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# The Factor Analysis of the Components of the Resilience among Senior Citizens on the Continuing Exercise Behaviors

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**Abstract**

This study aimed to analyze the components of resilience related to continuing exercise behaviors among senior citizens. A total of 100 older adults were selected through accidental sampling at the Phanat Nikhom Municipality sports field, located in the district with the highest proportion of elderly in Chonburi Province. Data were collected from February 1 to March 31, 2023, by using a resilience-based instrument. Exploratory Factor Analysis with principal component extraction and Varimax rotation was employed. The results identified four components with eigenvalues greater than 1.0, accounting for 80.57% of the total variance. These components were as follow: (1) perceived competence and health goals, (2) health care planning ability, (3) support for Exercise Engagement, and (4) learning and adaptability. All variables showed factor loadings above 0.50, indicating strong contributions to resilience in sustaining exercise among older adults.

**Keywords**: **Factor Analysis, Resilience, Senior Citizens, Continuing Exercise, Behavior**

## 1. Introduction

Regular exercise is a significant challenge for older adults due to the natural physical decline associated with aging. However, empirical evidence suggests that consistent physical activity contributes to increased longevity, enhanced quality of life, and reduced risk of disability among the elderly (Kongphet, C., 2019). This study adopts the resilience framework, which includes three key components: I Am (personal identity, such as self-worth and optimism), I Have (external support from family, community, and access to resources), and I Can (skills and abilities). Resilience is defined as the capacity to recover, adapt, and persist despite adversity, and is widely recognized in both psychology and health promotion. Chonburi Province, Thailand, has seen a steady rise in its elderly population, reaching 237,816 individuals in 2022 (15.24% of the total population). Notably, Phanat Nikhom District reported the highest elderly proportion at 23.45%, signaling the province's transition into an aged society and emphasizing the need for targeted strategies to support the health and well-being of older adults (Chonburi Provincial Statistical Office, 2023).

## 2. Methods

This quantitative survey research involved 100 participants and was conducted at the municipal sports field in Phanat Nikhom District, Chonburi Province, Thailand, using accidental sampling. The study was part of a larger project on developing an integrated model for holistic elderly care. The research instrument, based on the resilience framework (I Am, I Have, I Can), was validated by experts with IOC values ranging from 0.87 to 1.00. Data were collected from February 1 to March 31, 2023. Exploratory Factor Analysis (EFA) was performed using principal component extraction and Varimax orthogonal rotation. Statistical significance was assessed at the 0.05 level with 80% power, following guidelines for factor loading relative to sample size (Hair et al., 2019).

## 3. Results and Discussion

The sample predominantly consisted of male participants (61%), with a mean age of 67 years. Approximately 85% were married, and 70% engaged in physical exercise more than three times per week. Over 60% had completed primary education. The majority were either retired, self-employed, or business owners. Notably, 61% of the participants reported no existing health problems.

A Principal Component Analysis (PCA) with Varimax orthogonal rotation was performed, resulting in the extraction of four components with eigenvalues exceeding 1.0. These findings indicate that the 14 variables converged into four common factors, accounting for a cumulative

variance of 80.57%. All variables demonstrated factor loadings above 0.55 within their respective components, as presented in Table 1.

**Table 1. Results of Orthogonal Rotation Using the Varimax Method**

| Component | Component Name | Explained Variance of Extracted Components | | |
|---|---|---|---|---|
| | | Total Eigen value | % of Variance | Cumulative % |
| 1 | Perceived Self-Efficacy and Health Goals | 3.086 | 30.860 | 30.860 |
| 2 | Ability to Plan for Health Care | 2.273 | 22.730 | 53.591 |
| 3 | Support for Exercise Engagement | 1.659 | 16.593 | 70.184 |
| 4 | Ability to Learn and Adapt | 1.039 | 10.388 | 80.572 |

(KMO Measure of Sampling = .669, Chi-Square = 502.974, df =45, $p$ =.00)

All variables demonstrated factor loadings above 0.55, confirming strong construct validity. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.669, exceeding the acceptable threshold of 0.50, indicating the suitability of the data for factor analysis. Factor analysis identified four core components of resilience contributing to sustained exercise among senior citizens: (1) Perceived Competence and Health Goal Orientation. Defined by three variables with factor loadings between 0.886 and 0.933, this component reflects self-worth, confidence in one's abilities, and the presence of clear health goals. It accounted for 30.86% of the variance in resilience for continued exercise. (2) Health Self-Management and Planning Ability. Comprising three variables with loadings from 0.743 to 0.898, this component captures the ability to independently plan exercise, manage time effectively, and monitor personal performance. It explained 22.73% of the variance. (3) Support for Exercise Engagement. Represented by two variables with loadings from 0.933 to 0.940, this component involves social support and access to exercise facilities and equipment. It accounted for 16.53% of the variance. (4) Learning and Adaptability. Consisting of two variables with loadings between 0.732 and 0.892, this component reflects the ability to learn exercise techniques and adapt to obstacles. It explained 10.39% of the variance.

Table 2 Factor Loadings of Variables within Each Component

| Variables | Component | | | | Communality |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | |
| Perceives self-worth | 0.933 | | | | 0.890 |
| Confidence in one's own abilities | 0.931 | | | | 0.894 |
| Had clear health goals | 0.886 | | | | 0.806 |
| Able to independently plan exercise | | 0.898 | | | 0.860 |
| Able to allocate time for exercise | | 0.868 | | | 0.780 |
| Able to monitor and evaluate exercise performance | | 0.743 | | | 0.585 |
| Had friends or was in a community that supports exercise | | | 0.940 | | 0.894 |
| Access to appropriate exercise facilities or equipment | | | 0.933 | | 0.891 |
| Able to learn appropriate exercise techniques | | | | 0.892 | 0.798 |
| Able to adapt when facing barriers to exercise | | | | 0.732 | 0.661 |
| Sum of Squares | 2.589 | 2.216 | 1.846 | 1.406 | 8.057 |
| Percentage of Trace | 25.893 | 22.161 | 18.457 | 14.061 | 80.572 |

Extraction Method: Principal Component Analysis, Rotation Varimax

## 4. Conclusion

This study identified 4 principal components of resilience among senior citizens that influence continuing exercise behaviors:

1. Perceived Self-Efficacy and Health Goals. This component comprises 3 variables, namely as a sense of self-worth, confidence in personal ability, and the presence of clear health-related goals. Grounded in Bandura's Self-Efficacy Theory, it emerged as the most influential factor in supporting long-term engagement in health-promoting behaviors, particularly regular physical activity. (Bandura, A., 1977, Xie, L., et al.,2025**,** Dawe, J., et al., 2024 and Toros, T., et al., 2023)
2. Ability to Plan for Health Care. This component includes 3 variables, namely the capacity to independently plan exercise routines, manage time effectively, and monitor personal progress. The findings highlight the critical role of self-regulation, including planning and self-assessment, in facilitating exercise adherence among the elderly. (Yu, S., et al., 2025).
3. Support for Exercise Engagement. This component involves 2 variables, namely social support from peers or community, as well as access to appropriate facilities and equipment for exercise. The results underscore the importance of a supportive social and physical environment in enhancing motivation and reducing barriers to physical activity. (Steinhoff, P. & Reiner, A., 2024, Tou, N.X., et al., 2024)
4. Ability to Learn and Adapt. This component reflects 2 variables, namely the ability to

acquire new exercise-related skills and to adapt when facing challenges. The findings align with evidence on the benefits of neuroplasticity and cognitive flexibility in older adults, reinforcing the role of continuous learning and adaptability in sustaining exercise behavior. (Leanos, S., et al., 2023), Norgaard, J. E., et al., 2021)

Collectively, these 4 components constitute a comprehensive framework that explains the psychosocial and behavioral factors contributing to the resilience of senior citizens on continuing exercises. The findings support the development pathway of a new conceptual model that systematically delineates the psychosocial and environmental determinants of resilience factor in senior citizens. This model provides a robust foundation for designing targeted health promotion interventions and informing policy strategies to enhance long-term physical activity and well-being in aging populations.

**References**

1. Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.

2. Chonburi Provincial Statistical Office. (2023). *Statistical report of the elderly population in Chonburi Province, 2022*. National Statistical Office of Thailand.

3. Dawe, J., et al. (2024). Measuring Self-Efficacy for Exercise among Older Adults: Psychometric Properties and Measurement Invariance of a Brief Version of the Self-Efficacy for Exercise (SEE) Scale. Healthcare 12, 1-13. doi: 10.3390/healthcare12161642

4. Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (8th ed.). Cengage Learning.

5. Kongphet, J. (2019). *Exercise among older adults*. Journal of Nursing Science, 68(4), 64–71. https://he01.tci-thaijo.org/index.php/pck/article/view/249205

6. Leanos, S., et al. (2023). *The impact of learning multiple real-world skills on cognitive abilities and functional independence in healthy older adults*. The Journals of Gerontology, 78(8), 1305–1317. doi: 10.1093/geronb/gbad053 Advance access publication 12 May 2023

7. Norgaard, J. E., et al. (2021). Effects of gait adaptability training on falls and fall-related fractures in older adults: a systematic review and meta-analysis. Age and Ageing, 50(6), 1914–1924.

8. Steinhoff, P. & Reiner, A. (2024). Physical activity and functional social support in community-dwelling older adults: a scoping review. BMC Public Health 24, 1-13. doi: 10.1186/s12889-024-18863-6

9. Toros, T., et al. (2023). *The Impact of Regular Exercise on Life Satisfaction, Self-Esteem and Self-Efficacy in Older Adults*. Behavioral Sciences, 13(9), 714.

10. Tou, N.X., et al. (2024). Effectiveness of community-based Baduanjin exercise intervention for older adults with varying frailty status: a randomized controlled trial. European Review of Aging and Physical Activity 21, 1-11, doi: 10.1186/s11556-024-00363-6

12. Xia, L., et al. (2025). *Association between exercise self-efficacy and physical activity in older adults: A systematic review*. Frontiers in Psychology 16, 1-17. doi:10.3389/fpsyg.2025.1525277

13. Yu, S., et al. (2025). Understanding regular exercise behavior in frail older adults: a structural equation model based on social-cognitive variables. BMC Geriatrics 25, 1-11, doi: 10.1186/s12877-025-05702-5