

**A STRUCTURAL EQUATION MODEL OF PHYSICAL  
ACTIVITY, PSYCHOLOGICAL FACTORS, AND LIFE  
SATISFACTION AMONG HEALTH SCIENCES  
STUDENTS IN HEALTH CAMPUS, UNIVERSITI SAINS  
MALAYSIA**

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**UNIVERSITI SAINS MALAYSIA**

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MALAYSIA**

**by**

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## LIST OF ABBREVIATIONS AND SYMBOLS

IPAQ-SF	The International Physical Activity Questionnaire Short Form
BCS	Body-Compassion Scale
SCS-SF	Self-Compassion Scale-short form
PSS	Perceived Stress Scale
SWLS	Satisfaction with Life Scale
SWB	Subject well-being
PA	Physical activity
BC	Body-compassion
SC	Self-compassion
SL	Stress Level
LS	Life satisfaction
SCO	Self-compassionate attitude
SCR	Self-critical attitude
DEF	Defusion
CH	Common Humanity
ACC	Acceptance
PSE	Perceived Self-Efficacy
PH	Perceived Helplessness
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index

TLI	Tucker-Lewis Index
RMSEA	Root Mean Square Error of Approximation
SRMR	Standardized Root Mean Square Residual
CI	Confidence Interval
CR	Composite Reliability
SD	Standard Deviation
SE	Standard Error
SEM	Structural Equation Modelling
WHO	World Health Organization
MI	Modification Index
ML	Maximum Likelihood
MLR	Robust Maximum Likelihood
MLM	Maximum Likelihood estimation with Robust standard errors
USM	Universiti Sains Malaysia
$b$	Regression Coefficient
$\beta$	Standardized Path Regression Coefficient
df	Degree of Freedom
$m$	Number of Observed Variables
$n$	Number of Participants
$r$	Correlation Coefficient
$\chi^2$	Chi-square
$p$	P-Value

**Model Persamaan Struktur Aktiviti Fizikal, Faktor Psikologi, dan Kepuasan  
Hidup dalam Kalangan Pelajar Sains Kesihatan di Kampus Sihat, Universiti  
Sains Malaysia**

**ABSTRAK**

**Pengenalan:** Globalisasi yang semakin pesat dan tekanan sosial yang berterusan telah membawa kepada peningkatan isu kesihatan mental, khususnya dalam kalangan remaja. Aktiviti fizikal telah diterima umum sebagai faktor penting untuk memelihara kesihatan fizikal dan mental, telah terbukti berkesan dalam mengurangkan kemurungan, kebimbangan dan meningkatkan kesejahteraan. Walau bagaimanapun, kadar penyertaan aktiviti fizikal dalam kalangan pelajar universiti masih rendah, dan keadaan kesihatan mental mereka semakin merosot. Kajian ini mengambil kepuasan hidup sebagai pemboleh ubah hasil utama, untuk meneroka mekanisme pengaruh aktiviti fizikal dan faktor psikologi (belas kasihan sendiri, belas kasihan tubuh, stres yang dirasakan) mempengaruhi kepuasan hidup. **Objektif:** Kajian ini bertujuan mengkaji hubungan struktur antara aktiviti fizikal, belas kasihan sendiri, belas kasihan tubuh, stres yang dirasakan dan kepuasan hidup dalam kalangan pelajar sarjana muda sains kesihatan di Kampus Kesihatan Universiti Sains Malaysia. **Kaedah:** Kajian keratan rentas ini menggunakan borang soal selidik sendiri. Seramai 300 pelajar siswa direkrut menggunakan persampelan mudah. Analisis faktor pengesahan (CFA) dijalankan untuk mengesahkan kesahan dan kebolehpercayaan instrumen. Disebabkan sebahagian peserta memilih "Tidak Pasti" dalam soal selidik aktiviti fizikal, nilai kesetaran

metabolik (MET) tidak dapat dikira, maka hanya 240 set data lengkap digunakan untuk analisis Model Persamaan Struktur (SEM) untuk mengkaji hubungan antara pemboleh ubah. **Keputusan:** Keputusan Analisis Faktor Pengesahan (CFA) menunjukkan bahawa semua instrumen mempunyai kesahan dan kebolehpercayaan yang baik. Semua nilai pemuatan faktor melebihi 0.30, dan indeks kesesuaian model bagi setiap skala memenuhi ambang yang disyorkan ( $CFI > 0.90$ ,  $TLI > 0.90$ ,  $RMSEA < 0.08$ ,  $SRMR < 0.08$ ). Model akhir SEM menunjukkan kesesuaian yang baik ( $CFI=0.989$ ,  $TLI=0.979$ ,  $SRMR=0.032$ ,  $RMSEA=0.033$ ). Analisis menunjukkan aktiviti fizikal tidak secara langsung meramalkan kepuasan hidup ( $\beta = 0.081$ ,  $p = 0.161$ ), tetapi mempunyai kesan tidak langsung yang positif melalui pengurangan rasa tidak berdaya. Dalam dimensi belas kasihan tubuh, "penerimaan" secara langsung meningkatkan kepuasan hidup, manakala "defusi" mempunyai kesan tidak langsung melalui pengurangan tekanan; "kemanusiaan sejagat" tidak menunjukkan kesan yang signifikan. Sikap belas kasihan sendiri meningkatkan kepuasan hidup secara tidak langsung melalui peningkatan penerimaan tubuh, manakala sikap mengkritik diri sendiri mempengaruhi kepuasan hidup melalui pengurangan rasa ketidakberdayaan dan peningkatan penerimaan tubuh. Tahap tekanan sebagai konstruk menyeluruh menunjukkan kesan negatif yang signifikan terhadap kepuasan hidup. **Kesimpulan:** Kajian ini menunjukkan bahawa pengaruh aktiviti fizikal terhadap kepuasan hidup dicapai secara tidak langsung melalui pengurangan stres yang dirasakan, dan bukan melalui kesan langsung. Selain itu, meningkatkan penerimaan tubuh dan sikap belas kasihan sendiri yang positif memainkan peranan penting dalam meningkatkan kepuasan hidup. Strategi intervensi

masa depan harus mempertimbangkan gabungan aktiviti fizikal dan penyesuaian psikologi, dengan memberi tumpuan kepada pengurangan tekanan dan pembangunan penerimaan diri, untuk mempromosikan kesejahteraan menyeluruh pelajar universiti secara lebih berkesan.

**Kata kunci:** Aktiviti Fizikal; Belas Kasihan Kendiri; Belas Kasihan Tubuh; Stres Yang Dirasakan; Kepuasan Hidup

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SAINS MALAYSIA**

**ABSTRACT**

**Introduction:** With the acceleration of globalization and the continuous increase of social stress, mental health issues are becoming increasingly prominent worldwide, especially among young people. Physical activity is broadly acknowledged as a crucial element for supporting both physical and mental health, proven effective in reducing depression, anxiety, and improving well-being. However, the participation rate in physical activity among university students remains low, and their mental health status is deteriorating. This study focuses on life satisfaction as the primary outcome variable, aiming to explore the mechanisms by which physical activity and psychological factors (self-compassion, body compassion, perceived stress) influence life satisfaction.

**Objective:** This study aims to examine the structural relationships among physical activity, self-compassion, body compassion, perceived stress, and life satisfaction among undergraduate health sciences students at the Health Campus of Universiti Sains Malaysia. **Methods :** This cross-sectional study utilized self-administered questionnaires to gather data, with undergraduate students recruited through convenience sampling. A total of 300 participants were included. Confirmatory Factor Analysis (CFA) was initially performed to confirm the validity and reliability of the

measurement instruments. Due to some participants selecting "Not Sure" in the physical activity questionnaire, it was not possible to calculate the metabolic equivalent (MET) for those cases. As a result, only 240 complete datasets were retained for further analysis. Subsequently, Structural Equation Modeling (SEM) was applied to examine the interrelationships among the study variables. The self-administered questionnaire served as the data collection tool throughout the study. CFA was employed to assess and confirm the psychometric properties of the measurement tools, verifying their reliability and validity before advancing to the modeling stage. The "Not Sure" responses to items in the physical activity questionnaire resulted in missing MET scores, leading to the exclusion of incomplete data. Ultimately, 240 complete datasets were used for SEM analysis to model the associations among the variables, focusing on both direct and indirect effects. This combined approach of initial CFA for validation, followed by SEM for modeling, ensured a thorough and methodical analysis of the study data. **Results:** The CFA results showed that all instruments had good validity and reliability. All factor loadings exceeded 0.30, and model fit indices for each scale met recommended thresholds (CFI > 0.90, TLI > 0.90, RMSEA < 0.08, SRMR < 0.08). The final SEM model demonstrated a good fit (Comparative Fit Index=0.989, Tucker-Lewis Index=0.979, Standardized Root Mean Square Residual=0.032, Root Mean Square Error of Approximation=0.033). Analysis showed that physical activity did not directly predict life satisfaction ( $\beta = 0.081$ ,  $p = 0.161$ ), but had a positive indirect effect through reducing feelings of helplessness. In the dimensions of body compassion, "acceptance" directly improved life satisfaction, while "defusion" had an indirect effect

through stress reduction; “common humanity” did not show a significant effect. Self-compassion positively influenced life satisfaction indirectly through enhanced body acceptance, while self-criticism affected life satisfaction by reducing helplessness and increasing body acceptance. The overall stress level showed a significant negative impact on life satisfaction. **Conclusion :** This study indicates that the effect of physical activity on life satisfaction is achieved indirectly through the reduction of perceived stress rather than a direct effect. Additionally, improving body acceptance and fostering positive self-compassion play a crucial role in enhancing life satisfaction. Future intervention strategies should consider integrating physical activity with psychological adjustment, focusing on stress reduction and the development of self-acceptance, to more effectively promote the overall well-being of university students.

**Keywords:** Physical Activity; Self-Compassion; Body Compassion; Perceived Stress; Life Satisfaction.

## CHAPTER 1: INTRODUCTION

### *1.1 Background*

With the accelerated process of globalization and the increasing pressures of modern society, people are subjected to increasing psychological burdens in coping with their daily lives, work, and interpersonal relationships (Solomon, 2024). Research by the World Health Organization shows that mental health problems such as anxiety and depression are on a significant rise globally, especially among the younger population, where as many as 64% of young people are at risk of depression and report symptoms of depression or anxiety more frequently than adults, with prevalence rates increasing by 30% to 80%.(World Health Organization, 2023).

This global mental health problem is also affecting Malaysia, especially among young people and university students, who are experiencing increased mental stress. For instance, a 2019 study found that the prevalence of depression, anxiety, and stress among undergraduate students at a public university in Malaysia was 21%, 50%, and 12%, respectively(Amir Hamzah et al., 2019). The increase in these rates has been associated with academic stress, past medical history, insufficient family support, and differences in lifestyle. Recent studies indicate a marked rise in the occurrence of moderate to severe depression, anxiety, and stress among Malaysian university students, reaching 53.9%, 66.2%, and 44.6% respectively(Wong et al., 2023). This increase

shows that college students are facing increasing mental health challenges as time progresses.

However, life satisfaction, as an important measure of overall well-being, is strongly influenced by mental health and related psychological factors(Lombardo et al., 2018). Shin and Johnson (1978, p. 478) described life satisfaction as an overall evaluation of a person's life quality based on criteria they select themselves(SHIN AND JOHNSON, 1977). Diener et al. (1985) further state that satisfaction judgments depend on the results of an individual's comparison of his or her situation with the standards he or she considers appropriate. It is worth noting that people's judgment of satisfaction with their current life situation is based on the standards that each sets for himself or herself, rather than externally imposed (Diener et al., 1985). In addition, research has well established that mental health is positively associated with life satisfaction, and students with better mental health often report a higher level of satisfaction with their lives. The authors also noted that different cultural backgrounds also have an impact on mental health and life satisfaction(Tamini, 2009)

Physical activity (PA) is widely recognized as an effective means of promoting physical and mental health. The World Health Organization reports that regular PA has significant physical and mental health benefits, not only in terms of preventing chronic non-communicable diseases but also in terms of reducing depression and anxiety, enhancing brain health, and improving overall well-being (WHO,2024). In addition,

exercise increases the production of endorphins, a neurotransmitter associated with positive emotions and feelings of well-being, which helps improve overall mood and is an effective way to alleviate stress and feelings of anxiousness. It can also contribute to enhance the quality of sleep, self-esteem, and social support, leading to significant improvements in mental health(Hossain et al., 2024). In spite of the well-documented merits of PA, close to one-third (31%) of the global adult populace—roughly 1.8 billion individuals—remain sedentary, as evidenced by a recent inquiry(Strain et al., 2024). Of course, the Malaysian population faces the same problem, especially among university students, where a national survey conducted by the Institute for Public Health (IPH) in 2019 revealed that approximately one in four individuals aged 16 and above do not engage in regular PA, with students comprising 39% of this group. (Institute for Public Health (IPH), 2019). Although PA itself plays an important role in enhancing mental health, an individual's mental health is also moderated and mediated by a range of psychological factors. These factors include self-compassion, body compassion, and stress levels. They not only influence individuals' motivation and frequency of participation in PA but also directly or indirectly affect their life satisfaction.

Self-compassion can be understood as directing compassion inward, acknowledging oneself as the recipient of care and attention during times of distress(Neff, 2003). Body Compassion is the care and understanding of the body, applying the core elements of self-compassion (kindness, common humanity, and mindfulness) to the physical self, emphasizing positive mindfulness and acceptance to improve mental health and body-related experiences(Altman et al., 2020). PA impacts self-compassion through direct or

indirect pathways. The literature suggests that PA not only significantly enhances self-compassion but also indirectly influences an individual's self-care by increasing physical compassion. Furthermore, self-compassion is closely related to body compassion, and the two influence each other to promote improved mental health and reduce depression and anxiety(Wong et al., 2021). One study noted that when mental health problems increase, life satisfaction decreases significantly(Fergusson et al., 2015).

Hans Selye, who defined stress as “the body's non-specific response to any demand,” established a broad and foundational understanding of stress in both physiological and psychological terms.” (Fink, 2010, p. 5-6). One study showed that stress not only has an impact on physiological systems (e.g., neurological, endocrine, and immune systems) but also mental health, and that this impact is related to an individual's biological vulnerability and coping patterns(Schneiderman et al., 2005). Especially college students are vulnerable to negative influences due to the pressures they face in various areas such as academics, career planning, and social adaptation. A recent review has shown that stressors among college students are multifactorial in nature, including psychological, academic, biological, lifestyle, social, and economic aspects.(Mofatteh, 2021). PA is widely recognized as an effective measure in dealing with this multifaceted stress. Research shows that vigorous PA is associated with better mental health and lower levels of stress(Vankim & Nelson, 2013). At the same time, lower stress levels were associated with higher life satisfaction(Shi et al., 2015).

College students are the most appropriate subjects for this study because they have easy access to the well-equipped athletic facilities at the university. Nonetheless, PA among university students remains insufficient, mainly due to psychological, emotional and cognitive factors (e.g., lack of time and motivation), as well as environmental factors (Silva et al., 2022). These factors make it difficult for many college students to participate and adhere to PA, which in turn exacerbates mental health problems and leads to decreased life satisfaction.

Considering these realities, this study seeks to investigate ways to enhance college students' life satisfaction by promoting PA and strengthening psychological factors (such as self-compassion, body compassion, and stress levels). Although prior research has highlighted the beneficial effects of PA on mental health, there remains a gap in systematically analyzing the contribution of psychological factors to the link between PA and life satisfaction. This research examines how PA, self-compassion, body compassion, stress levels, and life satisfaction are interconnected, utilizing structural equation modeling (SEM) to clarify the interplay between these variables and the mechanisms by which they influence life satisfaction.

## **1.2 Problem Statement**

Despite the numerous studies that have confirmed the positive effects of PA on physical and mental health, many people are still unable to meet the recommended standards of

PA, resulting in still low individual participation rates (Chekroud et al., 2018; Warburton & Bredin, 2017). A study by Hallal et al. indicates that 31.1% of adults worldwide are physically inactive, while the rate in Southeast Asia is 17.0% (Hallal et al., 2012). It is particularly serious in Malaysia, As outlined by the World Health Organization (WHO) in the Global Status on PA 2022 report, 35% of Malaysian males aged 18 and older, and 43% of females in the same age bracket, do not engage in sufficient PA (WHO, 2022). The latest National Health and Morbidity Survey (NHMS) 2023 likewise indicates that approximately one-third of Malaysian adults remain physically inactive (National Health and Morbidity Survey, 2023). These data show that physical inactivity is widespread globally, especially in Malaysia. However, in addition to the influence of economic, social, and environmental factors, psychological factors play an important role in determining whether or not an individual participates in PA.

Body compassion and self-compassion play an important role in the relationship between PA and life satisfaction. Body Compassion is a relatively new concept proposed by Altman et al. (2017), which aims to bridge the gap between body imagery and self-compassionate conceptualizations. It emphasizes how individuals view their bodies, including aspects of appearance, health, and physical fitness, and promotes positive thinking, kindness, and acceptance of one's own body (Altman et al., 2020). Beadle's (2019) research suggests that individuals with higher levels of body compassion are more inclined to engage in healthful behaviors, such as PA, which further highlights the importance of developing positive, self-accepting body

attitudes(Beadle, 2019).

At the same time, Self-compassion, an important concept in positive psychology, can help individuals adopt a gentle and understanding attitude toward themselves in the face of difficulties. According to Wong et al., a systematic review and meta-analysis found a moderately strong positive association between PA and self-compassion. PA not only directly improves self-compassion, but also indirectly enhances self-compassion by promoting other aspects of mental health (e.g., reducing anxiety and depression)(Wong et al., 2021). Research has shown that positive dimensions of self-compassion (e.g., common humanity and positive thoughts) enhance individuals' subjective well-being and life satisfaction, whereas negative dimensions (e.g., self-criticism, isolation, and over-identification) reduce individuals' subjective well-being and life satisfaction(Çağlayan Mülazım & Eldeleklioğlu, 2016).

Stress level is an important factor in the mental health and life satisfaction of college students. College students face many challenges in the areas of academic, social, and financial pressures, as well as future planning, and high stress levels can lead to anxiety, depression, and a decrease in overall life satisfaction(Athar Javeth, 2018). PA is widely recognized as an effective way to relieve stress, and research has shown that regular PA can help to reduce an individual's stress levels and promote psychological well-being(Salmon, 2001). However, in reality, many college students tend to reduce or even give up PA when facing heavy academic and time management pressures, which may

exacerbate stress accumulation and negatively affect mental health(Mahindru et al., 2023). In addition, stress levels not only influence PA participation, but may also mediate the relationship between PA and life satisfaction, i.e., stress relief may be an important way in which PA enhances well-being and psychological well-being(Seo et al., 2018).

### **1.3 Rationale and Significance of the Study**

University students are facing an alarming increase in mental health problems. Research shows that the prevalence of depression, anxiety, and stress among Malaysian university students is as high as 53.9%, 66.2%, and 44.6%, respectively(Wong et al., 2023), with a significant increase in each of the indicators when compared to the 2019 data (depression 21%, anxiety 50%, and stress 12%)(Amir Hamzah et al., 2019). This trend highlights the growing psychological burden on students and underscores the urgent need for effective interventions to enhance mental health and life satisfaction. Health science students, in particular, face intense academic and clinical demands, making them especially vulnerable to stress and underscoring the need for targeted support.

While extensive research confirms the benefits of PA in alleviating stress, anxiety, and depression, these effects are not limited to direct outcomes but are mediated by various psychological factors, including self-compassion, body compassion, and perceived stress levels. However, limited research has explored how these factors interact and

collectively influence life satisfaction. This study utilizes SEM to systematically examine the complex relationships between PA, psychological factors, and life satisfaction. By constructing an integrated model that captures both direct and indirect pathways, this study provides a deeper understanding of the psychological mechanisms underlying the benefits of PA, thereby addressing gaps in current research and offering new insights into promoting mental health.

On a practical level, the findings will provide higher education institutions and public health policymakers with a scientific foundation for developing effective interventions that encourage PA participation among university students and help them overcome psychological barriers such as high stress levels. This study is particularly relevant for health science students, offering tailored strategies to improve well-being and academic resilience. Furthermore, the findings will offer empirical evidence to support policies from Malaysia's Ministry of Health (MoH) and Ministry of Education (MoE), emphasizing the integration of PA into mental health support systems and promoting the development of long-term health promotion initiatives. By highlighting the interactions between PA, mental health, and life satisfaction, this study aims to raise public awareness of the importance of an active lifestyle and contribute to sustainable mental health among university students.

#### **1.4 Scope of the Study**

The present study emphasizes PA, body-compassion, self-compassion, stress levels, and life satisfaction among undergraduate health sciences students enrolled at Universiti Sains Malaysia (USM) Health Campus during the second semester of the 2024/2025 academic year.

### **1.5 Research Question**

1. Are the Body Compassion Scale (BCS), Self-Compassion Scale Short Form (SCS-SF), Perceived Stress Scale (PSS) , and Satisfaction with Life Scale (SWLS) valid and reliable for assessing body compassion, self-compassion, stress levels, and life satisfaction among undergraduate health sciences students at the Health Campus, USM
2. Is there any significant path relationship among physical activity, body compassion, self-compassion, stress levels, and life satisfaction among undergraduate health sciences students at the Health Campus, USM?

### **1.6 Research Objectives**

#### **1.6.1 General Objective**

To determine the structural relationships between physical activity, body compassion,

self-compassion, stress levels, and life satisfaction among undergraduate health sciences students at the Health Campus, USM.

### **1.6.2 Specific Objectives**

1. To determine the validity and reliability of the BCS, SCS-SF, PSS, and SWLS among undergraduate health sciences students in Health Campus, USM by using confirmatory factor analysis.
2. To examine the path relationship between physical activity, body compassion, self-compassion, stress levels, and life satisfaction among undergraduate health sciences students in Health Campus, USM by using structural equation modeling.

### **1.7 Research hypothesis**

1. The BCS, SCS-SF, PSS, and SWLS are valid and reliable for assessing body compassion, self-compassion, stress levels, and life satisfaction among undergraduate health sciences students in Health Campus, USM by using confirmatory factor analysis.
2. There are significant path relationships among physical activity, body compassion, self-compassion, stress levels, and life satisfaction among

undergraduate health sciences students in Health Campus, USM, by using structural equation modeling.

### 1.8 Operational Definition

For this study, the following definition were applied.

Table 1.1 Operational Definitions

Physical Activity	Engaged in strenuous activity, moderate-intensity activity, walking, and sedentary time in the past seven days.
Body Compassion	The degree to which an individual is compassionate towards their own body, including three dimensions: defusion, common humanity, and acceptance.
Self-Compassion	An individual's attitude towards self-compassion includes six dimensions: self-kindness, self-judgment, common humanity, isolation, mindfulness, and overidentification.
Perceived Stress	The level of stress perceived by an individual over the past month.
Life Satisfaction	An individual's overall perceived judgment of their life satisfaction.

## **CHAPTER 2: LITERATURE REVIEW**

### **2.1 Introduction of the Chapter**

This chapter offers an overview of existing research to build a clear understanding of the current knowledge surrounding the subject under study. The literature review provides a synthesis and evaluation of both empirical and theoretical works that pertain to the topic of interest. Its aim is to assist readers in grasping the body of knowledge accumulated by scholars and researchers. Furthermore, it highlights gaps and contradictions in the current body of knowledge, thereby offering opportunities for future research directions.

The literature review in this chapter is divided into ten sections, systematically examining the psychological mechanisms and theoretical foundations underlying the influence of PA on life satisfaction. Section 3.2 introduces the search terms and databases used for literature selection. Section 3.3 explores the concept and theoretical perspectives of life satisfaction, providing theoretical support for the outcome variable in this study. Section 3.4 analyzes the multi-level positive effects of physical activity on life satisfaction. Sections 3.5 and 3.6 discuss how self-compassion and body compassion, respectively, indirectly influence life satisfaction by affecting psychological regulation and behavioral engagement. Section 3.7 further investigates perceived stress level as a potential mediator between PA and life satisfaction. Section 3.8 outlines the core theories supporting this study. Section 3.9 summarizes the existing

literature and identifies current research gaps. Finally, Section 3.10 integrates previous findings to construct a multiple mediation conceptual framework, aiming to uncover the pathway mechanisms through which PA influences life satisfaction via self-compassion, body-compassion, and stress level.

## **2.2 Search Terms and Databases**

Various databases and search engines, including Google Scholar, PubMed, Web of Science, and Scopus, were employed to locate published journals, dissertations, and books. To perform the literature search, the following keywords were utilized: physical activity, self-compassion, body compassion, stress levels, life satisfaction, students, universities, colleges, and young adults. Boolean operators like "AND" and "OR" were applied in combination with these keywords during the search process. The table illustrates the approach taken to implement the literature search strategy.

Table 2.1: Literature search strategy

	Search Engine			
	Google Scholar	PubMed	Web Of science	Scopus
Using Phrase				
Physical activity and life satisfaction	4,900,000	5709	5521	8287
Self-compassion and body compassion	54,800	454	691	578
Life satisfaction among undergraduate students	2,550,000	1209	368	998
Using Boolean Operators and keywords (examples)				
"Physical activity" AND "life satisfaction"	91,800	567	1267	1474
"Self-compassion" AND "body compassion" AND "stress levels"	24	0	0	0
"life satisfaction" AND "university students"	1	36	101	105

### **2.3 Life Satisfaction: Concept and Theoretical Perspectives**

Life satisfaction refers to an individual's subjective, stable, and cognitive assessment of the overall quality of life based on their criteria (Diener et al., 1985). It is a core component of Subjective Well-Being (SWB), which emphasizes the degree to which individuals are satisfied with their life situation. Fang et al. indicate that life satisfaction is an important indicator of mental health and well-being, reflecting the degree to which an individual achieves his or her life goals and how well he or she adapts to the life environment (Fang et al., 2025).

Regarding the formation mechanism of life satisfaction, scholars have proposed a variety of theoretical frameworks to explain it. SWB theory suggests that life satisfaction, together with positive and negative emotions, constitutes the core of well-being, and that the accumulation of positive emotions enhances an individual's optimistic tendencies and stress resistance, thereby increasing life satisfaction (Diener, 1984). Self-Determination Theory (SDT) suggests that an individual's SWB and life satisfaction are dependent on the degree to which Autonomy, Competence, and Relatedness are satisfied. When these basic psychological needs are satisfied, an individual's life satisfaction increases accordingly (Deci & Ryan, 2000). In addition, several studies have shown that an individual's physical health status, psychological adjustment, and health behaviors may affect his or her life satisfaction, and that physical health and good psychological adjustment often contribute to life satisfaction (Chida &

Steptoe, 2008; Diener & Chan, 2011; Grant et al., 2009).

In addition to the theoretical level of exploration, research has identified several psychological and behavioral variables that play an important role in life satisfaction, such as PA, Self-Compassion, Body-Compassion, and Stress Level. These variables affect an individual's overall evaluation of life through different psychological and physiological mechanisms.

## **2.4 The Role of Physical Activity in Enhancing Life Satisfaction**

PA encompasses any bodily movement generated by skeletal muscles that involves energy use, including casual activities such as walking, cycling, and household chores, as well as structured exercises like running, yoga, and strength training. Engaging in PA supports the prevention and management of chronic diseases, including heart disease, cancer, and diabetes. Additionally, it contributes to reducing symptoms of depression and anxiety, promotes brain health, and improves overall well-being. In recent years, PA has been acknowledged as an essential factor in maintaining physical health and has also been extensively researched for its beneficial effects on mental health and SWB (World Health Organization, 2024).

Warburton and Bredin (2017), through a systematic review, found that PA influences

life satisfaction through three primary mechanisms: physiological, psychological, and social. (Warburton & Bredin, 2017). Regular PA can enhance life satisfaction through physiological pathways. Firstly, exercise promotes mental health through neurobiological mechanisms, such as stimulating the release of endorphins, which are natural painkillers that regulate emotions and alleviate stress. Additionally, Engaging in PA elevates brain-derived neurotrophic factor (BDNF) levels, a crucial protein involved in supporting the formation of new neurons and enhancing synaptic adaptability, thereby improving cognitive function and reducing depressive symptoms. These physiological changes collectively enhance both physical and brain health, ultimately contributing to improved life satisfaction.

In addition to the physical benefits, PA also affects life satisfaction through psychological pathways. These include improvements in self-perception (such as self-esteem and self-efficacy), emotional regulation, and social relationships, as well as reductions in stress and internalizing symptoms, collectively promoting higher life satisfaction (Biddle & Asare, 2011). Moreover, PA has been shown to improve emotional regulation, lower stress levels, and facilitate psychological relaxation. It may exert these effects by increasing the availability of neurotransmitters such as serotonin and dopamine, which are closely associated with reduced anxiety and depressive symptoms, thus enhancing emotional stability (Ren et al., 2023). By increasing mental toughness, regulating negative emotions, and shaping positive self-perceptions, PA facilitates the enhancement of life satisfaction.

Beyond psychological mechanisms, PA also contributes to improvements in life satisfaction at the social level. Many forms of PA, such as team sports, group fitness classes, and outdoor recreational activities, provide individuals with opportunities for social interaction and cooperation. Individuals who participate in PA often develop positive social connections with others, which reduces feelings of loneliness and social isolation (Eime et al., 2013). In addition, group PA enhances the sense of belonging and social support, which helps individuals to obtain more emotional support and psychological security, thus improving life satisfaction. Research suggests that socially active individuals typically report higher life satisfaction because stable relationships and shared exercise experiences lead to richer life satisfaction (Deng et al., 2023).

The impact of PA on life satisfaction is rarely the result of a single factor. In addition to improving physical health and directly enhancing mood, PA may also influence life satisfaction indirectly through more subtle psychological mechanisms. For instance, regular engagement in PA can help individuals build confidence in their abilities, develop a kinder and more accepting attitude toward their bodies, and alleviate everyday stress. Changes such as greater self-compassion and body compassion, and reduced stress levels may serve as important psychological bridges linking PA and life satisfaction.

## **2.5 Self-Compassion and its Link to Physical Activity and Life Satisfaction**

Self-compassion, a concept developed by Neff (2003), refers to an individual's ability to treat himself or herself with gentleness, understanding, and non-judgment in the face of pain, failure, or difficulty (Neff, 2003). This construct consists of six dimensions, including three positive dimensions: self-kindness, common humanity, and mindfulness, and three negative dimensions: self-judgment, isolation, and emotional over-identification. Over-identification, the latter three being the antithesis of the former. Compared to self-esteem, a psychological construct based on achievement or evaluation by others, self-compassion places more emphasis on maintaining inner stability and acceptance in the midst of failure and vulnerability and is therefore considered one of the more solid and adaptive positive psychological traits. Research has shown that higher levels of self-compassion can help alleviate anxiety, depression, and self-blame, and can enhance an individual's psychological resilience, emotional regulation, and SWB (Neff & Germer, 2013).

In recent years, there has been an increasing focus on the importance of self-compassion in promoting PA behaviors. In a longitudinal study, Zhang et al. (2025) demonstrated that self-compassion enhances PA levels indirectly by improving individuals' barrier self-efficacy—the confidence to overcome obstacles to being active—thereby establishing a clear causal pathway from self-compassion to PA (Zhang et al., 2025). This mechanism was further supported by cross-sectional evidence from Zhang et al. (2023), who found that self-compassion reduces psychological distress and enhances emotional and motivational resources, which in turn contribute to increased PA

engagement(Zhang et al., 2023). From a sociocultural perspective, Thøgersen-Ntoumani et al. (2022) found that exposure to inclusive and function-focused images of women exercising significantly improved women's self-compassion and body appreciation, which led to stronger motivation and actual engagement in PA(Thøgersen-Ntoumani et al., 2022). Additionally, Huang et al. (2021) found additive effects of self-compassion and PA on mental health in a large Chinese college student sample: low levels of both self-compassion and PA were associated with a significantly higher risk of depression symptoms(Huang et al., 2021). Together, these studies suggest that self-compassion is not only an emotional resource but also a psychological foundation for the initiation and maintenance of PA.

In addition to its role in behavioral regulation, self-compassion has been found to have a positive impact on individuals' overall ratings of life satisfaction. Research has shown that individuals with higher levels of self-compassion tend to report higher life satisfaction either directly or through key psychological mediators such as hope. For example, Yang (2016) found a significant direct link between self-compassion and life satisfaction, along with a partially mediated pathway through increased hope(Yang et al., 2016). Similarly, Tran et al. (2022) emphasized hope as a full mediator in this relationship, suggesting that self-compassion increases life satisfaction by fostering a more optimistic and goal-oriented mindset(Beach et al., 2022). Furthermore, Chew and Ang (2021) confirmed the beneficial effects of self-compassion on life satisfaction within a broader framework of authentic self-expression and personal well-being(Chew

& Ang, 2021).

## **2.6 Body Compassion and its Link to Physical Activity and Life Satisfaction**

Body Compassion is a relatively new concept that extends the core principles of self-compassion to an individual's bodily experience. It refers to an individual's ability to treat his or her body with care, acceptance, and non-judgment in the face of physical imperfections, discomfort, or socio-cultural pressures to look good(Altman et al., 2020). The concept is based on Neff's (2003) theoretical framework of self-compassion, which emphasizes the individual's practice of kindness and empathy at the bodily level(Neff, 2003). body Compassion, which incorporates body acceptance, mindful awareness of bodily sensations, and an understanding that body imperfections are common to all human beings, is recognized as an important psychological resource for promoting positive body image and overall well-being.

Although body Compassion is a relatively novel psychological construct, its relationship with PA can be supported by several well-established theoretical frameworks. According to Physical Self Theory, individuals' perceptions and acceptance of their own bodies significantly influence their motivation to engage in PA (Fox, 1997). As a gentle and mindful attitude toward the body, body compassion helps reduce body-related anxiety and shame, thereby encouraging individuals to participate more actively in physical movement. Furthermore, from the perspective of Self-

Determination Theory, individuals with higher levels of body compassion are more likely to engage in exercise out of intrinsic motivation, such as caring for and appreciating their bodies—rather than due to external pressure or appearance-based concerns (Deci & Ryan, 2000). This view is also supported by current research, suggesting that body compassion serves as a psychological facilitator by enhancing emotional safety during PA and reducing avoidance behaviors triggered by body dissatisfaction.

Empirical studies further support this theoretical mechanism. Wong et al. (2021), in their revision of the Exercise and Self-Esteem Model (EXSEM-SC), identified body compassion as a key mediator between PA and self-compassion, demonstrating that PA may enhance psychological health by fostering greater acceptance of the body (Wong et al., 2021). In a subsequent longitudinal study, Wong et al. (2023) used a repeated measures structural equation modeling approach and confirmed the stability of the pathways linking PA, body compassion, and self-compassion, further underscoring the bridging role of body compassion in the relationship between PA and psychological well-being (Wong et al., 2023).

The positive association between body compassion and life satisfaction can be understood through the lenses of positive psychology and body image theory. As a form of positive self-attitude, body compassion encourages individuals to treat their bodies with kindness and acceptance, even when facing perceived physical flaws or societal

expectations. This compassionate stance contributes to emotional regulation, reduces body-related distress, and fosters a more stable and positive self-concept, thereby enhancing overall life satisfaction (Seligman & Csikszentmihalyi, 2000). According to body image research, individuals who appreciate and accept their bodies tend to report higher levels of well-being and life satisfaction (Cash & Pruzinsky, 2002). Therefore, body compassion, as a valuable psychological resource, may enhance subjective well-being by reducing self-criticism and body dissatisfaction.

## **2.7 Stress Levels as a Mediator Between Physical Activity and Life Satisfaction**

Perceived stress denotes the extent to which individuals interpret circumstances in their lives as distressing, particularly characterized by feelings of unpredictability, lack of control, and overwhelm (Cohen et al., 1983). Numerous studies have demonstrated a significant association between PA and stress level. For instance, Stamenković et al. found that in post-COVID-19 populations, higher levels of regular PA were significantly associated with lower levels of stress, anxiety, and depression across different age and sex groups (Stamenković et al., 2025). Similarly, Bozkurt et al. reported that among nurses in Türkiye, moderate-to-vigorous PA was negatively associated with perceived stress, and this relationship was partially mediated by resilience—indicating that PA not only helps reduce stress but also enhances individuals' psychological coping capacity (Bozkurt & Öztürk, 2025). In addition, Streram et al. concluded in a systematic review that various health behavior