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Analysis of the Role of Outbound Participation on the Functional Mobility of the Elderly

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Abstract:

- ***Background*:**

The aging process triggers a decline in functional mobility in the elderly. This decline will limit functional independence in daily activities. Outdoor activities such as outbound have the potential to maintain the physical fitness of the elderly. The purpose of this study was to analyze the role of outbound participation on the functional mobility of the elderly in Dukuh Tempuran, Bolon Village, Colomadu District, Karanganyar Regency, Central Java, Indonesia.

- ***Method*:**

This study used a quantitative pre-experimental design with a one-group pretest-posttest design. The population of the elderly in Dukuh Tempuran, Bolon Village, Colomadu District, Karanganyar Regency, Central Java, Indonesia was 130 people. The sampling technique used purposive sampling to obtain a total sample of 90 elderly. Functional mobility was measured using the Berg Balance Scale instrument. Data analysis of different tests.

- ***Results*:**

The results showed a significant increase in functional mobility after participating in outbound activities where the significance value was 0.000 p <0.05. Elderly who actively participated in outbound activities showed better balance so that this activity could stimulate the motoric and physical coordination of the elderly positively.

- ***Conclusion*:**

Participation in outbound activities plays a significant role in increasing the functional mobility of the elderly. This activity can be a recommendation for a preventive health program for the elderly.

Keywords: *Elderly, Functional Mobility, Outbound, Physical Activity.*

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I. INTRODUCTION

Aging is a natural phase in human life characterized by a gradual decline in physiological, psychological, and anatomical functions. The World Health Organization (WHO) defines individuals aged 60 and over as elderly. Globally and nationally, the elderly population continues to experience a massive surge. This population increase presents significant challenges to the health sector, particularly the phenomenon of aging, which is closely related to decreased muscle mass (sarcopenia) (Freiberger et al., 2022), decreased joint strength, and the degradation of the central nervous system, which regulates body balance. One essential component of healthy aging is mobility.

The most crucial biological impact of this aging process is the gradual decline in functional capacity in older adults, often manifested in functional limitations, including mobility limitations (Tuna HD, et al., 2009; Gill et al., 2012). Functional mobility is defined as a person's physical ability to move freely and independently to carry out daily activities. Although there is currently no standard definition of mobility in the elderly, most concepts and models understand mobility as a person's ability to move independently around their environment (Mitchell et al., 2018). Determinants of mobility include environmental, cognitive, physical, financial, psychosocial, cultural, and gender factors. Meanwhile, the domain of mobility ranges from physical, cognitive, neuromuscular, to psychological. Age-related physiological changes are associated with mobility in community-dwelling older adults. Balance changes with age, occurring due to postural control in static conditions, or changes in balance due to decline in the visual, sensory, and vestibular systems (Manchester et al., 1989; Choy et al., 2003). However,

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according to Ferrucci et al. (2016), mobility is a hallmark of aging and a crucial pillar in assessing the independence status of older adults. Because mobility is such a crucial factor, early identification of mobility limitations in the elderly and effective interventions to modify these limitations are essential.

Mobility limitations are reported to be increasingly common in older adults, affecting approximately 35% of people aged 70 years and a significant proportion of those aged 80 years and older (Cummings et al., 2014; Musich et al., 2018). Decreased outdoor mobility is strongly associated with an increased risk of falls, decreased quality of life (Shumway cook et al., 2005; Gill et al., 2006), social and personal withdrawal (Mollenkopt H, et al., 1997), higher disability in performing activities of daily living (ADL) (Jacobs JM et al., 2008), transition to a nursing home (Hadek A, 2015), and death (Inoue K, et al., 2006). The mobility component begins with the elderly walking outdoors and ends with reaching the outdoor mobility destination.

Low levels of outdoor mobility in older adults can be caused by several factors affecting both the environmental and individual levels (Smith AR et al., 2016; Rantanen 2013). Outdoor mobility in older adults is considered physically, psychologically, and cognitively challenging compared to mobility in controlled environments, especially at home. This can occur because of uneven surfaces, stairs, and obstructed walkways that pose challenges to strength, balance, and coordination (Smith AR et al., 2016). The components of outdoor mobility begin with a supervised walk outside and reach the outdoor mobility destination. Many older adults require navigation of outdoor environments by walking or using transportation, which can foster self-confidence and self-efficacy in older adults (Bergland A et al., 2010) as well as cognitive abilities to be able to adapt to the ever-changing demands of older adults (De Silva NA et al., 2019). Thus, outdoor mobility can be negatively impacted by physical, psychological, and cognitive impairments (Smith AR et al., 2016; Rantakokko M, et al., 2009). Optimal outdoor mobility has the potential to maintain and improve the quality of life of older adults by increasing opportunities for physical activity that promotes independence (Portegijs, et al., 2020) while reducing the risk of comorbidities and diseases (Jacobs JM et al., 2008) and social isolation (Mollenkopt H, et al., 1997).

To anticipate this decline in physical movement function, various communal physical exercise interventions have been developed. One potential recreational and therapeutic method that has not been widely explored specifically in the geriatric context is outbound activities. Unlike static indoor sports, participation in outbound activities combines the stimulation of physical play, dynamic balance training, motor coordination, and social interaction in the open air. The outbound activities selected were safe adaptive movements for the elderly, prioritizing physical, cognitive, social, language, and life satisfaction aspects. The hope is that the quality of life of the elderly can be improved by reducing the need to adapt to increased dependency (Saletti Cuesta et al., 2018).

Although outdoor activities have theoretical benefits for physical fitness, the researchers specifically sought to objectively analyze the role of frequency and intensity of outbound participation on functional mobility components in the elderly, a practice currently very limited by researchers. In selecting these outbound activities, the researchers referred to the World Health Organization (WHO), which provides guidance on a series of interventions that can be designed to optimize function and reduce disability in individuals with health conditions as they interact with their environment (WHO, 2025). Typically, most community programs still focus on conventional exercise such as elderly gymnastics or walking. Based on the explanation above, the purpose of this study was to determine the effectiveness of outbound participation on functional mobility in the elderly by combining outdoor mobility with physical activity, specifically outbound activities for the elderly.

II. MATERIAL AND METHOD

This study employed a quantitative approach with a pre-experimental design and a one-group pretest-posttest design. The researchers sought to uncover the influence of the independent variable, outbound participation, and the dependent variable, functional mobility.

The selected population was the elderly living in Tempuran Hamlet, Bolon Village, Colomadu District, Karanganyar Regency, Central Java, Indonesia, with a total of 130 elderly members. The sample was selected using a purposive sampling technique. The inclusion criteria were: 1) Tempuran residents aged 50-90 years, 2) registered as active elderly members of Tempuran Hamlet, Bolon Village, Colomadu District, Karanganyar Regency, Central Java, Indonesia, 3) elderly without mobility impairments, and 4) elderly willing to participate in outbound activities until completion. Based on the inclusion criteria, 90 samples completed the intervention.

In this study, the focus of the research variables was divided into two: independent variables and dependent variables. The independent variable in this study was outbound participation, and the dependent variable was functional mobility. The data sources used in this study were primary (observations and interviews) and secondary (data from integrated health posts).

A comparative analysis was used to determine the effectiveness of outbound participation on functional mobility in the elderly in Dukuh Tempuran, Bolon Village, Colomadu District, Karanganyar Regency, Central Java, Indonesia. Data processing was conducted after all measurement results were collected. The data were analyzed using the Berg Balance Scale instrument before and after the intervention, using a one-group pretest-posttest design. The intervention session lasted 120 minutes. This outbound intervention program addressed four aspects: physical, cognitive, neuromuscular, and psychological (behavioral), with eight activities provided. Data testing was performed using SPSS. The data type was interval data. Data analysis began with a normality test using the Kolmogorov-Smirnov test because the sample size was greater than 50. This

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normality test was used to determine the distribution of the data. If the result is (p>0.05), the data is normally distributed, and a paired t-test was then performed. Data analysis was carried out using the Kolmogorov-Smirnov normality test and the paired sample T-test.

III. RESULTS

This research was conducted at the Elderly Posyandu in Dukuh Tempuran, Bolon Village, Colomadu District, Karanganyar Regency, Central Java, Indonesia. Where the elderly population is 130 people. The sampling method used a purposive sampling technique with the following criteria: 1). Tempuran residents aged 50-90 years, 2). Registered as active elderly members in Dukuh Tempuran, Bolon Village, Colomadu District, Karanganyar Regency, Central Java, Indonesia, 3). Elderly who have no mobility problems, 4). Elderly willing to participate in outbound activities until completion. The implementation of this research follows a module that is carried out twice, with a time of 120 minutes. In taking research interventions, researchers measured using the Berg Balance Scale instrument with the aim of knowing functional mobility in the elderly which was carried out twice before the intervention and after the intervention. In the end, the sample that participated in the intervention was 90 people with demographic characteristics (Table 1) predominantly female gender 73 people (81%) while male 17 people (19%), elderly aged 60-74 years 40 people (44%), middle aged 45-59 years 25 people (28%) and elderly elderly 25 people (28%), still have a partner 60 people (67%) while those who are divorced or divorced are 30 people (33%) and level of education elementary school 30 people (34%), no school 20 people (22%), junior high school 20 people (22%) high school 10 people (22%).

➢ *Demographic Characteristics of Participants*

Demographic data for the 90 participants are presented in Table 1

Table 1 Demographic Characteristics of Participants

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	17	19
	Female	73	81
Age	Middle Age (45-59)	25	28
	Elderly Age (60-74)	40	44
	Older Adults Age (75-90)	25	28
Married	Married	60	67
	Divorced	30	33
Education	No schooling	20	22
	Elementary School	30	34
	Junior High School	20	22
	High School	10	11
	Bachelor's Degree	10	11

➢ *Analysis Paired Sample T-Test*

Table 2 Paired Sample T-Test Results Functional Mobility (n = 90)

Functional Mobility	Pre-Test Mean Score	Post-Test Mean Score	Mean Difference (Δ)	Significance (p-value)
Berg Balance Scale	3.30	5.80	+2.50	0.000

IV. DISSCUSSION

The results of this study indicate that participation in a structured adaptive outbound intervention significantly improves functional mobility in the elderly (Table 2). Physiologically, adaptively designed outbound activities include a variety of movements such as walking, balance, gross motor skills, and fine motor coordination, such as grasping light objects. This physical stimulus directly trains proprioception, the body's ability to sense joint position and movement in space (Park K & Santos DA, 2022).

Dynamic outdoor exercise reactivates muscle motor units and slows the process of sarcopenia (the loss of muscle mass due to aging) (Cochrane, 2022). Multidirectional movements performed by the quadriceps femoris and gastrocnemius muscles are fully responsible for the transition phase from sitting to standing and for gait stability (WHO, 2025). The muscular biomechanical advantages of outbound compared to conventional elderly exercise lie in the environmental and cognitive adaptation components. During outdoor activities, seniors are forced to continuously adjust their steps to the contours of the ground and the shape of the activity (Byun, JE, & Kang, EB, 2016). This requires the involvement of the brain's executive functions and intense visual-motor coordination.

This group-based outbound activity approach also triggers the release of endorphins and lowers cortisol levels. The pleasant atmosphere reduces anxiety about falling, which is often a major psychological barrier for older adults to actively move independently in daily life. Overall, the results of this study strengthen empirical evidence that a nature-based, communal physical activity approach has greater therapeutic value for the elderly population. By maintaining functional mobility, older adults can maintain their independence in carrying out daily activities without relying entirely on family or caregivers.

Various outbound interventions, including physical activity and exercise with balance and muscle strengthening components, are effective in reducing falls and improving

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physiological and functional performance in older adults. While it seems clear that physical activity (outbound) is an important component of any fall reduction program, there is no one-size-fits-all intervention approach, and the type of activity should consider various factors, including the level of fall risk, physical risk factors, and physical activity preferences of older adults (Isaacs AJ, 2007). Outbound activity itself has an impact on balance.

Motor tasks such as sitting to standing and gait tend to benefit better from higher intensity. In addition to high-intensity exercise, low-intensity exercise also offers benefits such as increased safety, ease of practice, less supervision required, and greater ease of inspiration in groups of adults. Reduced postural sway can be achieved even with low levels of physical activity intensity.

Most of the studies reviewed used gym-style exercise programs with specific individual or group exercises. These activities included balance and strength training, customized walking programs, standing, sitting, walking, and balancing exercises during daily activities, supervised stretching, endurance, coordination, and strengthening exercises. Weight training and the use of stationary bicycles were also used.

Robitaille et al. [46] developed a diverse group-based fall prevention program for independent older adults with a history of falls or who were concerned about their balance, and found that the intervention significantly improved static balance and mobility. They concluded that the structured, group-based, outdoor participation activities offered could successfully improve balance abilities among older adults concerned about falls and enable them to perform daily functional mobility.

An easy-to-follow and inexpensive exercise program may be more appealing to older adults, who can demonstrate significant improvements in dynamic balance performance, increased VO2 max, and decreased fat mass, suggesting that such programs may have a positive effect on functional mobility in older adults.

The effects of regular walking on postural stability in older adults may be beneficial for maintaining good balance and for the cardiovascular system. They found that healthy older adults who walked regularly since retirement had better postural control, particularly in static balance, than those who did not. Although older adults who walked regularly walked significantly more than those who did not walk, they experienced fewer falls. This study examined the effects of a lower-extremity strengthening exercise program, gait training, and postural control.

Functional limitations increase with age and due to demographic changes. Mobility is a key pillar of function and limitations in community-dwelling older adults. The role of muscle mass in mobility is much smaller than previously thought. There is increasing evidence that neuronal changes are more important in the process of mobility decline than age-related biomechanical changes. Although supervised physical activity interventions have been successful in improving functional mobility in older adults, long-term maintenance of exercise behavior still needs to be developed and maintained.

V. CONCLUSION

The results of the research conducted at the Elderly Posyandu in Dukuh Tempuran, Bolon Village, Colomadu District, Karanganyar Regency, Central Java, with the aim of determining the effectiveness of outbound participation on the functional mobility of the elderly can be informed as follows: demographic data in the dominant gender of women 73 people (81%) while men 17 people (19%), elderly aged 60-74 years 40 people (44%), middle 45-59 years 25 people (28%) and elderly elderly 25 people (28%), still have a partner 60 people (67%) while those who are divorced or divorced are 30 people (33%) and the level of education is elementary school 30 people (34%), no school 20 people (22%), junior high school 20 people (22%) high school 10 people (22%). And the results of the hypothesis test show a significance value of 0.000 ($p < 0.05$) so it can be concluded that outbound participation is very effective on the functional mobility of the elderly.

Mobility is a multifactorial and complex construct, and an interdisciplinary approach is essential. A central aspect of mobility research related to aging is an understanding of the complex interactions between the mechanisms, processes, and contributing systems. Functional mobility must be accessible to individuals throughout their lives. Research into functional mobility is also needed to examine medical, social, and psychological approaches so that this research can have a real impact on providing a healthy aging approach for older adults in Indonesia. Many older adults desire to return to activities such as netball, tennis, squash, dancing, badminton, swimming, and cricket—activities they enjoyed in the past but find difficult to perform now.

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