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PHYSICAL ACTIVITY AND ITS ASSOCIATION WITH ANXIETY AMONG ELDERLY INDONESIANS WITH DIABETES MELLITUS: FINDINGS FROM A NATIONAL SURVEY

Adi Putra Pamungkas[1], Yuni Asri[2*], Tien Aminah[3], Heny Nurmayunita[4]

[1-4]Department of Nursing, Faculty of Health and Science, Institute of Technology Science and Health RS dr Soepraoen Kesdam V/Brawijaya, Malang, Indonesia.

(*Correspondence: yuniasri@itsk-soepraoen.ac.id)

ABSTRACT

Introduction: Anxiety is a common but often under-recognized mental health issue among elderly individuals with diabetes mellitus. Although physical activity has been shown to reduce anxiety in several populations, evidence among older adults with diabetes in Indonesia remains limited. **Methods:** This study analyzed 4,130 adults aged ≥60 years with self-reported diabetes mellitus from the 2023 Indonesia Health Survey (Survei Kesehatan Indonesia/SKI). Anxiety was assessed using self-reported symptoms, and independent variables included sociodemographic, socioeconomic, clinical factors, and levels of physical activity. Chi-square tests were conducted, accounting for complex survey design. **Results:** The prevalence of anxiety among older adults with diabetes was 6.8%. Anxiety was significantly associated with age (p = 0.001), employment status (p = 0.001), moderate physical activity (p = 0.001), and heavy physical activity (p = 0.017). No significant associations were found between gender, marital status, education, residence, or diabetes type. **Conclusion:** Physical activity is inversely associated with anxiety among older Indonesians with diabetes mellitus. Promoting regular physical activity may serve as a low-cost, non-pharmacological strategy to improve mental health in this vulnerable population.

Keywords: anxiety, diabetes mellitus, elderly, Indonesia National Health Survey, physical activity.

AKTIVITAS FISIK DAN HUBUNGANNYA DENGAN KECEMASAN DI KALANGAN LANSIA INDONESIA PENDERITA DIABETES MELLITUS: TEMUAN DARI SURVEI KESEHATAN INDONESIA

ABSTRAK

Pendahuluan: *Kecemasan adalah masalah kesehatan mental yang umum tetapi seringkali kurang dikenali di antara individu lanjut usia dengan diabetes melitus. Meskipun aktivitas fisik telah terbukti mengurangi kecemasan di beberapa populasi, bukti di antara orang dewasa lanjut usia dengan diabetes di Indonesia masih terbatas.* ***Metode:*** *Studi ini menganalisis 4.130 orang dewasa berusia ≥60 tahun dengan diabetes melitus yang dilaporkan sendiri dari Survei Kesehatan Indonesia (SKI) 2023. Kecemasan dinilai menggunakan gejala yang dilaporkan sendiri, dan variabel independen meliputi faktor sosiodemografis, sosioekonomis, klinis, dan tingkat aktivitas fisik. Uji chi-square dilakukan, dengan mempertimbangkan desain survei yang kompleks.* ***Hasil:*** *Prevalensi kecemasan di antara orang dewasa lanjut usia dengan diabetes adalah 6,8%. Kecemasan secara signifikan berhubungan dengan usia (p = 0,001), status pekerjaan (p = 0,001), aktivitas fisik sedang (p = 0,001), dan aktivitas fisik*

berat (p = 0,017). Tidak ditemukan hubungan yang signifikan antara jenis kelamin, status perkawinan, pendidikan, tempat tinggal, atau jenis diabetes. ***Kesimpulan:*** *Aktivitas fisik berbanding terbalik dengan kecemasan di kalangan lansia Indonesia penderita diabetes melitus. Mendorong aktivitas fisik secara teratur dapat menjadi strategi berbiaya rendah dan non-farmakologis untuk meningkatkan kesehatan mental pada populasi rentan ini.*

Kata Kunci: *aktivitas fisik, diabetes melitus, kecemasan, lansia, Survei Kesehatan Indonesia.*

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Correspondence
Name: Yuni Asri
Affiliation: Department of Nursing, Faculty of Health and Science, Institute of Technology Science and Health RS dr Soepraoen Kesdam V/Brawijaya, Malang, Indonesia
Address: Jl. Sudanco Supriadi 22, Malang, Indonesia
Email: yuniasri@itsk-soepraoen.ac.id

INTRODUCTION

Diabetes mellitus (DM) is one of the most prevalent chronic conditions affecting the elderly population worldwide, including Indonesia (Alfaqeeh et al., 2024; Oktaviyani et al., 2022; Azam et al., 2021). As life expectancy increases, the number of older adults living with diabetes is projected to grow significantly (Chentli et al., 2015; Karter et al., 2023). According to global estimates, individuals aged ≥60 years comprise nearly half of the diabetic population (Ogurtsova et al., 2022). Indonesia is experiencing one of the fastest demographic transitions in Southeast Asia, with the proportion of adults aged ≥60 years expected to reach 19-21% by 2045 (Zaky, 2025). This demographic shift, along with rapid urbanization and lifestyle changes, has contributed to rising cases of type 2 diabetes (Asri et al., 2025; Liberty et al., 2024; Khan et al., 2020). In addition to its well-known physical complications, diabetes among older adults is closely associated with psychological distress, particularly anxiety (Asri et al., 2025; Shen et al., 2022).

Anxiety is an important but often overlooked mental health condition in diabetes care (Kalra et al., 2018; Oğuz, 2018). It affects patients' ability to manage their illness, reduces quality of life, and worsens clinical outcomes through poor glycemic control and reduced treatment adherence (Huang et al., 2024; Asri et al., 2024). Among older adults, anxiety is frequently underdiagnosed due to overlapping symptoms with chronic diseases and aging (Sayyed Kassem & Aron, 2020; Koychev & Ebmeier, 2016). Cultural factors in Indonesia, such as strong norms to suppress emotional expression, stigma toward mental illness, and reliance on family-based coping, may further reduce the likelihood of older adults openly

reporting anxiety symptoms, potentially masking the true burden.

Although physical activity is widely recognized as a protective factor for mental and physical health, its association with anxiety among older adults with diabetes remains underexplored in Indonesia (Asri et al., 2025; Azam et al., 2021; Mahmudiono et al., 2021; Nurhasanah et al., 2024; Tehuayo et al., 2021). Studies from other populations suggest that regular physical activity can reduce anxiety risks by regulating neurochemical pathways, improving sleep, and increasing self-efficacy (Cahyanto & Viana, 2025; Salam et al., 2021; Kandola et al., 2019; Stubbs et al., 2018). Indonesian evidence also indicates that older adults with higher physical activity levels tend to have better mental well-being, although these studies were not specific to diabetic populations (Nurhasanah et al., 2024; Mahmudiono et al., 2021). However, no research using national datasets has specifically examined anxiety and physical activity among Indonesian older adults with diabetes.

Most mental health research on diabetes in Indonesia has focused on depression, leaving anxiety insufficiently studied (Isfandari et al., 2023; Azam et al., 2021) Additionally, national health data have not been systematically analyzed to understand the influence of moderate and heavy physical activity on anxiety symptoms among diabetic elders (McDowell et al., 2019; Hallgren et al., 2019). Given Indonesia's diverse geography, socioeconomic disparities, and cultural variations in health behaviors, it is critical to examine these associations using nationally representative data (Asri et al., 2025; Adisasmito et al., 2020; Kusumawardani et al., 2018).

Despite the recognized benefits of physical activity, evidence regarding its relationship with anxiety among Indonesian elderly with diabetes remains limited. The 2023 Indonesia Health Survey (SKI) offers an opportunity to address this gap through its extensive demographic, behavioral, and health data. This study therefore aimed to investigate the association between physical activity and anxiety among older Indonesians with diabetes mellitus using nationally representative data.

METHODS

Data Sources and Study Design

This study utilized secondary data from the 2023 Indonesia Health Survey (Survei Kesehatan Indonesia/SKI), a nationally representative cross-sectional survey conducted by the Indonesian Ministry of Health. The SKI 2023 applied a multistage stratified sampling design to ensure representation across provinces, urban and rural areas, and demographic groups. The dataset contains

comprehensive information on sociodemographic characteristics, health behaviors, chronic disease diagnoses and mental health indicators.

Study Population

The target population for this study was elderly individuals aged ≥ 60 years who were identified in the SKI 2023 dataset as having been diagnosed with diabetes mellitus (DM), either type 1 or type 2. From a total of over 200,000 respondents surveyed, a subsample of 4,130 elderly individuals with diabetes mellitus was extracted and analyzed.

Inclusion and Exclusion Criteria

Inclusion Criteria: Respondents aged 60 years or older. Respondents with self-reported physician diagnoses of diabetes mellitus (type 1 or type 2). Respondents with complete data for all variables of interest, including physical activity and anxiety status, were included. Exclusion Criteria: Respondents aged below 60 years. Elderly respondents without a confirmed diagnosis of diabetes mellitus. Respondents with missing or incomplete data on key variables (e.g., age, activity level, and anxiety status).

Variables and Measurements

The dependent variable in this study was anxiety status, assessed using a single self-reported item asking participants whether they had recently experienced symptoms of anxiety. Responses were categorized into "yes" (presence of symptoms) and "no" (absence of symptoms). The SKI does not employ validated psychological instruments such as the GAD-7 or HADS; instead, it uses single-item assessments consistent with national mental health surveillance. Although single-item self-reported measures may be less sensitive than standardized scales, they are widely used in large population surveys because they reduce respondent burden and allow broad monitoring within national surveillance frameworks. This methodological characteristic and its limitations were considered in interpreting the findings.

Independent variables included age group (young elderly aged 60-69 years, middle elderly aged 70-79 years, and old elderly aged ≥80 years), gender, marital status, educational level (low, medium, high), employment status (employed or unemployed), area of residence (urban or rural), and type of diabetes mellitus (type 1 or type 2). Physical activity was assessed based on self-reported participation in moderate and heavy activities. Heavy activity referred to physically demanding tasks such as lifting heavy loads, farming work, or long-distance walking, whereas moderate activity included regular walking, household chores, and light cycling. Each physical activity variable was categorized

as “yes” for regular participation or “no” for no regular participation.

Statistical Analysis

All statistical analyses were performed using SPSS version 27.0.1 (IBM Corp., Armonk, NY, USA). The sampling weights included in the dataset were used to account for the complex survey design, which involved stratification, clustering, and unequal selection probabilities, thereby producing more accurate and representative estimates. Descriptive statistics were calculated to describe the characteristics of the study population. Bivariate analysis using chi-square tests was conducted to examine the associations between independent variables and anxiety status. Statistical significance was set at $p < 0.05$.

Ethics Approval

This study was conducted using secondary data obtained through a formal request process and in accordance with data confidentiality regulations. The data request was supported by a confidentiality agreement (No. FRM/SMKI-PUSDATIN/70/0108/2024) and was approved by ticket number 240675B7CC9C4327. This study adhered to all applicable ethical guidelines and regulations regarding participant privacy and data protection. Data access and request procedures are available publicly through the following link: https://www.badankebijakan.kemkes.go.id/data-mikro-ski/.

RESULTS

A total of 4,130 older adults with diabetes mellitus were included in the analysis. The prevalence of anxiety was 6.8% (n = 280), while 93.2% (n = 3,850) reported no anxiety symptoms. Most participants were young elderly aged 60-69 years (74.3%), female (56.5%), married (69.8%), and living in urban areas (72.2%). Nearly half had low education levels (48.6%), and more than half were employed (57.8%). Type 2 diabetes was predominant (73.7%). Approximately half of the respondents engaged in moderate physical activity (52.3%), whereas only 11.5% reported heavy physical activity. The full distributions are presented in Table 1.

Bivariate analysis showed significant associations between anxiety status and age ($p = 0.001$), employment status ($p = 0.001$), moderate physical activity ($p = 0.001$), and heavy physical activity ($p = 0.017$). Younger elderly (60-69 years) reported the highest proportion of anxiety compared with older age groups. Unemployed respondents reported more anxiety than employed individuals. Both moderate and heavy physical activity demonstrated protective effects, with lower anxiety prevalence among those who reported regular activity. Meanwhile,

gender, marital status, educational level, area of residence, and diabetes type showed no statistically significant associations with anxiety (all $p > 0.05$). See Table 2 for the full cross tabulations.

Table 1. Frequency Distribution of Characteristics Among Elderly With Diabetes Mellitus (n=4130)

Variable	Frequency (n)	Percent (%)
Age (Years)		
Young Elderly (60-69)	308	74,3
Middle Elderly (70-79)	922	22,3
Old Elderly (≥80)	140	3,4
Gender		
Male	1.795	43,5
Female	2.335	56,5
Marital Status		
Single	35	0,8
Married	2.883	69,8
Divorced	1212	29,3
Education Level		
Low	2.007	48,6
Medium	1.481	35,9
High	642	15,5
Employment		
Unemployed	1.741	42,2
Employed	2.389	57,8
Area of Residence		
Urban	2.980	72,2
Rural	1.150	27,8
Diabetes Mellitus Type		
Type 1	1.086	26,3
Type 2	3.044	73,7
Heavy Activity		
Yes	477	11,5
No	3.653	88,5
Moderate Activity		
Yes	2.160	52,3
No	1.970	47,7
Anxiety		
Yes	280	6,8
No	3.850	93,2

DISCUSSION

This study comprehensively examined the relationship between anxiety and a broad spectrum of demographic, socioeconomic, and clinical characteristics among older adults living with diabetes mellitus in Indonesia, drawing on nationally representative data to provide robust population-level insights. The analysis identified age, employment status, and physical activity levels (both moderate and heavy) as significant factors associated with anxiety levels in this population. These findings highlight the multifactorial nature of psychological well-being in older adults with chronic illnesses, reflecting the interplay between life-stage transitions, economic security, and health behaviors. The results also underscore the importance of considering not only the medical management of diabetes but also the social determinants of health and modifiable lifestyle factors that can influence mental health outcomes in the aging population. By pinpointing these associations, this study provides a foundation for designing targeted, evidence-based interventions aimed at reducing anxiety and improving the quality of life of older Indonesians with diabetes mellitus.

Specifically, the analysis revealed that younger elderly individuals (aged 60-69 years) exhibited a higher prevalence of anxiety than their older counterparts. This pattern aligns with the findings of Denche-Zamorano et al. (2023), who noted that individuals in the early stages of old age may be more susceptible to lifestyle-related stressors and transitional life events, such as retirement, shifting social roles, and

increased responsibility for dependents. These challenges can disrupt psychological stability and increase the risk of anxiety. In contrast, older age groups may have developed greater emotional resilience and acceptance of chronic illness and age-related changes, resulting in a lower prevalence of anxiety.

Table 2. Relationship Between Anxiety Among Elderly with Diabetes Mellitus Levels Using Chi-Square Analysis (n=4130)

Variable	Category	Anxiety		P-Value
		Yes [n (%)]	No [n (%)]	
Age (Years)	Young Elderly (60-69)	178 (4,3)	2.890 (70,0)	0,001*
	Middle Elderly (70-79)	84 (2,0)	838 (20,3)	
	Old Elderly (≥80)	18 (0,4)	122 (3,0)	
Gender	Male	117 (2,8)	1.687 (40,6)	0,558
	Female	163 (3,9)	2.172 (52,6)	
Marital Status	Single	4 (0,1)	31 (0,8)	0,546
	Married	194 (4,7)	2.689 (65,1)	
	Divorced	82 (2,0)	1.130 (27,4)	
Education Level	Low	141 (3,4)	1.866 (45,2)	0,623
	Medium	101 (2,4)	1.380 (33,4)	
	High	38 (0,9)	604 (14,6)	
Employment	Unemployed	145 (3,5)	1.596 (38,6)	0,001*
	Employed	135 (3,3)	2.254 (54,6)	
Area of Residence	Urban	200 (4,8)	2.780 (67,3)	0,779
	Rural	80 (1,9)	1.070 (25, 9)	
Diabetes Mellitus Type	Type 1	65 (1,6)	1.021 (24,7)	0,225
	Type 2	215 (5,2)	2.829 (68,5)	
Heavy Activity	Yes	20 (0,5)	457 (11,1)	0,017*
	No	260 (6,3)	3.393 (82,2)	
Moderate Activity	Yes	101 (2,4)	2.059 (49,9)	0,001*
	No	179 (4,3)	1.791 (43,4)	

*p<0.05

Employment status was also significantly associated with anxiety, with unemployed individuals reporting slightly higher anxiety levels than employed individuals (Hiswåls et al., 2017). This is consistent with the findings of Priyono and Kim (2025) and Anillo Arrieta et al. (2021), who emphasized that economic inactivity can negatively impact health-related quality of life (HRQoL) and contribute to increased levels of depression and anxiety among individuals with diabetes. The absence of structured daily activities, financial insecurity, and reduced social engagement may further exacerbate psychological distress in this vulnerable group (Sayyed Kassem & Aron, 2020).

Physical activity, both at moderate and heavy intensity levels, has a strong inverse relationship with anxiety (Li et al., 2025; Figueira et al., 2023). Participants who did not engage in regular physical activity were significantly more likely to experience anxiety symptoms (Svensson et al., 2021). This finding aligns with a substantial body of evidence emphasizing

the protective role of physical activity in supporting mental health (Rahmati et al., 2024; White et al., 2024). For example, (Arsh et al., 2023) reported that physical activity significantly reduces depressive symptoms in adults with type 2 diabetes mellitus, even though its influence on glycemic control may be limited. In a similar vein, multiple studies have shown that moderate-intensity physical activity contributes positively to psychological well-being, particularly by reducing depression and anxiety among older adults with diabetes (Kim, 2018; Lee et al., 2021; Hidalgo et al., 2021). The underlying mechanisms are believed to involve neurochemical regulation, improved sleep quality, and enhanced self-efficacy, all of which can mitigate anxiety symptoms in this population.

Interestingly, no statistically significant associations were found between anxiety and gender, education level, area of residence, marital status, or diabetes type (Hwang & Oh, 2024; Nigussie et al., 2023). These findings contrast with those of some international studies, such as Ulambayar et al. (2025), who reported notable gender differences in psychological well-being among individuals with diabetes. The lack of such associations in the present study may be influenced by contextual factors unique to Indonesia, such as strong family based social support systems, communal living environments, and varying levels of access to healthcare services (Mahadevan & Fan, 2025; Ekadinata et al., 2023). These cultural and systemic buffers may help mitigate the impact of certain demographic characteristics on anxiety among elderly individuals with diabetes.

The absence of a significant association between diabetes type and anxiety in this study may reflect a broader under-recognition of psychological comorbidities within routine diabetes care practices (de Groot, 2023). Despite this, a growing body of evidence consistently highlights the bidirectional relationship between type 2 diabetes and mental health disorders, particularly anxiety and depression.

This study examined factors associated with anxiety among older adults with diabetes mellitus in Indonesia using nationally representative data from the 2023 SKI. The findings showed that age, employment status, and levels of physical activity were significantly associated with anxiety, while gender, marital status, education, residence, and diabetes type did not show significant associations. These findings highlight the multidimensional determinants of psychological well-being among elderly individuals with diabetes and reinforce the importance of considering

both social and behavioral factors alongside clinical characteristics.

Younger elderly (60-69 years) experienced higher levels of anxiety compared with those aged 70-79 years and ≥80 years. This pattern aligns with previous research suggesting that early-stage older adults may face more transitional stressors such as retirement, changing social roles, and increasing caregiving or financial responsibilities (Denche-Zamorano et al., 2023). In contrast, older age groups may develop greater psychological adaptation and acceptance of chronic disease trajectories, leading to reduced anxiety with advancing age.

Employment status also displayed a significant association with anxiety. Unemployed respondents reported higher anxiety than those still employed, consistent with studies demonstrating that economic inactivity and loss of structured daily routines can negatively affect psychological well-being in individuals with chronic illnesses (Hiswåls et al., 2017; Priyono & Kim, 2025). Employment in older age may not only provide financial security but also maintain social engagement and personal meaning, which can protect against anxiety.

Physical activity, both moderate and heavy, was inversely associated with anxiety. Respondents who engaged regularly in physical activity showed lower anxiety levels, supporting a substantial body of evidence emphasizing the psychological benefits of movement-based interventions (Li et al., 2025; Figueira et al., 2023; Tehuayo et al., 2021). Multiple pathways may explain this protective effect, including improvements in neurochemical regulation, sleep quality, stress reduction, and enhanced self-efficacy (Kandola et al., 2019; Stubbs et al., 2018). Within the Indonesian context, physical activity may also increase opportunities for social interaction in communal environments such as neighborhood walking groups or community exercise programs, which can further mitigate anxiety (Cahyanto & Viana, 2025; Salam et al., 2021).

In contrast to some international findings, gender, marital status, education, residence, and diabetes type were not significantly associated with anxiety in this study. One possible explanation involves Indonesia's strong family-based social support systems that may buffer psychological stress regardless of gender or marital status (Mahadevan & Fan, 2025). Additionally, cultural norms that emphasize emotional restraint and avoidance of expressing negative feelings, especially among older adults, may reduce reporting of anxiety symptoms across demographic groups (Nurhasanah et al., 2024; Ekadinata et al., 2023). These

cultural factors highlight the importance of contextual interpretation when examining mental health outcomes in diverse settings.

Several limitations should be acknowledged. First, anxiety was assessed using a single-item self-report measure, which is less sensitive than validated psychological instruments such as the GAD-7 or HADS. This approach may lead to underreporting, especially in older adults who may normalize emotional distress or view anxiety as a private matter due to cultural expectations. Second, this study used a cross-sectional design, preventing causal inference. It remains unclear whether low physical activity increases anxiety or whether anxiety reduces motivation to engage in physical activity. Third, important confounders such as duration of diabetes, glycemic control, medication adherence, and presence of complications were unavailable in the SKI dataset, which may limit the explanatory power of the analyses. Lastly, mental health symptoms may be influenced by cultural perceptions, stigma, and variations in health literacy across regions of Indonesia, which could influence response accuracy.

Despite these limitations, the study offers valuable insights for clinical practice and public health. Routine mental health screening should be integrated into diabetes care for older adults, using brief and culturally appropriate tools that can be feasibly applied in primary care settings. Physical activity should also be promoted as a low-cost, accessible, and non-pharmacological intervention for reducing anxiety among older individuals with diabetes. Community-level initiatives, such as group walking programs, senior exercise groups, and culturally responsive movement activities, could be strengthened to increase participation and sustain behavioral changes. Policymakers should consider incorporating mental health and physical activity promotion into national programs targeting elderly and diabetic populations. Future research should utilize longitudinal designs and validated mental health scales to establish causal pathways and evaluate targeted interventions aimed at improving mental health among older Indonesians with diabetes.

The findings of this study have important implications for clinical practice, public health policy, education, and future research. From a clinical perspective, the results underscore the need to integrate mental health screening, particularly for anxiety, into routine diabetes management in older adults. Incorporating simple, validated screening tools during primary care visits or diabetes follow-up appointments could facilitate early detection and timely interventions. Clinicians should also consider adopting a holistic, multidisciplinary approach that

addresses both the physical and psychological aspects of diabetes care, ensuring that anxiety is treated alongside glycemic control and other medical priorities. From a public health standpoint, promoting regular physical activity should be recognized as a cost-effective, non-pharmacological strategy for reducing anxiety and improving mental well-being in elderly populations with diabetes. Community-based initiatives, such as group exercise programs, senior walking clubs, and culturally adapted fitness classes, can increase participation while fostering social connections that provide additional psychological benefits. Policymakers should consider integrating such interventions into existing national programs targeting noncommunicable diseases and aging populations. Healthcare providers should receive specialized training in culturally sensitive mental health communication and motivational strategies for physical activity promotion. Tailored counseling that considers local beliefs, traditions, and barriers, such as mobility limitations, safety concerns, and lack of facilities, may enhance adherence and long-term behavioral changes. Finally, the findings highlight the key directions for future research. Longitudinal studies are needed to establish causal relationships between physical activity and anxiety in elderly diabetic populations, whereas randomized controlled trials could evaluate the effectiveness of specific exercise interventions. Future investigations should explore the role of other potential mediators, such as diet quality, sleep patterns, medication adherence, and social support, in moderating the relationship between physical activity and mental health outcomes. Collectively, these implications emphasize the need for a comprehensive, multilevel approach that bridges clinical care, community engagement, policy development, and research innovation to improve the physical and mental health of older Indonesians living with diabetes.

CONCLUSION

Using nationally representative data from the 2023 SKI, this study found that physical activity is inversely associated with anxiety among older Indonesians with diabetes mellitus, with an overall anxiety prevalence of 6.8%. Age and employment status were also significant correlates, while gender, marital status, education, residence, and diabetes type showed no meaningful associations. These findings underscore the need to integrate simple, culturally appropriate anxiety screening tools into routine diabetes care for older adults in Indonesia. Promoting safe, accessible physical activity, through community walking groups, senior exercise programs, or tailored primary care

counseling, may serve as an effective non-pharmacological approach to improve mental well-being in this population. A coordinated effort involving clinicians, community organizations, and policymakers is essential to strengthen mental health and lifestyle-based interventions for older adults with diabetes.

Future research should employ longitudinal study designs to better clarify causal pathways between physical activity and anxiety and investigate how changes in activity levels influence psychological outcomes over time. Additionally, randomized or quasi-experimental exercise-based interventions are needed to evaluate the effectiveness, feasibility, and cultural acceptability of structured physical activity programs tailored for older Indonesians living with diabetes. Expanding research in these areas will help inform more targeted, evidence-based strategies for improving mental health among aging populations with chronic diseases.

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DATA AVAILABILITY STATEMENT

The dataset analyzed in this study was obtained from the 2023 Indonesia Health Survey (Survei Kesehatan Indonesia/SKI), which is managed by the Indonesian Ministry of Health. Access to the dataset is restricted and requires an official request and approval from the Ministry of Health to ensure compliance with national data governance policies and participant confidentiality regulations. Interested researchers may submit a formal data request through the Ministry of Health's official data repository at the following link:

https://www.badankebijakan.kemkes.go.id/data-mikro-ski/.

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