Article

Positive mental health and quality of life among students with disabilities and diabetes. Unraveling the role of physical fitness

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Abstract: This study aims at exploring the direct impact of positive mental health through 6 factors on quality of life among students with disabilities and diabetes at Saudi universities, as well as the moderating impact of physical fitness on all direct relationships among all variables of the study. Employing a quantitative research methodology, using self-administered surveys distributed to a sample of students with disabilities and diabetes at numerous Saudi Arabian universities. 468 completed surveys were received and subjected to statistical analysis, using PLS-SEM, and the study uncovered significant positive direct relationships between all positive mental health sub factors and quality of life among students. Additionally, the study revealed that physical fitness acts as a moderator in all direct relationships These findings offer valuable insights for universities, in order to develop and implement psychological support and academic adjustments policies ensuring students have access to health and wellness programs, and engage local communities in the creation of policies that can help students with disabilities.

Keywords: positive mental health; quality of life; students with disabilities; students with diabetes; physical fitness

1. Introduction

The concepts of positive mental health (PMH) and quality of life (QOL) have received great attention today (Oikonomou et al., 2024; Pant, 2023). Mental health literacy encompasses the knowledge and attitudes regarding mental health conditions that enable people to recognize, address, or prevent mental health challenges. Due to its importance, efforts to improve mental health literacy have gained increased attention as a strategy to promote positive mental health, enable earlier identification of conditions, reduce stigma, and boost the willingness to seek assistance(Geerts et al., 2020).The idea of Positive Mental Health (PMH) is derived from the notion of mental health and traces its roots back to Seligman's positive psychology, as well as the research conducted by Marie Jahoda in 1958(Clark and Wu, 2016).While there isn't a single definition, PMH is regarded as a component of mental health, encompassing an individual's capability to comprehend their surroundings and adjust or change them to enhance their optimal functioning (Group, 1995).

The importance of quality of life (QOL) in mental health treatment has grown (Nobre et al., 2022).The United Nations states that one of the essential intervention goals in the Sustainable Development Goals (SDGs) for year 2030 is the development

of goodmental health(GMH) for people, and development of their well-being (Sequeira et al., 2020).The World Health Organization(WHO) describes QOL as "a person's understanding of their role in the world, the cultural setting and values they adhere to, and how all of this relates to their expectations, norms, and concerns." (Iasiello et al., 2019). The primary dimensions of mental health and PMH, which are both seen as protective components of mental health, have attracted increasing attention from researchers worldwide (Hassan Osman et al., 2023). The PMH Questionnaire has been used to evaluate PMH in various contexts, including individuals with long-term issues like students with disabilities (Bratke and Sivertsen, 2021). Previous studies found that students who have high degrees of mental wellness are shielded from mental illness (Prince et al., 2007).

There is significant scholarly interest in understanding students' MH experiences since they affect learning processes and academic achievement (Organization, 2003). A close link has been seen between MH and health-related QOL (Organization, 2022). Since MH refers toan individual or a person's state of psychological, emotional, and social functioning, it is a crucial component of total health and well-being (Morales-Rodríguez et al., 2020; Vaillant, 2012). People who are in a good condition of mental well-being are more equipped to manage obstacles in life, make decisions, form relationships, learn new things, advance their careers, and become engaged members of their communities (Haug, 2017).

Mental wellness is the foundation of psychological health (Pregot, 2021). To avoid cognitive loss, it is essential to control age-related changes in cognition and keep up an appropriate level of both physical and mental activity. Subjective happiness, felt self-efficacy, autonomy, competence, intergenerational reliance, and awareness of one's capacity to reach one's full psychological and intellectual capacity are among the terms of mental health (Vaillant, 2012). PMH is a major contributor to community well-being because it fosters resilience, social cohesion, and overall life satisfaction. The development of effective public health programs depends on the interaction between PMH and community dynamics (Cattan and Tilford, 2006).

This paper explores the impact of PMH on the QOL among Students with Disabilities (SWD) and Diabetes at the Saudi university level. Universities around the globe have started to focus on the importance of a welcoming place for learning. The goal of inclusive education is to completely overhaul the system of learning (Andrews and Withey, 2012). Additionally, by utilizing curricula and educational programs that reflect the requirements of all students, including those with impairments and diabetes, educational institutions have promoted learning chances (Goodwin and Zaman, 2023).

This research draws from promoting mental healththeory. Itis important for everyone, not only those who are mentally ill to enhance mental health through a broad strategy that combines community development projects, governmental and commercial health-promoting policies, and educational programs (Auerbach et al., 2018). This research also draws from the theory of life satisfaction (Andrade et al., 2022).

This study is considered important because it is aligned with the SDGs (Sequeira et al., 2014). It focuses on improving the level of MH among SWD and diabetes at the university level. But rather than MH, the focus has been on positive health promotion about mental disease, academic progress, and QOL. More recently, the idea of mental

health promotion has been expanded and improved conceptualized. The student population especially those with disabilities and diabetes had a high prevalence of mental health problem symptoms, even in those with good physical health. This made students especially vulnerable to mental health issues during the learning process (Lluch, 2002).

This research tries to close the knowledge gap and accomplish two major objectives in the context of Saudi Arabian universities. It first looks at how PMH directly affects QOL. Second, it looks at this relationship's indirect impact through the moderating role of Physical fitness. Very few studies have been conducted to see how physical fitness moderates the relationship between PMH and QOL.

Thus, the purpose of our study is to examine the relationships that have been postulated between the QOL and the PMH variables (personal satisfaction, prosocial attitude, self-control, autonomy, problem-solving and self-actualization, and interpersonal relationship skills). Furthermore, we aim to investigate the moderating influence that physical fitness is expected to show on these connections.

2. Theoretical background and hypothesis development

Good mental health (GMH) is a dynamic state involving a balance of positive and negative emotions, thoughts, and behaviors that contribute to individual qualities and skills. Embracing these feelings can help individuals develop resilience by maintaining a positive and problem-solving outlook (Roldán-Merino et al., 2017). The ability to see oneself and the society and surroundings as enabling factors, as well as the capacity to interact with and positively adjust to them, is known as PMH (Diener and Larsen, 1984).

According to earlier studies, the PMH consists of the following six components: 1. Self-control (ability to handle difficult situations, emotional equilibrium/control, and tolerance for stress, anxiety, and frustration); 2. Autonomy (personal security/self-confidence, independence, self-regulation of one's behavior); 3. Self-satisfaction (self-concept/self-esteem, contentment with one's own life); 4. Pro-social attitude (helping-supporting attitude towards others, acceptance of others, and distinct social facts); 5. Self-realization or problem-solving skills (aptitude of constant personal development); 6. Interpersonal Relationship Skills (ability to form and maintain close relationships with others, capacity for emotional support, and empathy/ability to understand the feelings of others) (Botelho Guedes et al., 2022; Huebner et al., 2004).

Adults' overall evaluation of their current emotions, perspectives on life, and contentment with the past and future is known as life satisfaction (Sadjapong and Thongtip, 2023). Research in the area of MH reveals a strong correlation between teenagers' reported life satisfaction (LS), a subjective measure of well-being, and their MH (Trigueros et al., 2019). Several studies demonstrate that the experiences that teenagers have with their families have a particular bearing on how happy they are with life (Dehury et al., 2024).

Research indicates that there is a positive correlation between the MH of young people and LS, which is a subjective measure of their well-being based on a comparison between their circumstances and what they consider to be a sufficient life standard (Trigueros et al., 2019). Healthy mental well-being generally improves

overall life quality, interpersonal relationships, academic success, and resilience, all of which lead to greater life satisfaction. On the other hand, inadequate mental health can diminish life satisfaction by negatively affecting emotional balance, social bonds, and the capacity to interact positively with life. Juggling responsibilities in both environments encourages teenagers to develop healthy, active habits and a solid base for motivation early on, meaning that families can serve as a supplementary resource to the educational system. Advocating for mental health programs, effective coping techniques, and nurturing environments can improve both mental well-being and overall life satisfaction for youth.

QOL and self-satisfaction are strongly positively correlated, according to numerous research (Radzi et al., 2024). People who express greater levels of self-satisfaction also frequently express greater levels of general well-being (Hewitt, 2002; Murtaza et al., 1988). QOL and self-satisfaction are related ideas that have a big influence on someone's general well-being. Although there may be individual and cultural variations in the precise nature of the relationship between the two, research generally points to a positive correlation. Studies reveal a favorable correlation between self-satisfaction and quality of life (QOL) (García and Trascastro, 2021). Among university students, there are noteworthy associations between self-esteem, life satisfaction, and QOL (Yanjie et al., 2015). Self-esteem and QoL among students with physical disabilities were found to have a strong positive association in a study, suggesting that higher self-esteem and self-satisfaction improve QOL (Ahn et al., 2024).

Furthermore, a person's perception of themselves is greatly impacted by the perspectives of important people that they engage with daily (Etman et al., 2015). Previous studies found that QOL is greatly improved by prosocial attitudes through a variety of processes, such as social support and constructive social interactions (Moffitt et al., 2013). According to research, having supportive social interactions is essential for maintaining one's health and QOL, especially for older persons who depend on these relationships for daily tasks and cognitive reserves (Bull et al., 2020; Moxley and Habtzghi, 2019).

In addition, resolving social and personal concerns successfully enhances people's QOL considerably (Yurdakul and Arar, 2023). Many studies seek to confirm the impact of psychological traits like self-control and autonomy on the changes in the lives of inactive college students (Maslow, 2013). Since health has become a fundamental component of lifestyle, there has been a recent spike in interest in the subject of health research, with the belief that lifestyle can revolutionize our understanding of health and QOL in contemporary society (Diener et al., 1985). Numerous academics have discussed the relationship between self-control and happiness in adults, emphasizing that this process begins in childhood. The majority of these researches found a positive association (Cummins et al., 2004).

From other points, many factors can affect the level of QOL among people. For example, WHO recommends at least 60 min of moderate physical activity per day, three days of strenuous physical exercise per week, and a reduction in sedentary behavior. Physically inactive people do not satisfy these recommendations (Peplau, 1988). Data point to the possibility that physical exercise intensity—rather than frequency or duration—may have a greater impact on health advantages (Berkman

and Glass, 2000). This shows the positive association between physical activity and QOL.

According to Maslow's hierarchy of requirements, self-actualization is the ultimate objective of human beings. It speaks of reaching one's greatest potential, which includes developing oneself creatively and personally as well as finding meaning and fulfilment in life (Marsh et al., 1994). The groundwork for this ground-breaking work is that individuals attempt to enter the self-actualization stage as soon as they feel their lower-level (safety, physiological) and middle-order (social) needs are satisfied (Veal, 2017). People who have needs for self-actualization are driven by growth and prioritize humanity and love over meeting their basic requirements. Continued novelty in appreciation, acceptance, sincerity, composure, goal-setting, humanitarianism, prior experiences, moral aim, and inventive spirit are characteristics of self-actualization (Ayad, 2022).

In contrast to traditional objective metrics, self-reported happiness, health, and social support are independent determinants of health outcomes (Bryman and Cramer, 2012). Interpersonal relations are defined as interactions that can take place between two or more people, such as between clients and service providers, peers, or family members, according to Peplau's Theory of Interpersonal Relations (Peplau, 1988). The significance of supporting connections in attaining health is highlighted by the Theory of Interpersonal Relations (Peplau, 1988). We argue that a good and sustainable interpersonal relationship might improve the QOL for students especially those with disabilities. It has been found that social support shields against physical health outcomes like mortality and cardiovascular disease in the general population as well as mental health outcomes like anxiety and despair (Berkman and Glass, 2000).

Drawing from the above analyses of extensive literature, the ensuing hypotheses may be advanced. See **Figure 1**:

H1: Personal Satisfaction has a significant direct influence on QOL.

H2: Prosocial Attitude has a significant direct influence on QOL.

H3: Self-control has a significant direct influence on QOL.

H4: Autonomy has a significant direct influence on QOL.

H5: Problem-solving and Self-Actualization have a significant direct influence on QOL.

H6: Interpersonal Relationship Skills have a significant direct influence on QOL.

H7: The connection between QOL and Personal Satisfaction will be moderated by physical fitness.

H8: The association between prosocial attitude and QOL will be moderated by physical fitness.

H9: The association between self-control and QOL will be moderated by physical fitness.

H10: The association between autonomy and QOL will be moderated by physical fitness.

H11: The relationship between problem-solving, self-actualization, and QOL will be moderated by physical fitness.

H12: The association between interpersonal connection skills and QOL will be moderated by physical fitness.
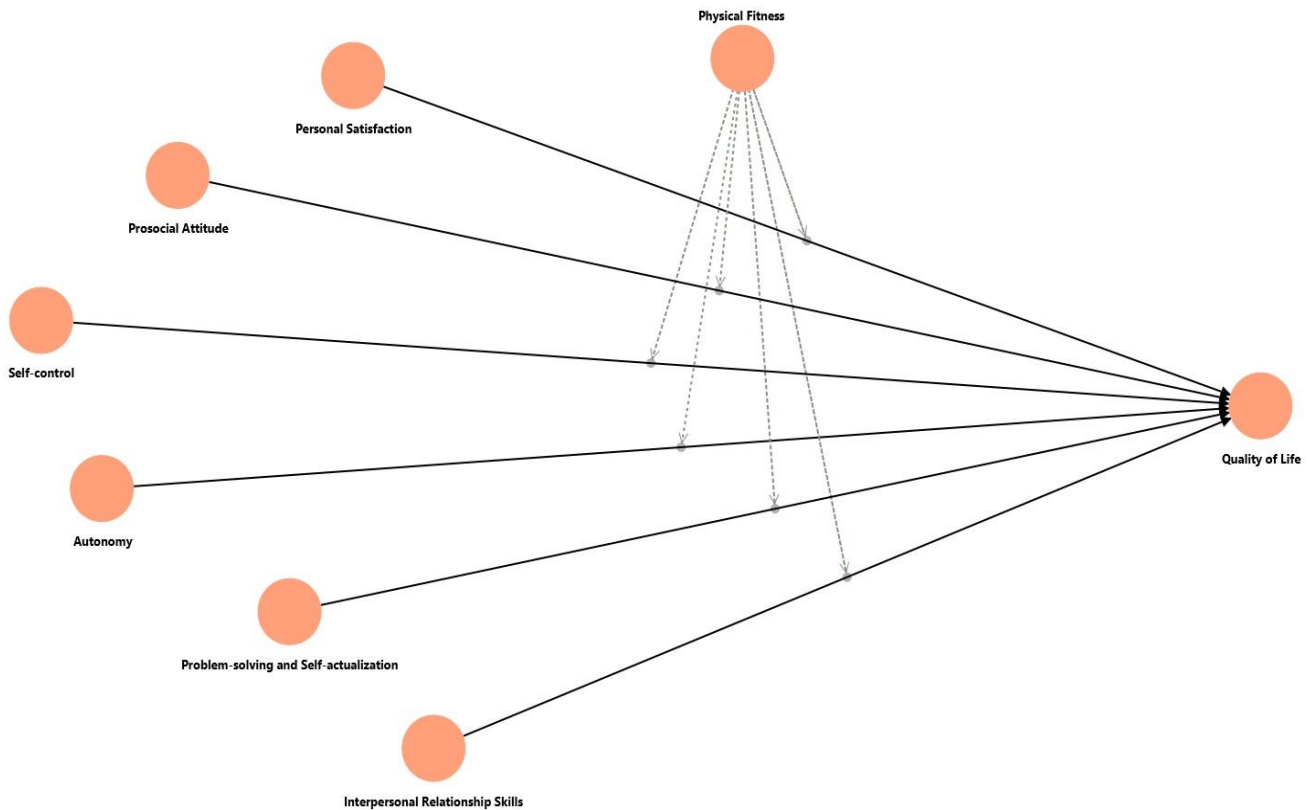
Figure 1. The proposed conceptual framework.

3. Materials and methods

3.1. The study constructs

The literature studies served as the basis for the scale that was used in this study to measure the variables. The PMH where measured through 6 factors which are personal satisfaction (measured by 3 items), problem-solving and self-actualization (measured by 4 items), self-control (measured by 3 items), autonomy (measured by 4 items), prosocial attitude (measured by 3 items), and interpersonal relationship skills (measured by 4 items), adopted from Roldán-Merino et al. (2019). Regarding QOL, it was measured by 5 items, which were adopted from Diener et al. (1985). As for physical fitness, it was measured by the scale adopted from Marsh et al. (1994), which focus on 4 factors (Muscular strength, Flexibility, Body Composition, and Cardio-respiratory fitness). The validity of selecting this scale is supported by the fact that all variable scales demonstrated high reliability, with values exceeding 0.822.

3.2. Research population and sampling

University students with disabilities and diabetes are the target population for the study. Based on Veal's recommendations and the lack of government data and statistics on the number of Saudi Arabian university students with diabetes and disabilities (Veal, 2017), the sample size for any study with an unknown population is often calculated with a population of 20,000 people. Using Stephen Sampson's formula, the sample size for this study was determined (Ayad, 2022). yielding 372 replies.

$$n = \frac{Nxp(1-p)}{[[N-1x(d^2 \div z^2)] + p(1-p)]}$$

In this case, "*z*" stands for the degree of confidence (95%), "*n*" denotes the sample size, "*N*" refers to the population size, and "*p*" indicates the probability distribution.

3.3. Data collection

Students' self-administered questionnaires were used in the study's quantitative methodology to gather primary data. A panel of senior students with disabilities and diabetes and a group of academics examined and modified the questionnaire. In April and May of 2024, 490 students received it. In the end, 468 completed surveys (response rate of 95.5%) were received and subjected to statistical analysis. Because of their excellent connections to numerous Saudi Arabian university disability support services departments, the authors were able to obtain a high response rate, which helped in reaching this number of students with disabilities and diabetes and distributing the questionnaire to them. Great care was taken when distributing the questionnaires that the sample of students belonged to a variety of academic programs. Furthermore, to our commitment to ethical considerations towards the students participating in the survey, by give them the freedom to express their opinions, preserving their right to the confidentiality of their personal data, and protecting them from any potential harm or unjustified pressure. The questionnaire is structured into four sections to address the study's objectives. The first section gathers demographic data, while the subsequent three sections focus on the main three variables of the study: positive mental health (with 6 sub-factors), quality of life, and physical fitness. Respondents to the questionnaire evaluated all items for each variable using a 5-point Likert scale.

3.4. Data analysis techniques

The analysis of descriptive data and the exploration of the sample's demographic characteristics were carried out using Excel 2010 and SPSS version 24. Additionally, structural equation modeling (PLS-SEM version 4.1.0.6) was employed to tests of the research hypotheses and an investigation of the correlations between all variables.

4. Results

4.1. The respondents' characteristics

The authors were very careful to ensure that there was diversity among the study sample. Of the 468 completed responses, 249 (53.2%) were male and 219 (46.8%) were female. Additionally, 85.2% of the sample, or most of the respondents, were under the age of 21. The universities whose students received the questionnaire, were chosen according to their locations, and each university received roughly the same amount of questionnaires. This strategy was intentional to guarantee that the study sample included respondents from every area of the Kingdom of Saudi Arabia (North, South, Central, West, and East of the Kingdom). The percentage of students at each university varied, ranged from 9.8% at Tabuk University, which was the lowest, to 22.4% at King Faisal University. Refer to **Table 1** for details. Based on the data mean

values, which ranged from 3.2 to 3.88, and the standard deviation scores, which ranged from 0.984 to 1.124, it was identified that the data was more dispersed and less intense than its mean value. Furthermore, skewness and kurtosis values did not exceed ±2, indicating support for univariate normality (Bryman and Cramer, 2012).

Table 1. Respondents' demographic features.

Profile		*N*	Frequencies	Percent
University	KFU		105	22.4%
	KSU		86	18.4%
	KAU	468	82	17.5%
	UQU		88	18.8%
	UT		46	9.8%
	Jazan University		61	13.1%
Disciplines	Medicine		48	10.3%
	Pharmacy		42	9%
	Engineering		47	10%
	Computer Sciences and Information Technology		56	12%
	Agricultural and Food Sciences	468	44	9.4%
	Business		52	11.1%
	Arts		36	7.7%
	Law		42	9%
	Tourism		54	11.5%
	Education		47	10%
Gender	Male	468	249	53.2%
	Female		219	46.8%
Age	Below 21 Years		399	85.3%
	21–below 25 Years	468	58	12.4%
	25 Years and above		11	2.3%
Students' Height	145–170 cm	468	413	88.2%
	171 cm and more		55	11.8%
Students' Weight	45–64 kg		319	68.2%
	65–84 kg	468	89	19%
	85 kg and more		60	12.8%

4.2. Measurement model (outer model)

4.2.1. Convergent validity

Convergent validity was evaluated to verify the construct reliability and validity of the model. The results showed that all items' reliability was greater than 0.7, satisfying the Hair et al. recommended threshold (Hair Jr et al., 2017). Furthermore, all study variables' composite reliability (CR) was greater than 0.7, meeting the standards set forth by Bryman and Cramer (2012) and Hair et al. (2014). Additionally, all variables had Average Variance Extracted (AVE) values larger than 0.5, in accordance with Fornell and Larcker's recommendation (Fornell and Larcker, 1981).

These results show that the model is valid and dependable. For more details, see **Table 2**.

Table 2. Measurement model-convergent validity.

"Variables"	"Items"	"Loading"	"α"	"AVE"	"CR"
Personal Satisfaction (Roldán-Merino et al., 2017)	PS1	0.952			
	PS2	0.847	0.901	0.836	0.902
	PS3	0.941			
Prosocial Attitude (Roldán-Merino et al., 2017)	PA1	0.881			
	PA2	0.872	0.890	0.816	0.963
	PA3	0.956			
Self-control (Roldán-Merino et al., 2017)	SC1	0.940			
	SC2	0.842	0.890	0.821	0.889
	SC3	0.934			
Autonomy (Roldán-Merino et al., 2017)	AU1	0.850			
	AU2	0.936			
	AU3	0.941	0.857	0.705	0.932
	AU4	0.850			
Problem-solving and self-actualization (Roldán-Merino et al., 2017)	PSSA1	0.798			
	PSSA2	0.798			
	PSSA3	0.873	0.822	0.658	0,819
	PSSA4	0.876			
Interpersonal relationship skills (Roldán-Merino et al., 2017)	IRS1	0.730			
	IRS2	0.912			
	IRS3	0.896	0.888	0.753	0.906
	IRS4	0.919			
Physical Fitness (Marsh et al., 1994)	PHF1	0.923			
	PHF2	0.874			
	PHF3	0.884	0.924	0810	0.951
	PHF4	0.919			
Quality of Life (Diener et al., 1985)	QL1	0.846			
	QL2	0.941			
	QL3	0.926	0.943	0.817	0.945
	QL4	0.873			
	QL5	0.929			

4.2.2. Discriminant validity

To bolster confidence in the results and conclusions of the model, we verified that every model variable is different from every other one, proving the discriminant validity of Kock's model (Kock, 2020). The cross-loadings approach and the Fornell-Larcker criterion were used to accomplish this. For more details, see **Tables 3** and **4** and **Figure 2**.

Table 3. Fornell-Larcker criterion.

Variables	PS	PA	SC	AU	PS-SA	IRS	PH-F	Q-L
PS	**0.915**							
PA	0.602	**0.904**						
SC	0.522	0.634	**0.906**					
AU	0.446	0.556	0.762	**0.840**				
PS-SA	0.422	0.682	0.584	0.462	**0.811**			
IRS	0.544	0.419	0.429	0.432	0.533	**0.868**		
PH-F	0.448	0.662	0.444	0.582	0.652	0.622	**0.9**	
Q-L	0.518	0.528	0.548	0.684	0.488	0.451	0.683	**0.904**

* The bolded values indicate the square root of the average variance extracted.

Table 4. Discriminant validity-Cross Loading.

	PS	PA	SC	AU	PS-SA	IRS	PH-F	Q-L
PS1	**0.952**	0.722	0.668	0.771	0.621	0.423	0.722	0.567
PS2	**0.847**	0.422	0.654	0.692	0.546	0.492	0.432	0.342
PS3	**0.941**	0.554	0.418	0.564	0.784	0.773	0.564	0.646
PA1	0.706	**0.881**	0.520	0.522	0.546	0.712	0.528	0.522
PA2	0.487	**0.872**	0.534	0.533	0.479	0.495	0.522	0.445
PA3	0.629	**0.956**	0.636	0.649	0.696	0.487	0.534	0.533
SC1	0.566	0.706	**0.940**	0.566	0.553	0.239	0.576	0.232
SC2	0.487	0.740	**0.842**	0.675	0.534	0.732	0.444	0.533
SC3	0.479	0.495	**0.934**	0.463	0.528	0.522	0.445	0.495
AU1	0.444	0.632	0.564	**0.850**	0.522	0.611	0.499	0.528
AU2	0.542	0.682	0.766	**0.936**	0.329	0.651	0.446	0.675
AU3	0.444	0.667	0.649	**0.941**	0.422	0.683	0.542	0.602
AU4	0.428	0.522	0.711	**0.850**	0.731	0.444	0.572	0.528
PSSA1	0.529	0.549	0.422	0.486	**0.798**	0.438	0.339	0.566
PSSA2	0.438	0.622	0.712	0.529	**0.798**	0.644	0.656	0.548
PSSA3	0.555	0.654	0.712	0.541	**0.873**	0.622	0.614	0.629
PSSA4	0.634	0.611	0.499	0.642	**0.876**	0.533	0.466	0.436
IRS1	0.562	0.544	0.529	0.611	0.517	**0.730**	0.651	0.413
IRS2	0.622	0.652	0.588	0.556	0.589	**0.912**	0.722	0.597
IRS3	0.644	0.631	0.622	0.568	0.526	**0.896**	0.486	0.688
IRS4	0.711	0.666	0.619	0.721	0.698	**0.919**	0.744	0.734
PHF1	0.714	0.645	0.788	0.651	0.609	0.712	**0.923**	0.764
PHF2	0.588	0.532	0.633	0.682	0.586	0.589	**0.874**	0.444
PHF3	0.618	0.522	0.577	0.591	0.644	0.582	**0.884**	0.611
PHF4	0.598	0.588	0.677	0.619	0.712	0.555	**0.919**	0.633
QL1	0.619	0.622	0.761	0.555	0.588	0.449	0.568	**0.846**
QL2	0.711	0.623	0.639	0.618	0.644	0.689	0.588	**0.941**
QL3	0.551	0.582	0.712	0.682	0.644	0.719	0.588	**0.926**
QL4	0.612	0.689	0.555	0.598	0.648	0.685	0.711	**0.873**
QL5	0.612	0.583	0.567	0.683	0.721	0.713	0.688	**0.929**

As suggested by Fornell and Larcker (Fornell and Larcker, 1981), and Hair et al. (2017), the presented results in **Table 3** demonstrate that each variable explains the variance of its components more effectively than other factors that make up the proposed model. This supports the discriminant validity of the model.

The presented results in **Table 4** demonstrate that each item loads more strongly on its own constructions than it does on any other variable construct in the proposed model. This result fully supports the model's discriminant validity, which Chin (2009) has validated.
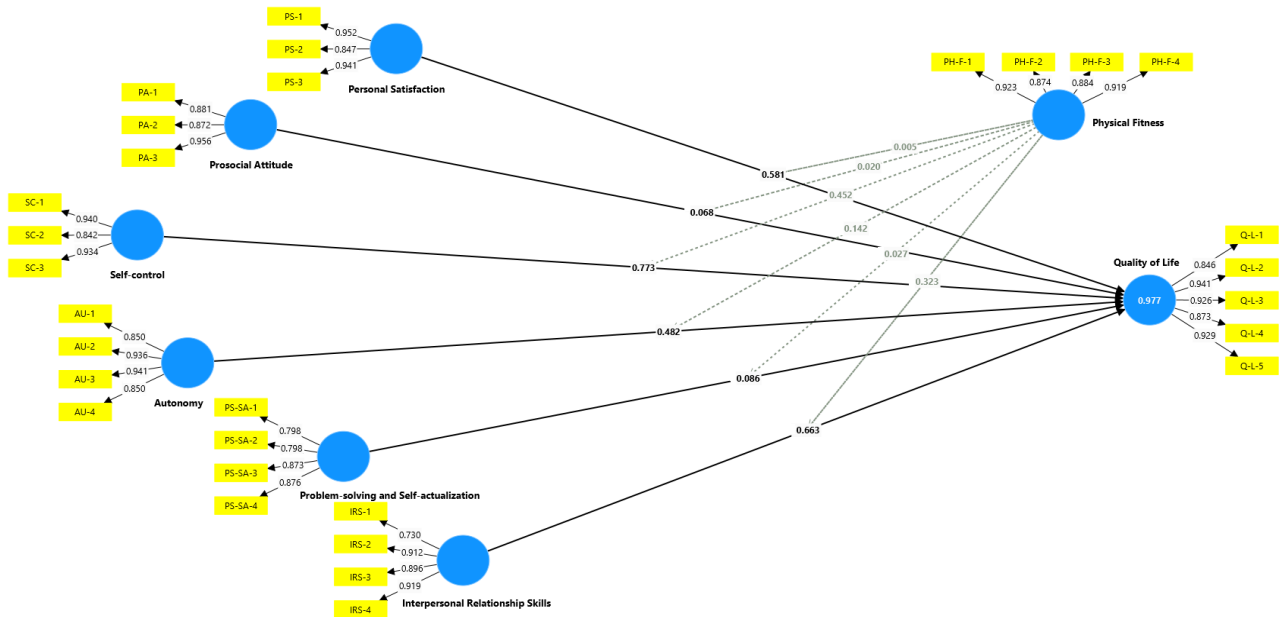
Figure 2. Measurement model.

4.3. Structural Model (Inner model)

4.3.1. Coefficient of determination (R^2)

The coefficient of determination (R^2) was employed to assess the proposed model's predictive power of the independent variable with respect to the variance ratio that occurs in the dependent variable. The presented results at **Table 5** illustrate how the independent variables "PS," "PA," "SC," "AU," "PS-SA," and "IRS" cause a significant variation on the dependent variable "Q-L," exceeding the Chin recommended cut-off threshold, with a result of above 0.67(Chin, 1998).

Table 5. Coefficient of Determination (R^2) for the Endogenous Latent Variables.

Variable	R^2	Level
Quality of Life "Q-L"	0.977	High

4.3.2. Effect size (f^2)

Effect size (f^2) analysis was used to quantify the relative contributions of each exogenous latent variable to the endogenous latent variable at the proposed model. The presented results at **Table 6** demonstrate how each of the exogenous latent variables in the proposed model, "PS," "PA," "SC," "AU," "PS-SA," and "IRS,"

affected the endogenous latent variable, "Q-L," with the effect sizes ranging from small to big, in accordance with Cohen's proposal (Cohen, 1988).

Table 6. Results of the effect size (f^2) among variables.

Variables	Q-L	Effect
PS	0.210	Medium
PA	0.14	Small
SC	0.512	Large
AU	0.171	Medium
PS-SA	0.23	Medium
IRS	0.176	Medium

4.3.3. Goodness of fit of the model (GoF)

At the level of measurement, structural, and overall model performance, the goodness of fit test was conducted to make sure that the proposed model of this study is regarded as a global fit measure model, According toChin(Chin, 2009):

$$GoF = \sqrt{R^2 \times AVE}$$

$$GoF = 0.944$$

It can be concluded that the goodness of fit of the proposed model used in this study is sufficiently large to be deemed sufficiently valid for a global PLS model based on the recommended criteria of Wetzels et al. (2009) and the GoF test result.

4.3.4. Assessment of hypotheses "significance of path coefficients"

To assess how well the proposed theoretical model compatible with the primary data, the test of path coefficients significance was performed. Below is a summary of every hypothesis test result. For more details, see **Table 7** and **Figures 3 and 4**.

Table 7. Path coefficient test results.

Tested Hypothesis	Std.-Beta	Std.-Error	*T*-value	*P*-values	Results
H1: Personal Satisfaction → Quality of Life	0.581	0.029	20.034	0.046	Supported
H2: Prosocial Attitude → Quality of Life	0.068	0.056	1.214	0.000	Supported
H3: Self-control → Quality of Life	0.773	0.091	8.494	0.000	Supported
H4: Autonomy → Quality of Life	0.482	0.108	4.462	0.020	Supported
H5: Problem-Solving and Self-Actualization → Quality of Life	0.086	0.036	2.388	0.018	Supported
H6: Interpersonal Relationship Skills → Quality of Life	0.663	0.031	21.387	0.028	Supported
H7: Physical Fitness x Personal Satisfaction → Quality of Life	0.005	0.002	2.5	0.040	Supported
H8: Physical Fitness x Prosocial Attitude → Quality of Life	0.020	0.018	1.111	0.003	Supported
H9: Physical Fitness x Self-control → Quality of Life	0.452	0.053	8.528	0.032	Supported
H10: Physical Fitness x Autonomy → Quality of Life	0.142	0.069	2.057	0.040	Supported
H11: Physical Fitness x Problem-Solving and Self-Actualization → Quality of Life	0.027	0.013	2.076	0.003	Supported
H12: Physical Fitness x Interpersonal Relationship Skills → Quality of Life	0.323	0.031	10.419	0.003	Supported

The structure equation model results (**Tables 6** and **7**) and the 12 hypotheses proposed by this study are shown in **Figure 1**. As demonstrated by **Figures 3** and **4**, "PS" positively and significantly influences "QOL" [Effect size = 0.224; Std.-Beta = 0.581; *P*-value = 0.046],"PA" has a direct impact on "QOL" that is both positive and significant [Effect-size = 0.244; Std.-Beta = 0.068; *P*-value = 0.000], also "SC" has a direct impact that is both positive and significant [Effect-size = 0.425; Std.-Beta = 0.773; *P*-value = 0.000]. In the same context, "Au" has a direct impact that is both positive and significant [Effect-size = 0.410; Std.-Beta = 0.482; *P*-value = 0.020]. Additionally, "PS-SA" shows a direct impact that is both positive and significant [Effect-size = 0.140; Std.-Beta = 0.086; *P*-value = 0.018], and "IRS" shows a direct impact that is positive and significant [Effect-size = 0.286; Std.-Beta = 0.663, *P*-value = 0.028].Therefore, all of the direct impacts hypothesis (H1, H2, H3, H4, H5, and H6) were shown to be true and received support.
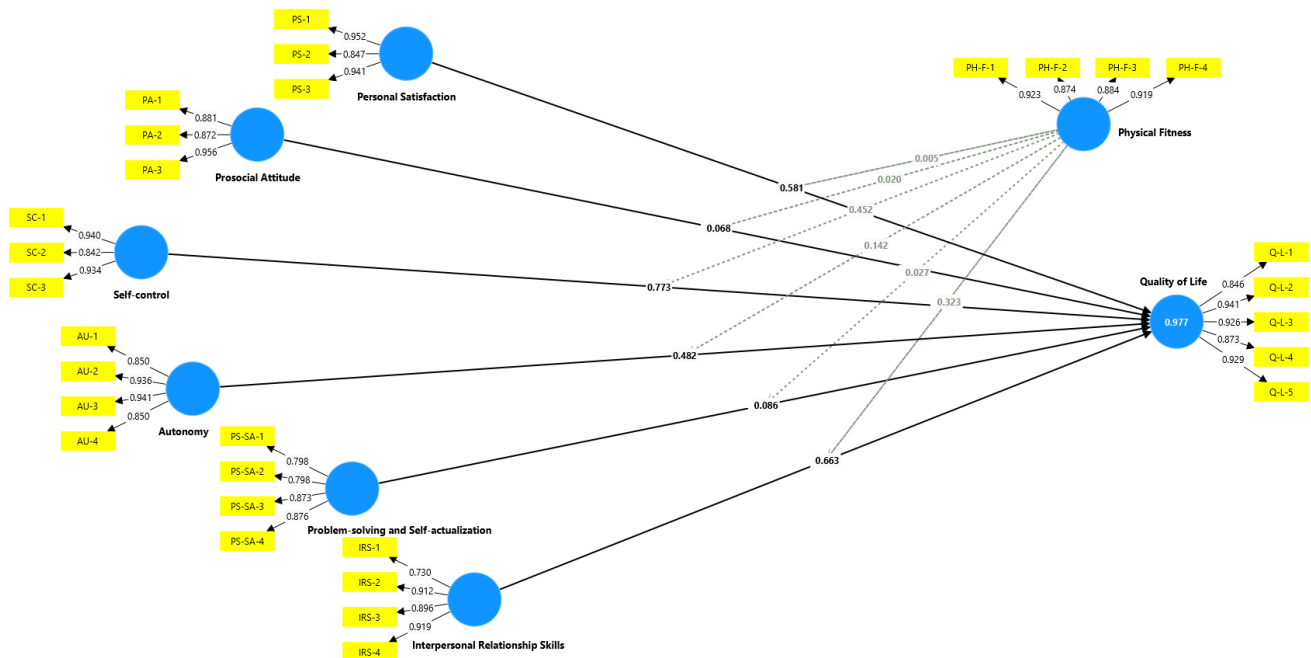

Figure 3. The final proposed model of the study.

As for the indirect relationships between the study variables, "PH-F" shows a moderating effect on the relationship between "PS" and "QOL" [Mod.-Effect-Size = 0.005 and *P*-value = 0.040], between "PA" and "QOL" [Mod.-Effect-Size = 0.020 and *P*-value = 0.003], between "SC" and "QOL" [Mod.-Effect-Size = 0.452 and *P*-value = 0.032], between "AU" and "QOL" [Mod.-Effect-Size = 0.142 and *P*-value = 0.040], between "PS-SA" and "QOL" [Mod.-Effect-Size = 0.027 and *P*-value = 0.003], and between "IRS" and "QOL" [Mod.-Effect-Size = 0.323 and *P*-value = 0.003]. Consequently, as every moderating relationship was significant, the hypotheses H7, H8, H9, H10, H11, and H12 were accepted. See **Figure 4**.
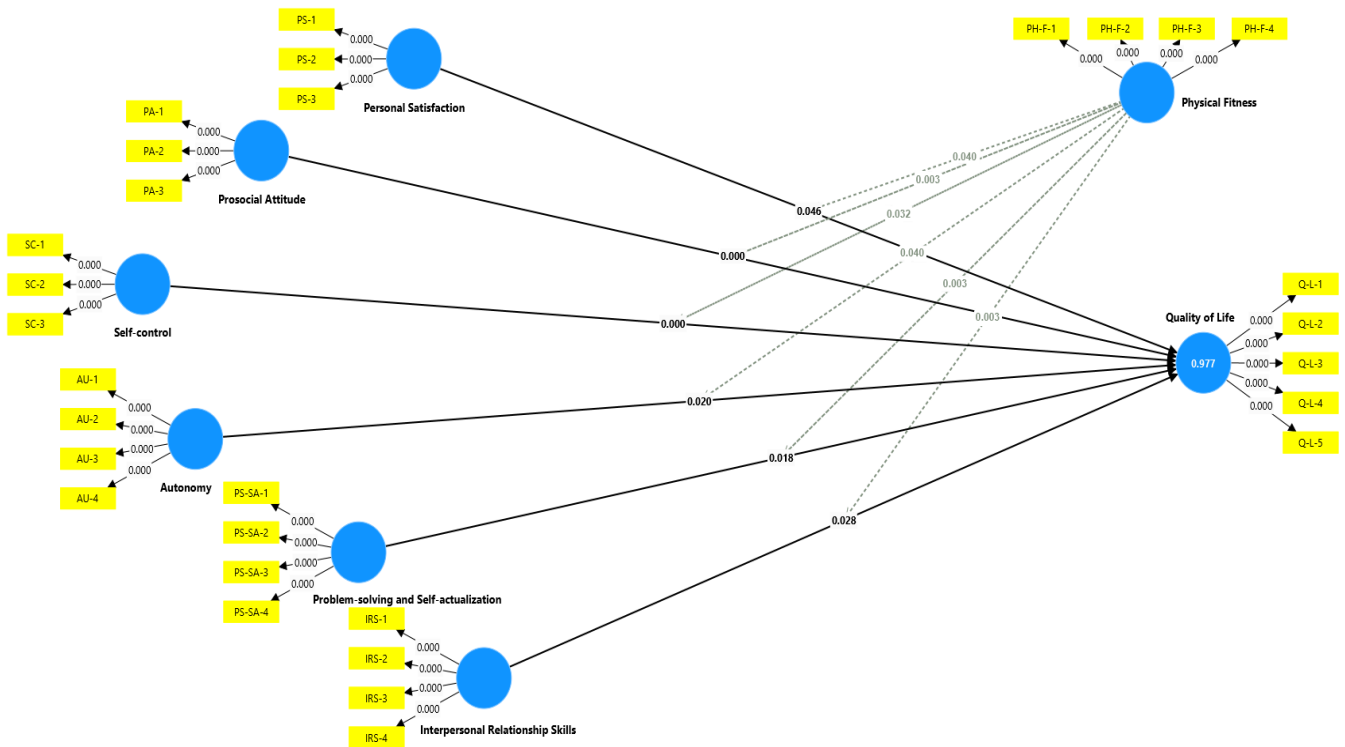
Figure 4. Significance of path coefficients.

5. Discussion and implications

Health (PMH) and Quality of life (QOL). This research aimed to determine the important factors that influence the academic life quality of Students with Disabilities (SWD) and Diabetes at the Saudi university level. This study focuses on two aspects of the relationships: the direct association between personal satisfaction and Quality of life (QOL); prosocial attitude and Quality of life (QOL); self-control and Quality of life (QOL); autonomy and Quality of life (QOL); problem-solving and self-actualization and Quality of life (QOL); interpersonal relationship skills and Quality of life (QOL).

In addition our research aimed to explore: (1) the moderation effect of physical fitness on the relationship between personal satisfaction and Quality of life (QOL); (2) the moderation effect of physical fitness on the relationship between prosocial attitude and Quality of life (QOL); (3) the moderation effect of physical fitness on the relationship between self-control and Quality of life (QOL); (4) the moderation effect of physical fitness on the relationship between autonomy and Quality of life (QOL); (5) the moderation effect of physical fitness on the relationship between problem-solving and self-actualization and Quality of life (QOL); (6) the moderation effect of physical fitness on the relationship between inter personal relationship skills and Quality of life (QOL).

The findings of this study indicate that PMH has a positive direct impact on quality of life. Our findings align with previous empirical studies (Nobre et al., 2022; Vaingankar et al., 2020). These studies show that students with impairments who are confident in their skills are more likely to have a higher quality of life (Tafoya and Aldrete-Cortez, 2019). Furthermore, personal qualities can influence how people deal with obstacles and feel satisfied. Furthermore, the way people handle obstacles and

find fulfillment in their lives can be influenced by their personal traits. SWD, however, have particular difficulties because of their physical restrictions, which can make it challenging them to engage in the university events. This could make them feel frustrated and alone, which could lower their self-esteem. As a result, the availability of support services at universities can have a substantial impact on a student's well-being.

Additionally, the outcomes of this study indicate that a prosocial attitude and self-control have a direct impact on quality of life. These findings are congruent with those from earlier research investigations (Cobb-Clark et al., 2022). Within the context of a student's impairment, prosocial activities can promote beneficial connections with peers, instructors, and relatives, thereby improving overall well-being (Berkman and Glass, 2000). Furthermore, excellent self-control can help the students reduce stress and anxiety, resulting in enhanced mental health.

The results of this study support the positive direct association between autonomy, problem solving, self-actualization, and quality of life (QOL) for SWD, which is consistent with the findings of earlier studies (Ahn and Kim, 2022). Students with disabilities are empowered via autonomy, problem solving, and self-actualization, allowing students an awareness of control and agency over their lives. This study indicates that higher levels of autonomy, problem-solving abilities, and self-actualization have been linked to better mental and emotional health. Universities could design inclusive classrooms that assist students with disabilities and offer chances for their academic development.

The link between interpersonal connection skills and QOL for SWD is complex and multifaceted. While problem solving and self-actualization might improve well-being, the outcomes of this study show that interpersonal connection skills and QOL are positively related. This research suggests that interpersonal connection skills are critical for a student's quality of life (QOL). These skills include effective communication and social engagement. Building up these skills in students with disabilities can have a significant impact on their quality of life. On the other hand, communication difficulties may affect how well students with impairments engage with others.

This study's findings show that physical fitness moderates and improves the relationship between PMH variables (personal satisfaction, prosocial attitude, self-control, autonomy, problem solving and self-actualization, and interpersonal relationship skills) and QOL. These findings highlight the significance of physical fitness in promoting excellent educational outcomes and PMH. A few previous studies have investigated the relationship between physical fitness and PMH variables (Appelqvist-Schmidlechner et al., 2020; Precht et al., 2023; Tamminen et al., 2020). This is despite the fact that there is a strong correlation between quality of life, student with disabilities behavior, and their apparent academic ability. As a result, high levels of physical fitness increase personal satisfaction and prosocial attitude, which improves prospect quality of life. Therefore, better physical fitness can result in an improved perspective on their bodies and higher trust in one's physical ability. This improved physical fitness can encourage students to get involved in a variety of activities, manage problems, and, ultimately, have a higher quality of life. However,

the degree of this moderation will most likely be determined by the student's individual condition and circumstances.

Our findings indicate that physical fitness mediates and improves the relationship between self-control, autonomy, problem solving, self-actualization, and quality of life (Perez-Sousa et al., 2020). This conclusion adds to the research findings on the context of disabled people (Perez-Sousa et al., 2018). Thus, consistent physical activity can help kids regulate their emotions and behaviors, so enhancing their self-control. Furthermore, physical fitness can provide pupils a sense of success while also helping them develop problem-solving abilities and cultivate autonomy. Universities could provide adaptive physical activities that are suited for students of various capacities. Furthermore, institutions might offer assistance and encouragement to students who are hesitant to engage in physical activity.

This study's findings contribute to the current literature by reporting novel results. In this study, we aimed to understand how physical fitness moderates the link between interpersonal relationship skills and QOL. This study's findings demonstrate that physical fitness is crucial to improving the link between interpersonal relationship skills and QOL (Perez-Sousa et al., 2018). A single, moderate degree of physical activity has a substantial impact on the ability of students to integrate into their educational environments as well as engage in social activities. This suggests that universities should provide more physical education courses that are inclusive and available to all students. Furthermore, institutions should encourage students to participate in physical activities that might help them socialize and develop their skills. Furthermore, it is strongly advised that universities should develop and implement policies ensuring students have access to health and wellness programs, thereby reducing barriers to participating in physical activities. Policies that are effective must include psychological support and academic adjustments to meet the varied requirements of students with disabilities.

Universities should also engage local communities in the creation of policies that can improve the efficacy of inclusive strategies. This will help students with disabilities to being able to get their full rights in the public well-being infrastructure.

6. Conclusion, limitations and future research

This study investigated the direct effects of PMH factors on quality of life (QOL). We collected data online via a self-reported questionnaire and received valid responses from 490 students. To analyze the gathered data, we used Excel 2010, SPSS version 24, and PLS-SEM version 4.1.0.6. The findings of this study demonstrate that personal satisfaction, prosocial attitude, self-control, autonomy, problem solving, self-actualization, and interpersonal connection skills all have a direct impact on quality of life (QOL). Furthermore, the study's findings show that physical fitness increases and moderates the relationship between PMH elements and QOL. To evaluate this study's model in two unique groups or in a different setting (people, industry, or nation), additional research can use another moderating factors such as gender and student year of study, as well as a multiple group analysis.

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