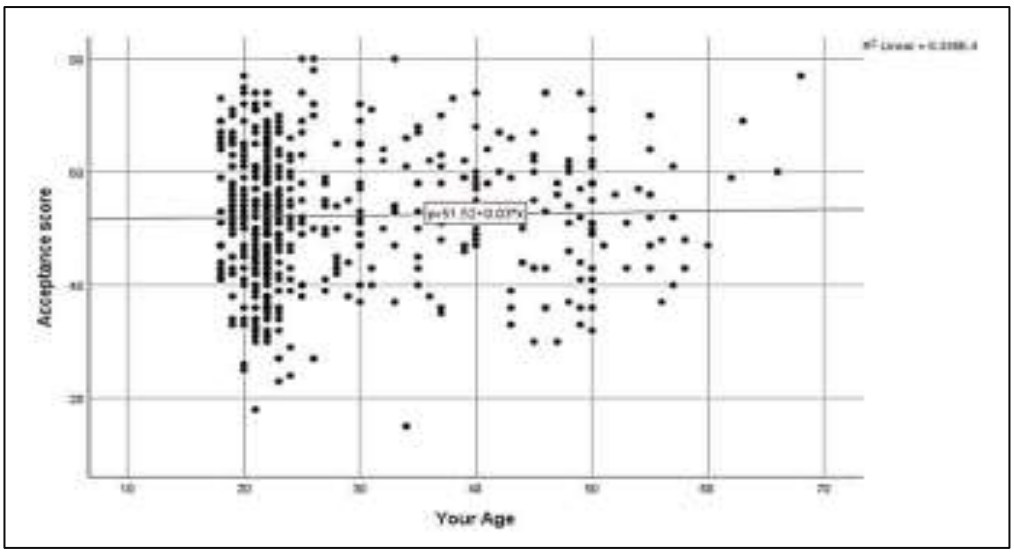

Figure. 1: Scatter plot where r = 0 shows no relationship between acceptance score and age.

4. CONCLUSION

The study's authors set out to survey Riyadh residents about their attitudes toward and experiences with people who rely on prosthetics in intimate relationships, social circles, and the workplace. Furthermore, we analyzed the variance in participants' acceptance rates by demographic characteristics such as age, gender, and level of education. None of the three of them stood out from the others in any significant way. This suggests that these areas have a negligible effect on the acceptance rate. In addition, there was room for improvement in the sample's low acceptance rate. As a response, we propose launching campaigns to educate the public about people with prostheses and encourage the general public to stop discriminating against them. This is because people with prostheses are just like everyone else; the device simply enhances their abilities.

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