

**STRUCTURAL EQUATION MODELLING OF
HOLISTIC HEALTH VARIABLES, HEALTHY DIET,
PHYSICAL ACTIVITY, AND QUALITY OF LIFE:
COMPARISON BETWEEN MALAYSIAN AND
NIGERIAN UNDERGRADUATE STUDENTS**

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UNIVERSITI SAINS MALAYSIA

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by

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LIST OF ABBREVIATIONS AND ACRONYMS

AVE	Average variance extracted
CFA	Confirmatory factor analysis
CFI	Comparative fit index
CR	Composite reliability
CSDH	Commission on social determinants of health
CVI	Content validity index
DL	Demands of life
DLQ	Demands of life questionnaire
EDH	Environmental determinants of health
EDHQ	Environmental determinants of health questionnaire
EFA	Exploratory factor analysis
FUD	Federal University Dutse
FVI	Face validity index
HD	Healthy diet
ICC	Intraclass correlation coefficient
IP	Individual potentials
IPAQ	International physical activity questionnaire
IPQ	Individual potentials questionnaire

JEPeM	Jawatankuasa Etika Penyelidikan Manusia
KMO	Kaiser-Meyer-Olkin
PA	Physical activity
RMSEA	Root Mean Square Error of Approximation
SDH	Social determinants of health
SDHQ	Social determinants of health questionnaire
SEM	Structural Equation Modelling
SRMR	Standardized Root Mean Square Residual
TLI	Tucker Lewis Index
USM	Universiti Sains Malaysia
WHO	World Health Organization

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**PEMODELAN PERSAMAAN STRUKTUR PEMBOLEHUBAH KESIHATAN
HOLISTIK, PEMAKANAN SIHAT, AKTIVITI FIZIKAL DAN KUALITI
HIDUP: PERBANDINGAN ANTARA PELAJAR SARJANA MUDA
MALAYSIA DAN NIGERIA**

ABSTRAK

Kesejahteraan timbul daripada interaksi antara potensi individu (IP), tuntutan hidup (DL), penentu sosial (SDH), dan penentu persekitaran (EDH). Pemakanan sihat (HD) dan aktiviti fizikal (PA) seterusnya menyumbang kepada kualiti hidup secara keseluruhan. Oleh itu, kajian ini bertujuan untuk menilai bagaimana SDH, EDH, IP, DL, HD, dan PA berinteraksi dalam model kesihatan holistik untuk mempengaruhi kualiti hidup. Kajian itu menggunakan pendekatan kaedah campuran, dijalankan dalam tiga fasa, untuk membangunkan dan mengesahkan model kesihatan holistik. Dalam Fasa I, empat instrumen baharu telah dibangunkan untuk mengukur penentu utama kesihatan holistik: Soal Selidik Penentu Sosial Kesihatan (SDHQ), Soal Selidik Penentu Kesihatan Persekitaran (EDHQ), Soal Selidik Permintaan Kehidupan (DLQ), dan Soal Selidik Potensi Individu (IPQ). Alat ini dibangunkan melalui kajian literatur yang meluas, temu bual mendalam, dan penilaian pakar untuk memastikan kandungan dan menghadapi kesahan. Fasa II merangkumi kajian pengesahan menggunakan tinjauan keratan rentas 1,460 pelajar sarjana muda (730 setiap seorang dari Nigeria dan Malaysia). Fasa ini menggunakan analisis faktor penerokaan dan pengesahan (EFA dan CFA), di samping penilaian kebolehpercayaan dan kesahan, termasuk kebolehpercayaan komposit (CR), varians purata yang diekstrak (AVE), alfa Cronbach dan kebolehpercayaan ujian semula. Fasa III menyiasat hubungan struktur antara SDH, EDH, DL, IP, HD, PA, dan kualiti hidup, menggunakan sampel bebas 1,140

pelajar (570 dari setiap negara), serta ukuran dan invarian struktur untuk mengesahkan kebolegunaan silang budaya instrumen. Dalam Fasa I, empat soal selidik kesihatan holistik telah dibangunkan: SDHQ (20 item, 2 faktor), EDHQ (18 item, 2 faktor), DLQ (18 item, 3 faktor), dan IPQ (14 item, 2 faktor), semuanya menunjukkan kandungan yang boleh diterima dan kesahan muka (indeks = 0.83–1.00). Dalam Fasa II, menunjukkan kesahan dan kebolehpercayaan yang mencukupi merentas semua instrumen, dengan indeks kesesuaian yang mencukupi (CFI = 0.928–0.967; TLI = 0.910–0.957; SRMR = 0.039–0.080; RMSEA = 0.041–0.068 = 0.041–0.068) dan kebolehpercayaan tinggi 0.815–0.947; CR = 0.760–0.950; Dalam Fasa III, pemodelan persamaan struktur menyokong 8 daripada 10 laluan hipotesis dalam kedua-dua sampel Malaysia dan Nigeria, dengan kesesuaian model yang baik (CFI = 0.972–0.989, TLI = 0.954–0.982, SRMR = 0.021–0.026, RMSEA = 0.026, RMSEA = 0.006, RMSEA = 0.0. 0.110–0.879). Instrumen menunjukkan pengukuran dan invarian struktur merentas kedua-dua kumpulan (Δ CFI dan Δ TLI <0.01 , Δ RMSEA <0.015), dan SEM berbilang kumpulan mengesahkan enam hubungan laluan yang sama (CFI = 0.982, TLI = 0.969, SRMR = 0.020, RMSEA₂ = 0.020, RMSEA₂ = RMSEA₂. 0.360). Kajian itu mengesahkan bahawa SDHQ, EDHQ, DLQ dan IPQ adalah sah, boleh dipercayai dan invarian di seluruh pelajar Nigeria dan Malaysia, menjadikannya sesuai untuk menilai faktor kesihatan holistik. Ia juga memperkenalkan salah satu model kuantitatif pertama yang mengaitkan pembolehubah ini dengan HD, PA, dan kualiti hidup, menawarkan asas untuk penyelidikan antara disiplin masa depan tentang perkaitan antara penentu kesihatan sosial, alam sekitar dan individu.

**STRUCTURAL EQUATION MODELLING OF HOLISTIC HEALTH
VARIABLES, HEALTHY DIET, PHYSICAL ACTIVITY, AND QUALITY OF
LIFE: COMPARISON BETWEEN MALAYSIAN AND NIGERIAN
UNDERGRADUATE STUDENTS**

ABSTRACT

Holistic health is increasingly recognized as a comprehensive approach that considers the whole person and the interplay of multiple life dimensions. Well-being arises from the interaction between individual potentials (IP), demands of life (DL), social determinants (SDH), and environmental determinants (EDH). Healthy diet (HD) and physical activity (PA) further contribute to overall quality of life. This study therefore aims to evaluate how SDH, EDH, IP, DL, HD, and PA interact within a holistic health model to influence quality of life. The study applied a mixed-methods approach, conducted in three phases, to develop and validate a holistic health model. In Phase I, four new instruments were developed to measure key determinants of holistic health: the Social Determinants of Health Questionnaire (SDHQ), Environmental Determinants of Health Questionnaire (EDHQ), Demands of Life Questionnaire (DLQ), and Individual Potentials Questionnaire (IPQ). These tools were developed through extensive literature review, in-depth interviews, and expert evaluations to ensure content and face validity. Phase II covers a validation study using a cross-sectional survey of 1,460 undergraduate students (730 each from Nigeria and Malaysia). This phase employed exploratory and confirmatory factor analyses (EFA and CFA), alongside assessments of reliability and validity, including composite reliability (CR), average variance extracted (AVE), Cronbach's alpha, and test-retest reliability. Phase III investigated the structural relationships between SDH, EDH, DL,

IP, HD, PA, and quality of life, using independent samples of 1,140 students (570 from each country), as well as the measurement and structural invariance to confirm the cross-cultural applicability of the instruments. Additionally, multigroup SEM was conducted to compare structural relationships across Nigerian and Malaysian samples. In Phase I, four holistic health questionnaires were developed: SDHQ (20 items, 2 factors), EDHQ (18 items, 2 factors), DLQ (18 items, 3 factors), and IPQ (14 items, 2 factors), all showing acceptable content and face validity (indices = 0.83–1.00). In Phase II, demonstrated adequate validity and reliability across all instruments, with adequate fit indices (CFI = 0.928–0.967; TLI = 0.910–0.957; SRMR = 0.039–0.080; RMSEA = 0.041–0.068) and high reliability (Cronbach's α = 0.815–0.947; CR = 0.760–0.950; ICC = 0.765–0.987). In Phase III, structural equation modeling supported 8 of 10 hypothesized pathways in both Malaysian and Nigerian samples, with good model fit (CFI = 0.972–0.989, TLI = 0.954–0.982, SRMR = 0.021–0.026, RMSEA = 0.039–0.060, RMSEA p-value = 0.110–0.879). The instruments demonstrated measurement and structural invariance across both groups (Δ CFI and Δ TLI < 0.01, Δ RMSEA < 0.015), and multigroup SEM confirmed six similar path relationships (CFI = 0.982, TLI = 0.969, SRMR = 0.020, RMSEA = 0.052, RMSEA p-value = 0.360). The study confirmed that the SDHQ, EDHQ, DLQ, and IPQ are valid, reliable, and invariant across Nigerian and Malaysian students, making them suitable for assessing holistic health factors. It also introduced one of the first quantitative models relating these variables to HD, PA, and quality of life, offering a foundation for future interdisciplinary research on the interrelationship of social, environmental, and individual determinants of health.

CHAPTER 1

INTRODUCTION

1.1 Background of the study

The initial concept behind the application of a holistic approach to human life to address both individual and societal issues is not a new idea; it can be traced back to ancient philosophers and prophets (Shahtahmasebi, 2006). For instance, the Persian philosopher and prophet Zoroaster emphasized a holistic approach to both physical and mental well-being (Shahtahmasebi, 2006). According to his ideology, merely doing good is not sufficient; one must also think good and be good. This interconnected model highlights a “feedback” effect among the three components. Similarly, the Ten Commandments, which are foundational to many religions and cultures, promote a holistic way of life (Shahtahmasebi, 2006). Moreover, the Holy Koran extends this approach beyond the individual, offering guidelines and teachings aimed at fostering a spiritually, mentally, and physically healthy society (Shahtahmasebi, 2006).

These beliefs laid the groundwork for many subsequent philosophers and medical professionals who adopted a holistic approach to treating illness (Bircher, 2020; Bircher & Kuruvilla, 2014; Mato-Juhász et al., 2016; Saylor, 2004). The underlying rationale for this strategy is that physical symptoms often reflect underlying mental or spiritual issues, and vice versa (Bircher, 2020). Therefore, effective treatment must consider the interconnectedness of physical, mental, and spiritual aspects. This approach has proven successful in numerous cases (Bircher, 2020). However, as health care systems evolved increasingly sophisticated to address the population's various health demands, some practitioners started to associate resources with the growing

demand and health disparities (Arcaya & Figueroa, 2017; Solar & Irwin, 2010; Thornton et al., 2016). McKinlay's retelling of the healthcare provider on the riverbank fable (McKinlay, 1979) may provide a better understanding of the issue:

“You know,” he said, “sometimes it feels like this. There I am, standing by the shore of a swiftly flowing river, and I hear the cry of a drowning man. So, I jump into the river, put my arms around him, pull him to the shore, and apply artificial respiration. Just when he begins to breathe, there is another cry for help. So, I jump into the river, reach him, pull him to shore, apply artificial respiration, and then just as he begins to breathe, another cry for help. So back in the river again, reaching, pulling, applying breathing, and then another yell. Again and again, without end, goes the sequence. You know, I am so busy jumping in, pulling them to shore, and applying artificial respiration that I have no time to see who the hell is upstream pushing them all in a.” (McKinlay, 1979, p. 502). This highlights the importance of viewing health not only from a curative perspective but also from a preventive one. With the increasing health challenges and the rise of various chronic diseases in our time, a holistic approach is essential to enhancing overall well-being and quality of life.

Researchers have proposed that healthcare systems should be viewed within a broader context, presenting a conceptual framework in which education, the economy, transportation, agriculture, the environment, nutrition, housing, industry, science and technology, medical science, and preventative care all play a role in shaping population health alongside health-specific parameters (Nordenfelt, 2007; Northridge et al., 2003; Shahtahmasebi, 2006; Solar & Irwin, 2010). This framework is structured into three layers: the top layer includes health factors, natural-biological, and socio-economic elements; the intermediate layer comprises living and working conditions, public

health, and natural environments; and the lower layer reflects the individual's characteristics and social way of life, which are directly influenced by the upper two layers (Northridge et al., 2003). However, putting such a conceptual framework into practice remains a challenging task (Bird et al., 2018). Traditional approaches to quantifying and modelling these interrelationships have various limitations, as most involve dynamic processes and outcomes that are inherently dynamic (Bircher, 2020; Bird et al., 2018).

Researchers continue to recognize holistic health as a comprehensive approach to well-being that addresses the whole person, rather than concentrating solely on physical symptoms or specific illnesses (Bircher, 2020; Bird et al., 2018; Nordenfelt, 2007; Shahtahmasebi, 2006). It highlights the interrelationships of the physical, mental, emotional, spiritual, and social dimensions of life, stressing that achieving balance across these areas is critical for overall health (Bircher, 2020; Bird et al., 2018). The widely recognized definition of health originates from the world health organization (WHO) 1948 preamble, which describes health as a state of complete physical, mental, and social well-being, not merely the absence of disease or infirmity (WHO, 1948). However, this definition has been increasingly viewed as overly ambitious and is now often critiqued or rejected (Bircher, 2020). For example, Swedish health philosopher Lennart Nordenfelt offered an alternative perspective: a person is fully healthy if, and only if, they are in a physical and mental state that enables them to achieve their vital goals within the limits of standard situations (Nordenfelt, 2013a).

In Malaysia, non-communicable diseases (NCDs) such as cardiovascular disease, diabetes, and cancer pose a major health burden and public health challenge (Nurul-Farehah et al., 2022; Shanmuganathan et al., 2022). According to the Ministry of

Health Malaysia (MOH, 2020) and the World Health Organization (WHO, 2022), NCDs are leading causes of death and disability in the country. Current estimates show that 1 in 5 Malaysian adults have diabetes, 1 in 3 live with hypertension, and nearly half are overweight or obese (Razali, 2023). This rising prevalence continues to strain the nation's healthcare system. To address this, a range of strategies are being promoted to help individuals achieve and maintain overall health and well-being (Razali, 2023). These include holistic health approaches such as nutritional counselling, adequate physical activity, stress management techniques (e.g., meditation or deep breathing exercises), mind-body practices (e.g., yoga, mindfulness meditation), and complementary or alternative therapies (e.g., acupuncture, phytotherapy) (Goh et al., 2020; Koo et al., 2023; Razali, 2023). In addition, lifestyle changes such as improving sleep, reducing toxin exposure, learning new skills, engaging in hobbies like gardening, and maintaining strong social relations are also encouraged (Ismadi et al., 2024; Ismail & QI, 2025). Together, these approaches aim to reduce premature mortality from NCDs, support the body's natural healing processes, and enhance quality of life (Ismail & QI, 2025; Merlo et al., 2025).

Nigeria's population growth has contributed to significant health implications, influencing mortality patterns, life expectancy, and the overall health profile of its citizens (Adesola et al., 2024). This rapid population growth not only directly impacts education and healthcare demand but also poses a wide range of health challenges (Adesola et al., 2024). For instance, Nigeria bears the highest burden of neglected tropical diseases (NTDs) in sub-Saharan Africa, accounting for about 25% of the region's total NTD cases (Chowdhury et al., 2023). Among these, Buruli ulcer, leprosy, and lymphatic filariasis (manifesting as lymphedema and hydrocele) are prioritized for integrated case management (Chowdhury et al., 2023). The growing

burden of both communicable and non-communicable diseases has highlighted the importance of adopting a holistic approach to health in Nigeria (Oso, 2023). Partners from the Ministry of Health at federal and state levels, alongside non-governmental development organizations, have recommended the need to expand beyond medical intervention to include sustainable, holistic support to improve overall well-being (Abdullahi et al., 2025; Oso, 2023). These underscore that, in the Nigerian context, a truly holistic approach to well-being must address not only medical treatment but also the broader social, cultural, and environmental determinants of health, making it a more comprehensive pathway to improving population health (Abdullahi et al., 2025).

Promoting the health of individuals and populations is a complex task that requires the involvement of multiple stakeholders, including governments, academics, administrators, development partners, corporations, the media, families, communities, and individuals, whose roles often overlap or intersect (Bircher, 2020; Bircher & Kuruvilla, 2014; Bird et al., 2018). Highlighting these relationships, a comprehensive definition of health can provide a systematic framework for identifying necessary actions and fostering collaboration. Beyond the individual, the scope of health determinants has expanded to include social and environmental factors (Bircher & Kuruvilla, 2014). In this context, Bircher and Kuruvilla (2014) introduced the Meikirch model, which defines health as “a state of well-being emerging from conducive interactions between an individual’s potentials (IP), the demands of life (DL), the social determinants of health (SDH), and the environmental determinants of health (SDH).”

Furthermore, a healthy diet (HD) and regular physical activity (PA) play a key role in influencing holistic health and quality of life by addressing various interrelated

dimensions of health: physical, mental, emotional, and even social and spiritual well-being (Serra et al., 2020; Smith, 2019; Tavares, 2014). Their combined action fosters balance and promotes general harmony within the body and mind (Batsis et al., 2021). In addition to preventing disease, a HD and regular PA improve quality of life by fostering resilience, balance, and a long life (Batsis et al., 2021). For example, a nutritious diet supplies vital nutrients (Cena & Calder, 2020; Gordon & Jin, 2017), while regular exercise develops bones and muscles, improves cardiovascular health, and strengthens the immune system (Cunningham et al., 2020; Rebar et al., 2015). When combined, they lower the chance of developing chronic conditions like diabetes, heart disease, obesity, and some types of cancer (Serra et al., 2020; Smith, 2019; Tavares, 2014). Therefore, this study aims to evaluate the holistic health model inspired by the Meikirch model to explore how the SDH, EDH, IP, and DL interrelate to influence quality of life. Healthy diet and physical activity were also included in the model because of their well-established relationship with overall well-being.

1.2 Problem statement

The WHO definition of health was criticized in 2010 by an international conference of experts, who stated that it "contributes to the medicalization of society, is inadequate for chronic diseases, and is neither operational nor measurable." According to these experts, "the resilience or capacity to cope and maintain and restore one's integrity, equilibrium, and sense of well-being" should be included in any definition of health (Huber et al., 2011). Although these helpful concepts were found during the conference, the participants were unsuccessful in going further as to create a new definition of health (Bircher, 2020; Bircher & Kuruvilla, 2014).

Over time, many researchers have developed the holistic model of health as a substitute for the conventional biological approach, which mostly concentrates on identifying and treating physical diseases (Bircher, 2020; Bircher & Kuruvilla, 2014; Bird et al., 2018; Kraja et al., 2013; Marmot & Bell, 2016; Nordenfelt, 2007; Nordenfelt, 2013a; Raphael, 2016; Smith et al., 2016; Täljedal, 2004). These researchers have helped to shape this concept by highlighting the connections between the physical, mental, emotional, spiritual, and social facets of human well-being. The holistic approach to health represents an increasing recognition that resolving the intricate interactions between various aspects of life is necessary to attain well-being. Health research, policy, and practice around the world are still influenced by this concept (Bircher, 2020; Bird et al., 2018).

In September 2015, the United Nations established the primary goals of sustainable development as part of the 2030 Agenda focused on sustainable development. For all age groups, the goals related to healthy lives and well-being included reducing maternal, newborn, and child mortality; eradicating severe diseases such as AIDS, tuberculosis, and malaria; and combating hepatitis and other infectious diseases (United Nations, 2015). However, achieving these sustainable development goals is challenging in the presence of widespread serious diseases, as they impede economic growth and efforts to alleviate poverty (Mato-Juhász et al., 2016).

For centuries, individuals have judged their own health, determining whether they are well or ill without relying on formal or standardized criteria (Bircher, 2020). They simply knew when they were ill (Bircher, 2020). As a result, achieving a consensus and understanding of an individual's overall holistic health is crucial for meeting

sustainable development goals and structuring systems like healthcare. However, to date, there is still no valid and effective method that has been developed.

The health and well-being of university students are increasingly recognized as aspects of their academic success, personal development, and long-term quality of life (Hernández-Torrano et al., 2020; Sining et al., 2022). In both Malaysia and Nigeria, young adults, mostly students, may face multiple health issues due to the rising rates of non-communicable diseases, unhealthy dietary practices, sedentary lifestyles, and exposure to social and environmental stressors (Nursiswati et al., 2025; Onwasigwe et al., 2024). While traditional health studies generally focus on specific factors such as physical activity or diet, there is growing evidence that health outcomes are better understood through a holistic approach that incorporates social determinants of health, environmental influences, individual potentials, and the demands of daily life (Bircher, 2020).

Despite this acknowledgement, little empirical studies have explored the ways in which these holistic health factors interact to influence quality of life, especially in the heterogeneous contexts of Malaysia and Nigeria. Most existing studies address these factors separately, overlooking their interrelated nature and the possibility of their cumulative or mediating effects (Bircher, 2020). Furthermore, there is a scarcity of cross-country comparative studies, leaving a gap in understanding how cultural, social, and environmental differences may shape these relationships. Hence, addressing this gap will provide understanding for developing holistic interventions that will promote overall well-being and quality of life.

1.3 Study rationale

The Meikirch model is currently regarded as one of the most comprehensive health models, encompassing key factors that define holistic health (Bircher, 2020). According to the Meikirch model (Bircher & Kuruvilla, 2014), health is shaped by four dimensions: Social Determinants of Health (SDH), Environmental Determinants of Health (EDH), Individual Potentials (IP), and Demands of Life (DL). The EDH contains two components: the natural and built environments. The DL consists of three components: physiological, psychosocial, and environmental demands. The IP consists of two components: personally acquired potential and biologically given potential. The primary limitation of the Meikirch model so far is that it has not been quantitatively tested, and there is a lack of valid and reliable measures to assess its dimensions both quantitatively and qualitatively (Bircher, 2020).

A cross-cultural holistic health approach is also essential for advancing equitable, efficient, and inclusive healthcare. In addition to addressing health inequities and ensuring that all facets of well-being—physical, mental, emotional, spiritual, and social—are taken into consideration, it guarantees that health treatments are culturally acceptable (Bircher, 2020; Bird et al., 2018; Mato-Juhász et al., 2016; Săvoiu et al., 2023; Saylor, 2004; Shahtahmasebi, 2006). The United Nations advocated for a thorough understanding of health across various demographics, improved health outcomes, and deeper community ties as the results of this strategy (United Nations, 2015). SDG 3 set the stage for the worldwide achievement of more general sustainable development goals by focusing on universal health coverage, preventing and treating communicable and non-communicable diseases, and enhancing health systems in general (United Nations, 2015). In this study, we aim to develop and validate tools for evaluating the various dimensions of the Meikirch model in both Nigeria and

Malaysia, as well as examine their interrelationships and impact on quality of life, along with their cross-cultural applicability. The development of these measures will significantly enhance the practical use of the model and enable the assessment of its effect on overall well-being.

1.4 Operational definitions

1.4.1 Social determinants of health (SDH)

- SDH are referred to as social factors that affect an individual's or population's health as well as the social processes that lead to an unequal distribution of these factors among groups with unequal status in society (Kostelanetz et al., 2022; Marmot, 2017; Marmot & Bell, 2016). These factors include income, education, occupation, social class, gender, race, or ethnicity; material circumstances; psychological circumstances; behavioural and/or biological factors; and the quality and availability of health services, both of which were categorized as either structural determinants of health or intermediary determinants of health (WHO CSDH, 2008).

1.4.2 Environmental determinants of health (EDH)

- EDH refers to a set of factors involving both objective and subjective aspects of the environment (Schulz & Northridge, 2004; Tonne et al., 2021). These include air and water quality, noise levels, access to green spaces, neighbourhood safety, and exposure to environmental hazards such as pollution or toxins (Naik et al., 2019). Subjective environmental aspects refer to individuals' perceived assessments or beliefs regarding the quality, safety, and influence of their surroundings on their overall well-being (Castaldo et al., 2018; Castilla et al., 2017).

1.4.3 Individual potentials (IP)

- IP is a person's capacity, resources, and abilities that allow them to meet life's challenges while preserving their health and well-being (Bircher, 2020; Bircher & Kuruvilla, 2014). According to the Meikirch model of health, IP is a crucial component that aids people in overcoming obstacles in life and reaching a state of well-being (Bircher, 2020; Bircher & Kuruvilla, 2014). Individual potentials are divided into two categories: biologically derived potentials and personally acquired potentials. These potentials form the basis of an individual's capacity to lead a healthy, fruitful life by utilizing their natural talents and learned skills to overcome obstacles in life while preserving overall health (Bircher, 2020; Bircher & Kuruvilla, 2014).

1.4.4 Demands of life (DL)

- DL refers to the various needs, stresses, and difficulties that people face during their lives and that have an effect on their health and general well-being (Bircher, 2020; Bircher & Kuruvilla, 2014). The Meikirch model of health states that in order to attain and preserve a condition of holistic health, these demands need to be properly handled and controlled (Bircher, 2020; Bircher & Kuruvilla, 2014). The model divides life's demands into three categories: physiological, psychosocial, and environmental needs. These categories reflect the different difficulties people encounter on a daily basis. Attaining holistic health and well-being requires the ability to effectively manage these demands by utilizing one's own potential (Bircher, 2020; Bircher & Kuruvilla, 2014).

1.4.5 Healthy diet (HD)

- The term "HD" describes a dietary pattern that lowers the risk of chronic diseases, promotes general well-being, and gives the body the vital nutrients it needs

to operate well. Appropriate amounts of macronutrients (fats, proteins, and carbs), micronutrients (vitamins and minerals), and water are all part of a nutritious diet that is diverse and balanced (Ayob & Shukri, 2020; Cena & Calder, 2020; Paxton et al., 2011).

1.4.6 Physical activity (PA)

- PA refers to any movement of the body that involves the use of energy and is caused by the contraction of skeletal muscles (Andersen et al., 2016; Hills et al., 2015; Powell et al., 2011). From daily living activities to organized exercise and sports, it encompasses all types of movement, whether intentional or not (Andersen et al., 2016; Hills et al., 2015; Powell et al., 2011). Maintaining and enhancing general health and well-being requires regular PA. PA is generally categorized into three: low PA: those who do not fit into category 2 or 3; moderate PA: 3 or more days of strenuous exercise lasting at least 20 minutes each day, or 5 or more days of moderate-intensity exercise, such as walking for at least half an hour each day; and high PA: getting at least 1500 MET-minutes per week and engaging in vigorous-intensity exercise for at least 3 days (Craig et al., 2003).

1.4.7 Quality of life

- Quality of life refers to how people see themselves in relation to their objectives, aspirations, standards, and goals, as well as their place in life within the framework of their culture and societal systems (Chaturvedi & Muliya, 2016; Nordenfelt, 2013b).

1.5 Research questions, objectives, and hypotheses

We presented the research questions, objectives, and hypotheses in alignment with phases I, II, and III, following the study's format and design.

1.5.1 Research questions

Phase I:

1. What are the constructs and items that can be used to assess the social determinants of health (SDH), environmental determinants of health (EDH), demands of life (DL), and individual potentials (IP)?
2. Are the newly generated constructs and items for assessing SDH, EDH, DL, and IP valid by using content and face validity among experts and undergraduate students in Nigeria?
3. Are the newly generated constructs and items for assessing SDH, EDH, DL, and IP valid by using content and face validity among experts and undergraduate students in Malaysia?

Phase II:

4. Are the newly developed questionnaires for assessing SDH, EDH, DL, and IP valid by using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) among undergraduate students in Federal University Dutse (FUD), Nigeria?
5. Are the newly developed questionnaires for assessing SDH, EDH, DL, and IP reliable by using Cronbach's alpha, composite reliability, and test-retest reliability among undergraduate students in FUD, Nigeria?

6. Are the newly developed questionnaires for assessing SDH, EDH, DL, and IP valid by using EFA and CFA among undergraduate students in Universiti Sains Malaysia (USM), health campus, Malaysia?
7. Are the newly developed questionnaires for assessing SDH, EDH, DL, and IP reliable by using Cronbach's alpha, composite reliability, and test-retest reliability among undergraduate students in USM, health campus, Malaysia?

Phase III:

8. Are there any significant structural relationships between SDH, EDH, DL, IP, healthy diet (HD), physical activity (PA), and quality of life among undergraduate students in FUD, Nigeria?
9. Are there any significant structural relationships between SDH, EDH, DL, IP, HD, PA, and quality of life among undergraduate students in USM, health campus, Malaysia?
10. Do the newly developed questionnaires for assessing SDH, EDH, DL, and IP have adequate measurement and structural invariance across Nigerian and Malaysian samples?
11. Are the structural relationships between SDH, EDH, DL, IP, HD, PA, and quality of life similar across Nigerian and Malaysian samples?

1.5.2 General objective

The overall aim of the current study is to develop holistic health questionnaires (i.e., SDH, EDH, DL, IP) and examine their structural relationships with HD, PA, and quality of life across the samples of Nigerian and Malaysian undergraduate students.

1.5.3 Specific objectives

Phase I:

1. To develop new holistic health questionnaires for assessing the social determinants of health (SDH), environmental determinants of health (EDH), demands of life (DL), and individual potentials (IP).
2. To determine the content validity and face validity of the newly developed questionnaires for assessing SDH, EDH, DL, and IP among experts and undergraduate students in Nigeria.
3. To determine the content validity and face validity of the newly developed questionnaires for assessing SDH, EDH, DL, and IP among experts and undergraduate students in Malaysia.

Phase II:

4. To determine the construct validity of the of the newly developed questionnaires for assessing SDH, EDH, DL, and IP using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) among undergraduate students in FUD, Nigeria.
5. To determine the reliability of the newly developed questionnaires for assessing SDH, EDH, DL, and IP using Cronbach's alpha, composite reliability, and test-retest reliability among undergraduate students in FUD, Nigeria.
6. To determine the construct validity of the of the newly developed questionnaires for assessing SDH, EDH, DL, and IP using EFA and CFA among undergraduate students in USM, health campus, Malaysia.

7. To determine the reliability of the newly developed questionnaires for assessing SDH, EDH, DL, and IP using Cronbach's alpha, composite reliability, and test-retest reliability among undergraduate students in USM, health campus, Malaysia.

Phase III:

8. To determine the structural relationship between SDH, EDH, DL, IP, healthy diet (HD), physical activity (PA), and quality of life among undergraduate students in FUD, Nigeria.
9. To determine the structural relationship between SDH, EDH, DL, IP, HD, PA, and quality of life among undergraduate students in USM, health campus, Malaysia.
10. To determine the measurement and structural invariance of the newly developed questionnaires for assessing SDH, EDH, DL, and IP across the samples of Nigerian and Malaysian undergraduate students.
11. To conduct an SEM multigroup comparison between samples of Nigerian and Malaysian undergraduate students.

1.5.4 Research hypotheses

Phase I:

1. Not applicable
2. The newly generated constructs and items for assessing SDH, EDH, DL, and IP are valid by using content and face validity among experts and undergraduate students in Nigeria.

3. The newly generated constructs and items for assessing SDH, EDH, DL, and IP are valid by using content and face validity among experts and undergraduate students in Malaysia.

Phase II:

4. The newly developed questionnaires for assessing SDH, EDH, DL, and IP are valid by using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) among undergraduate students in FUD, Nigeria.
5. The newly developed questionnaires for assessing SDH, EDH, DL, and IP are reliable by using Cronbach's alpha, composite reliability, and test-retest reliability among undergraduate students in FUD, Nigeria.
6. The newly developed questionnaires for assessing SDH, EDH, DL, and IP are valid by using EFA and CFA among undergraduate students in USM, health campus, Malaysia.
7. The newly developed questionnaires for assessing SDH, EDH, DL, and IP are reliable by using Cronbach's alpha, composite reliability, and test-retest reliability among undergraduate students in USM health campus, Malaysia.

Phase III:

8. There are significant structural relationships between SDH, EDH, DL, IP, healthy diet (HD), physical activity (PA), and quality of life among undergraduate students in FUD, Nigeria.
9. There are significant structural relationships between SDH, EDH, DL, IP, HD, PA, and quality of life among undergraduate students in USM, health campus, Malaysia.

10. The newly developed questionnaires for assessing SDH, EDH, DL, and IP have adequate measurement and structural invariance across Nigerian and Malaysian samples.
11. The structural relationships between SDH, EDH, DL, IP, HD, PA, and quality of life are similar across Nigerian and Malaysian samples.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter covered a review of current issues and understanding about holistic health based on previous studies. The review focused on the research questions and objectives expressed in the previous chapter. This chapter was divided into 23 sections: search terms, an overview of the current concept of health, the Meikirch model components, quality of life, healthy diet, physical activity, relationship between social determinants of health and quality of life, relationship between environmental determinants of health and quality of life, relationship between individual potentials and quality of life, relationship between demands of life and quality of life, relationship between healthy diet and quality of life, relationship between physical activity and quality of life, relationship between social determinants of health and individual potentials, relationship between social determinants of health and demands of life, relationship between environmental determinants of health and individual potentials, relationship between individual potentials and demands of life, general information on the qualitative and quantitative research methods employed in the present study, and conceptual framework of the study.

2.2 Databases and search terms

Web of Science, Google Scholar, PubMed, Scopus, and Academic Search Complete (EBSCO) database sources were among the search engines that were used. The following key phrases were used in the search: holistic health, social determinants of health, environmental determinants of health, individual potentials, demands of life, quality of life, healthy diet, physical activity, relationship between social determinants

of health and quality of life, relationship between environmental determinants of health and quality of life, relationship between individual potentials and quality of life, relationship between demands of life and quality of life, relationship between healthy diet and quality of life, relationship between physical activity and quality of life, relationship between social determinants of health and individual potentials, relationship between social determinants of health and demands of life, relationship between environmental determinants of health and individual potentials, relationship between individual potentials and demands of life. In the literature search, the terms were put together using the Boolean operators "AND" and "OR."

Table 2.1: Summary of literature search

	Search engine					
	Web Science	of	Google Scholar	PubMed	Scopus	EBSCO
Using phrases						
Holistic health	1116		49300	364	8526	11
Social determinants of health	11460		344000	8029	88	10
Environmental determinants of health	243		10100	433	266	3
Individual given potentials	80		4090	12034	4406	7
Demands of life	85		21400	8102	144	22
Quality of life	543222		45900	86673	654056	71
Healthy diet	7903		360000	4485	15773	3
Physical activity	251162		2720000	40921	272658	32
Applied Boolean operators and keywords (example)						
“Social determinants of health” AND “Quality of life”	529		56100	449	1284	0
“Environmental determinants of health” AND “Quality of life”	3		3160	20	8	1
“Individual potentials” AND “Quality of life”	2488		94100	300	1613	3
“Demands of life” AND “Quality of life”	752		3990	1388	963	8
“Healthy diet” AND “Quality of life”	412		55100	188	794	0
“Physical activity” AND “Quality of life”	24756		1420000	4585	30114	1
“Social determinants of health” AND “Environmental determinants of health”	37		3530	76	67	2
“Social determinants of health” AND “Individual potentials”	246		16500	84	280	2
“Social determinants of health” AND “Demands of life”	17		191	34	336	0
“Environmental determinants of health” AND “Individual potentials”	1		4	3	1	0
“Environmental determinants of health” AND “Demands of life”	5		51	3	5	0
“Individual potentials” AND “Demands of life”	86		2850	19	85	0

2.3 Overview of the current concept of health

Holistic health was believed to be influenced by one's lifestyle, activity, surroundings, and diet (Stanhope & Lancaster, 2000). But over time, physical health became the main focus of Western conceptions of health (Saylor, 2004). Prior to 1900,

mental health was only gradually incorporated into the idea of health, which for many years had emphasised primarily physical wholeness. As medical research advanced through the 1900s and many diseases had efficient cures, freedom from disease—physical or mental—became the standard definition of health (Pender, 2011).

These early Western theories of health were built on a machine conception of the human body that broke down issues into manageable parts, giving rise to medical specialisations that focus on particular body systems (Saylor, 2004). Many people who still think that health is just the absence of symptoms still define health as being free from disease (Leonardi, 2018). Despite its flaws, this model has served as the inspiration for a lot of global medical research. Even though this idea may seem limited, it has given us a clear definition and laid the groundwork for huge leaps forward in medical research (Leonardi, 2018).

In 1948, the World Health Organization (WHO) defined health as "a state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity." This was the first time the idea of health as well-being was introduced (WHO, 1948). This definition has been widely accepted throughout the past century and has contributed significantly to the growth of national health care systems, pushing countries beyond the conventional limits of health care defined by the physical circumstances of people (Jadad & O'grady, 2008). Others have defined health as being able to live (Rochlen, 2005), feeling good while living a life of activity, enjoyment, and social connections (Fineberg, 2013), having optimistic expectations (Little et al., 2012), and having the best level of fitness for each person to live a full, satisfying life (Wills et al., 2016). In the WHO definition, attention was paid to a number of different aspects of health, such as physical (structure and function), social role, mental (emotional and intellectual), and general views of health status. So, many researchers

consider it the first definition of health that takes the whole person into account, and it was an important step away from focusing on the physical parts of health (Badash et al., 2017; Bircher, 2020; Leonardi, 2018; Van Druten et al., 2022).

However, numerous critical evaluations have demonstrated that the WHO definition of health is no longer adequate for addressing the new issues brought on by the rising number of individuals suffering from chronic diseases (Baauw et al., 2019; Huber et al., 2011; Jadad & O'grady, 2008; Saracci, 1997). The likelihood of living longer and in excellent health into old age has never been higher than it is at the dawn of the twenty-first century, but this new perspective calls for a shift in the health paradigm (WHO, 2018). It is time to move on from the WHO's utopian approach; we can no longer define health as a condition of total physical, mental, and social well-being (Horton, 2014). For a more in-depth look, several researchers have summarised the main issues with the WHO definition.

The first one refers to "complete wellbeing," which is a status that is so extreme that it is practically unachievable. It is certainly never achievable for elderly people or patients with chronic illnesses, who make up an ever-increasing population due to the rate of ageing and the improvement in the prognosis for many diseases (Huber et al., 2011; Jadad & O'grady, 2008). Others, on the other hand, see complete well-being as a challenge because their daily lives show them that a long time without physical and mental symptoms is very unlikely. Science shows that the average adult experiences about four symptoms over the course of 14 days (Huber et al., 2011). In reality, a full state of wellbeing would also mean that there are no risk factors for diseases. This is a situation that is impossible for anyone to reach, because even the most optimistic health advocate has to admit that risk-free health is hard to achieve (Pender, 2011).

The second important aspect is how poorly the WHO definition is suitable for practical application (Boddington & Räsänen, 2009; Dugdale, 2020; Levesque et al., 2013): it has never produced practical and usable health standards and is not applicable in real-world circumstances because it is neither operational nor measurable (Dugdale, 2020). Although some significant attempts have been made, it is time to admit that utopian conceptions cannot be measured (Leonardi, 2018; Roux, 2016).

The third issue is a serious one that is frequently undervalued and is related to the vastness of the WHO definition of health. A complete state of physical, mental, and social well-being implies a life without poverty, evil, injustices, marginalisation, crime, persecution, and war, which are mainly challenges of living that cannot be considered medical issues (Manwell et al., 2015). It should be noted that this conception of health is potentially so broad that it confounds scientific assessments with moral and political arguments (Manwell et al., 2015). This notion of health was viewed as much more of a political statement than a scientific one, or a term much more closely related to happiness than health, because it implicitly contains existential issues, ethical arguments, moral implications, and political dimensions (Boddington & Räsänen, 2009; Carter, 2014; Little et al., 2012).

The growing medicalization of society is the fourth important factor. The broad scope of this definition and the idealised view of wellbeing cause all facets of life to get medicalized, and as a result, issues that are under the purview of other fields or the social sphere are viewed as falling under the purview of medicine (Bodai et al., 2018; Davis, 2015). If the nature of the problem is perceived to be medical, a medical remedy will be sought rather than any other form of treatment, even though this effect is certainly unintended. This indicates that every small departure from physical and psychological norms raises the possibility of health issues, which would in turn