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Effectiveness of Rheumatic Exercise in Reducing Joint Pain among the Elderly: A Quasi-experimental Approach

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Abstract

Introduction: Joint pain is a common complaint among the elderly, primarily due to degenerative changes in the musculoskeletal system. Non-pharmacological interventions, such as rheumatic exercise, have been shown to effectively reduce joint pain. **Aims:** This study aimed to assess the effect of rheumatic exercise on the joint pain scale among elderly residents at UPTD Pusat Pelayanan Sosial Griya Lansia.

Methods: A quasi-experimental design was employed using a two-group pre-test–post-test approach. The sample included 30 elderly individuals experiencing joint pain, divided into two groups: 15 participants in the intervention group (rheumatic exercise) and 15 in the control group (elderly exercise). Data were analyzed using paired t-tests and independent sample tests. **Results:** The average joint pain score in the intervention group decreased from 4.53 to 3.07, while in the control group, it decreased from 5.07 to 3.53. Statistical analysis revealed a significant reduction in joint pain within both groups ($p < 0.05$); however, no statistically significant difference was found between the two groups ($p = 0.756$). **Conclusion:** Both rheumatic and elderly exercise programs were effective in reducing joint pain among older adults. These findings support the implementation of regular exercise programs as non-pharmacological interventions in social care settings. Future research is encouraged to explore additional influencing variables, such as nutritional intake and emotional well-being.

Keywords: fine motor skills, early childhood, weaving, origami, developmental stimulation

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Introduction

Elderly individuals, defined as those aged 60 years and above, are considered to be in the final stage of the human life cycle. Within this population, the aging process leads to various physiological and cognitive changes. A prominent consequence of aging is the progressive decline in biological functions, particularly motor capabilities, often associated with bone loss and joint pain. Several factors—including the aging process itself, occupational history, dietary habits, and levels of physical activity—contribute to the onset of joint pain. If not properly managed, joint pain may lead to joint stiffness, limited mobility, and interference with daily activities, ultimately diminishing independence and quality of life among the elderly (Yuniati et al., 2023).

According to data from the World Health Organization (WHO, 2024), the global elderly population is increasing, with 351.5 million individuals aged 60–64 and approximately 0.6 million individuals aged 100 or older. In Indonesia, projections from the Badan Pusat Statistik (BPS, 2024) estimate that by 2045, the elderly population will reach 65.82 million, accounting for 20.31% of the total population. The WHO (2024) also reported that 528 million people globally experienced joint pain in 2023, with a gender distribution of 9.6% in males and 18% in females.

In Indonesia, the 2018 Basic Health Research (Riskesdas) recorded a joint disease prevalence of 7.3%, with 6.1% among males and 8.55% among females. The total number of individuals experiencing joint pain was estimated at 55 million (24.7%), with prevalence rates of 5% in individuals under 40 years old, 30% in those aged 40–60, and 65% in individuals aged over 61. In West Java Province, the prevalence of joint disease reached 32.1%, with the highest number of cases recorded at 52,551 individuals. At the city level, Bandung reported a prevalence of 9.83% (2,849 cases), West Bandung Regency 5.91% (1,783 cases), and Cimahi City 9.02% (675 cases).

Preliminary studies conducted by the authors in December 2024 at the UPTD Pusat Pelayanan Sosial Griya Lansia revealed that 30 out of 158 elderly residents reported experiencing joint pain. Interviews with five affected individuals indicated that three used medication regularly to manage pain, while the remaining two relied on topical balms for relief (Data Lansia Nyeri Sendi, 2025).

Management of joint pain typically involves pharmacological and non-pharmacological approaches. Pharmacological interventions include analgesic medications, particularly non-steroidal anti-inflammatory drugs (NSAIDs) such as aspirin and ibuprofen. While effective, long-term NSAID use is associated with adverse effects, including gastrointestinal discomfort, peptic ulcers, nausea, diarrhea, renal impairment, and cardiovascular risks. Topical analgesics such as balms can also provide pain relief but may cause localized side effects like burning or stinging sensations (Ristanto et al., 2024).

Non-pharmacological methods do not involve medication and include range of motion (ROM) exercises, hot and cold compress therapy, acupuncture, transcutaneous electrical nerve

stimulation (TENS), and rheumatic exercises. Rheumatic gymnastics is a promising alternative for reducing joint pain by enhancing flexibility and decreasing stiffness in the elderly. This study employs the Roy Adaptation Model by Sister Callista Roy, which conceptualizes humans as adaptive systems striving to respond to environmental stimuli. Elderly individuals with joint pain face adaptation challenges that impact their physical, psychological, and social well-being. Persistent joint pain notably compromises mobility and quality of life.

Other influencing factors include age, medical history, social support, and prior pain experiences, all of which shape adaptive responses. In this context, rheumatic exercises function as external stimuli designed to support adaptation to joint pain (Amelia & Pranata, 2024). In this study, rheumatic exercises were used as the primary intervention, while the control group participated in elderly gymnastics—general physical activities tailored to older adults. Although not specifically targeting joint disorders, elderly gymnastics still provide physiological benefits, such as improved blood circulation and joint mobility. This comparison ensures that observed differences in outcomes can be attributed to the specific effects of rheumatic exercises (Abdimas Saintika et al., 2023).

Supporting evidence is provided by Gusman Virgo et al. (2025), whose study titled *"The Effect of Rheumatic Exercise on Joint Pain in the Elderly in Perambahan Village, Kampa Regency, 2024"* demonstrated significant reductions in joint pain following rheumatic exercise interventions. Similarly, Tika Wulandari et al. (2022), in their research conducted at the Kaliwedi Health Center in Cirebon Regency, found that rheumatic exercise significantly reduced joint pain in elderly participants (p-value = 0.001) (Bitcar et al., 2022).

Methods

This study employed a quantitative research design utilizing a quasi-experimental approach, which is commonly used to identify causal relationships between variables through the application of interventions, albeit without full control over external variables that may influence the outcomes (Budi Rianto & Susanto, 2022). The study population consisted of 158 elderly residents at the UPTD Pusat Pelayanan Sosial Griya Lansia. The research was conducted in March 2025 and involved a total of 30 participants, divided equally into an intervention group (n = 15) and a control group (n = 15).

A purposive sampling technique—classified under non-probability sampling—was employed to select participants who met specific inclusion criteria. These criteria included: being aged over 60 years, experiencing joint pain, the ability to follow instructions, and willingness to participate in five exercise sessions. Data were collected using the Numeric Rating Scale (NRS) observation sheet, which assesses joint pain intensity on a scale of 0 to 10. A score of 0 indicates no pain, 1–3 signifies mild pain, 4–6 moderate pain, and 7–10 severe pain (Pinzon, 2016).

Participants were then assigned to one of two groups: the intervention group received rheumatic gymnastics, while the control group engaged in elderly gymnastics. Group assignment was carried out after ensuring that all selected participants met the inclusion criteria and considering their physical condition and willingness to participate in the designated activity. Both groups participated in five sessions of exercise, conducted with the same duration and schedule, to ensure a fair and objective comparison of outcomes. This study received ethical approval from the Ethics Committee of STIKes (Approval No: 21/D/KEPK-STIKes/III/2025, March 2025).

Results

1. Overview of the joint pain scale before and after performing Rheumatic Exercise

Table 1. Overview of the joint pain scale before rheumatic exercise in the elderly (n=30).

Variabel	Mean	Std. Deviasi	Min	Max	N
Pretest	4.53	1.187	2	6	15
Posttest	3.07	1.280	1	5	15

Based on the analysis of Table 1, the average joint pain score among elderly participants in the intervention group before undergoing rheumatic gymnastics was 4.53 (SD = 1.187). The recorded scores ranged from a minimum of 2 to a maximum of 6, across a total of 15 respondents. Following the intervention, the average joint pain score decreased to 3.07 (SD = 1.280), with the minimum and maximum scores recorded at 1 and 5, respectively. These findings indicate a reduction in joint pain levels after the implementation of rheumatic gymnastics.

2. Overview of the joint pain scale before and after doing Elderly Exercise

Table 2. Overview of the joint pain scale before elderly exercise in the elderly (n=30)

Variabel	Mean	Std. Deviasi	Min	Max	N
Pretest	5.07	1.387	3	8	15
Posttest	3.53	1.356	2	6	15

Based on the analysis of Table 2, the average joint pain score among elderly participants in the control group prior to participating in elderly gymnastics was 5.07 (SD = 1.387). The pain scores ranged from a minimum of 3 to a maximum of 8, across a total of 15 respondents. Following the intervention with elderly gymnastics, the average joint pain score decreased to 3.53 (SD = 1.356), with post-intervention scores ranging from 2 to 6. These results indicate a reduction in joint pain following elderly gymnastics, although the decrease was less pronounced compared to the intervention group.

3. The Effect of Rheumatic Exercise on the Scale of Joint Pain in the Elderly

Table 3. Distribution of frequency results of the effect of rheumatic exercise on reducing thescale of joint pain in the elderly (n=30)

Variabel	Mean	Std. Deviasi	Std. Error Mean	P Value
Pretest	4.53	1.187	0.307	0.000
Posttest	3.07	1.280	0.330	

Based on the analysis presented in Table 3, the mean joint pain score among elderly participants before rheumatic gymnastics was 4.53, with a standard error of 0.307 and a standard deviation of 1.187. After the intervention, the mean pain score decreased to 3.07, with a standard error of 0.330 and a standard deviation of 1.280. A parametric test for two paired groups (paired sample t-test) yielded a p-value of 0.000 ($p < 0.05$), leading to the rejection of the null hypothesis (Ho). These results indicate a statistically significant effect of rheumatic gymnastics on reducing joint pain among the elderly at the UPTD Pusat Pelayanan Sosial Griya Lansia.

4. The Effect of Elderly Exercise on the Scale of Joint Pain in the Elderly

Table 4. Distribution of frequency results of the effect of elderly exercise on reducing the scale of joint pain in the elderly (n=30)

Variabel	Mean	Std. Deviasi	Std. Error Mean	P Value
Pretest	5.07	1.387	0.358	0.000
Posttest	3.53	1.356	0.350	

Based on the analysis in Table 4, the mean joint pain score among elderly participants before participating in elderly gymnastics was 5.07, with a standard error of 0.358 and a standard deviation of 1.387. Following the intervention, the mean joint pain score decreased to 3.53, with a standard error of 0.350 and a standard deviation of 1.356. A paired sample t-test revealed a p-value of 0.000 ($p < 0.05$), indicating statistical significance and leading to the rejection of the null hypothesis (Ho). These results suggest that elderly gymnastics had a significant effect on reducing joint pain among elderly residents at the UPTD Pusat Pelayanan Sosial Griya Lansia.

5. Average Decrease in Joint Pain Scale in Rheumatic Exercise and Elderly Exercise Groups

Based on the analysis in Table 5, the average reduction in joint pain scores was compared between the rheumatic gymnastics group and the elderly gymnastics group. The rheumatic gymnastics group showed an average decrease of 1.47 points (SD = 0.516), while the elderly gymnastics group demonstrated a slightly higher average decrease of 1.53 points (SD = 0.640). The independent sample t-test yielded a p-value of 0.756 ($p \geq 0.05$), indicating that there was no statistically significant difference between the two groups in terms of reducing joint pain.

These results suggest that both interventions were similarly effective in lowering joint pain among the elderly at the UPTD Pusat Pelayanan Sosial Griya Lansia.

Table 5. Distribution of the results of the average decrease in joint pain scale in rheumatic exercise and elderly exercise groups

Variabel	Mean	Std. Deviasi	P Value
Rheumatic Gymnastic	1.47	0.516	0.756
Elderly Gymnastic	1.53	0.640	

Discussion

The results of this study indicate that both rheumatic exercise and elderly exercise were effective in reducing joint pain among elderly residents at the UPTD Pusat Pelayanan Sosial Griya Lansia. A statistically significant reduction in joint pain was observed in both groups, as indicated by p-values < 0.05. The intervention group (rheumatic exercise) showed a reduction in mean joint pain scores from 4.53 to 3.07, while the control group (elderly exercise) showed a reduction from 5.07 to 3.53. These findings suggest that structured physical activity plays a substantial role in alleviating joint pain in older adults.

Theoretically, these results are consistent with Melzack and Wall's Gate Control Theory, which posits that non-nociceptive sensory input, such as that generated through physical exercise, can inhibit pain signals from reaching the central nervous system, thereby reducing the perception of pain. Additionally, physical activities such as gymnastics enhance blood circulation, stimulate synovial fluid production, strengthen the muscles supporting the joints, and reduce local inflammation—all of which contribute to pain relief.

The findings also align with the Roy Adaptation Model, which conceptualizes humans as adaptive systems that respond to environmental stimuli. In this context, rheumatic exercise functions as a positive external stimulus that facilitates physiological adaptation within the musculoskeletal system of the elderly. This adaptation manifests as increased joint flexibility, reduced stiffness, and, consequently, decreased pain. Moreover, successful participation in physical activity can enhance self-confidence and motivation among elderly individuals, improving their engagement in daily life.

Although both interventions were effective, the difference in outcomes between the rheumatic exercise group and the elderly exercise group was not statistically significant (p = 0.756), suggesting that both approaches provide comparable benefits. This may be attributed to the shared principles underlying both exercise regimens, which emphasize flexibility, breathing control, and joint mobilization, albeit through different structures and techniques.

From the researchers' perspective, the demonstrated effectiveness of gymnastics as a non-pharmacological intervention highlights its feasibility in managing joint pain, particularly within social care settings that require cost-effective, practical, and sustainable solutions. Beyond its physiological benefits, group-based gymnastics also supports psychosocial well-

being through social interaction and contributes to an overall improvement in the quality of life among the elderly.

Overview of the Joint Pain Scale in the Elderly Before and After Rheumatic Gymnastics

Based on the results of the analysis of table 1, it can be seen that the average joint pain scale in the elderly before rheumatic gymnastics is 4.53 with a standard deviation of 1.187. The minimum score recorded was 2 and the maximum was 6 out of a total of 15 respondents. After rheumatic gymnastics, the average pain scale decreased to 3.07 with a standard deviation of 1.280. The lowest joint pain score after gymnastics was 1 and the highest was 5.

These results are in line with the theory in the thesis which explains that rheumatic gymnastics is a form of nonpharmacological intervention that is useful in stimulating the body to secrete endorphins. These endorphins have a natural analgesic effect that helps reduce the perception of pain. In addition, the movements in rheumatic exercises also increase muscle flexibility and smooth blood circulation, thereby helping to reduce joint stiffness which is one of the causes of pain.

In terms of nursing model theory, these results are also supported by the Sister Callista Roy Adaptation Model, which explains that humans are adaptive creatures and will respond to environmental stimuli through bio-psychosocial adaptation mechanisms. In this context, rheumatic gymnastics is a positive stimulus that helps the elderly adjust physiologically to the degenerated body condition, especially in the musculoskeletal system.

Although the results show the effectiveness of rheumatic gymnastic, there may be other factors that influence the decrease in joint pain, such as the level of active participation of the elderly, environmental support, individual motivation, and the elderly's perception of pain itself. These factors are also explained in the theoretical basis that the experience of pain can be influenced by age, anxiety, meaning of pain, and support from the closest person.

According to the researcher, the results of this study indicate that elderly gymnastics which is routinely carried out in a structured manner can have a positive impact on reducing joint pain in the elderly. Although it is not a new intervention in social institutions, elderly exercise is still proven to help reduce joint stiffness and discomfort that is often experienced by the elderly. This can be seen from the decrease in mean joint pain after the exercise is performed. Thus, it can be concluded that rheumatic gymnastics is an effective intervention in reducing the scale of joint pain in the elderly and is in line with the theory underlying this study. Rheumatic gymnastics not only has a physiological impact, but also supports the elderly to adapt to their overall health condition.

Overview of the Joint Pain Scale in the Elderly Before and After Elderly exercise

Based on the analysis presented in Table 1, the mean joint pain score among elderly participants prior to rheumatic gymnastics was 4.53 (SD = 1.187), with scores ranging from a minimum of 2 to a maximum of 6 across 15 respondents. Following the intervention, the mean joint pain score decreased to 3.07 (SD = 1.280), with a post-intervention range of 1 to 5. These

findings indicate a reduction in joint pain levels after participation in rheumatic gymnastics.

The results align with the theoretical framework underpinning this study, which describes rheumatic gymnastics as a non-pharmacological intervention that stimulates the body's production of endorphins—natural analgesic compounds that reduce the perception of pain. In addition, the structured movements involved in rheumatic exercises promote muscle flexibility and enhance blood circulation, thereby alleviating joint stiffness, which is a common contributor to pain in the elderly.

From the perspective of nursing theory, these results are also supported by Sister Callista Roy's Adaptation Model, which conceptualizes humans as adaptive systems that respond to environmental stimuli through physiological, psychological, and social mechanisms. In this context, rheumatic gymnastics serves as a positive adaptive stimulus, enabling elderly individuals to physiologically adjust to age-related musculoskeletal degeneration.

While the findings demonstrate the effectiveness of rheumatic gymnastics, it is important to consider that other factors may have influenced the reduction in joint pain. These may include the participants' level of engagement, environmental support, individual motivation, and personal pain perception. The theoretical foundation of this study acknowledges that pain experiences can be affected by variables such as age, anxiety, personal beliefs about pain, and support from family or caregivers.

According to the researchers, the outcomes of this study suggest that regular and structured implementation of rheumatic gymnastics can have a meaningful impact on reducing joint pain among the elderly. Although rheumatic exercise is not a novel intervention within social care institutions, it remains a relevant and effective method for addressing joint stiffness and discomfort commonly experienced by older adults. The observed reduction in joint pain further supports the conclusion that rheumatic gymnastics is an effective, low-cost, and practical intervention for managing joint pain in elderly populations. In addition to its physiological benefits, this intervention also facilitates adaptive responses to declining physical health, thereby contributing to the overall well-being and quality of life of the elderly.

The Effect of Rheumatic Exercise on the Scale of Joint Pain in the Elderly at UPTD Pusat Pelayanan Sosial Griya Lansia

Based on the analysis of Table 3, the mean joint pain score among elderly participants before undergoing rheumatic gymnastics was 4.53, which decreased to 3.07 following the intervention. The paired t-test yielded a p-value of 0.000 (< 0.05), indicating a statistically significant effect of rheumatic gymnastics in reducing joint pain among the elderly at the UPTD Griya Lansia Social Service Center. These findings align with existing theory, which suggests that rheumatic exercises improve joint flexibility, strengthen muscles, and enhance blood circulation, collectively contributing to the reduction of joint stiffness and pain. As noted by Pfizer in Ambarsari (2018), rheumatic exercises are particularly recommended for elderly individuals suffering from joint pain and osteoarthritis because these movements facilitate improved circulation and increased joint lubrication.

Furthermore, the results are supported by Roy's Adaptation Model, which posits that humans actively adapt to environmental stimuli, including pain. In this context, rheumatic gymnastics functions as an external stimulus that promotes physiological adaptation—manifested through increased blood flow and enhanced joint flexibility—as well as psychosocial adaptation by boosting self-confidence, encouraging social interaction, and improving mood. According to the researchers, the success of this intervention is not solely attributable to the physical benefits of the exercises but is also influenced by the motivation and active participation of the elderly during sessions. The group-based and enjoyable nature of the exercise fosters higher compliance and engagement, thereby maximizing both the physiological and psychological benefits of the intervention.

The Effect of Elderly Exercise on the Scale of Joint Pain in the Elderly at UPTD Pusat Pelayanan Sosial Griya Lansia

Based on the analysis of Table 4, the average joint pain scale among elderly participants engaging in elderly gymnastics decreased from 5.07 to 3.53. This reduction indicates an improvement in joint pain following the intervention, although it is not statistically superior to the effects observed with rheumatic gymnastics. Nonetheless, these findings demonstrate that elderly gymnastics has a positive impact on pain reduction. Theoretically, these results align with the established framework that elderly gymnastics constitutes a form of light physical exercise aimed at maintaining joint flexibility, strengthening periarticular muscles, and enhancing blood circulation. According to Setiadi (2019) and Brunner and Suddarth (2016), exercises of this nature can reduce inflammation and stiffness while increasing joint lubrication, all of which contribute to alleviating pain.

Roy's Adaptation Model further supports these findings by conceptualizing elderly gymnastics as a positive stimulus that elicits physiological adaptive responses. Elderly individuals who engage effectively in this activity are likely to experience improved musculoskeletal function, decreased pain, and an overall enhancement in quality of life. The researchers also note that the efficacy of elderly gymnastics in reducing pain may be influenced by participants' enthusiasm and active involvement during the exercise sessions. Additionally, conducting these exercises in a group setting within a pleasant atmosphere promotes psychosocial benefits such as increased enjoyment, self-confidence, and social interaction, which collectively contribute to diminished pain perception.

In conclusion, the results reinforce that elderly gymnastics is a safe, effective, and practical non-pharmacological intervention. It is recommended that this exercise program be maintained as a routine component of care in social care settings to support and improve the well-being and quality of life of elderly populations.

Average Decrease in Joint Pain Scale in Rheumatic Exercise and Elderly Exercise Groups

Based on the analysis of Table 5, the intervention group (rheumatic exercise) showed a reduction in the mean joint pain score from 4.53 (SD = 1.187) before the intervention to 3.07

(SD = 1.280) after completing five sessions of rheumatic gymnastics. This decrease indicates an improvement in joint pain symptoms following regular participation in rheumatic exercise. Similarly, in the control group (elderly gymnastics), the mean joint pain score declined from 5.07 (SD = 1.387) to 3.53 (SD = 1.356), demonstrating that elderly gymnastics is also effective in alleviating joint pain, even though it is not specifically designed to target musculoskeletal complaints.

These findings are supported by Melzack and Wall's Gate Control Theory (1965), which posits that physical activity stimulates non-nociceptive nerve fibers capable of inhibiting pain signals to the central nervous system. Consequently, regular movement through structured exercises such as gymnastics can reduce the perception of pain in elderly individuals. Both rheumatic and elderly gymnastics activate these pathways through controlled and rhythmic physical movements, although they differ in focus and intensity.

Furthermore, the results align with Roy's Adaptation Model, which conceptualizes humans as adaptive systems that respond to internal and external stimuli via physiological and psychosocial mechanisms. In this context, joint pain represents a negative stimulus, while physical exercise functions as a positive adaptive stimulus. Elderly individuals who participate in regular gymnastics demonstrate improved adaptability, which manifests as decreased pain and enhanced physical functioning.

However, it is important to consider additional factors that may have contributed to the observed reduction in joint pain across both groups:

1. Variations in daily physical activity: Elderly individuals who maintained an active lifestyle outside of the scheduled sessions may have experienced greater pain reduction due to sustained joint mobility.
2. Psychological factors: Enthusiasm, motivation, and emotional well-being during the sessions could have influenced individual pain perceptions.
3. Concurrent medication use: The continued use of analgesics or anti-inflammatory medications may have contributed to pain relief alongside the exercise interventions.
4. Nutritional intake: Adequate consumption of nutrients such as calcium and vitamin D, which support joint and bone health, may have played a role, although dietary intake was not directly assessed in this study.
5. Social support: Participation in group-based exercises may have enhanced psychological well-being, indirectly reducing pain through improved mood and social engagement.

Given these contributing factors, it is likely that the reduction in joint pain cannot be attributed solely to the type of exercise performed. Individual characteristics and environmental

influences also play a critical role in shaping outcomes. Therefore, while both rheumatic and elderly gymnastics were effective in this study, a holistic, personalized approach remains essential in managing joint pain among elderly populations.

This study has several limitations that must be acknowledged. One key limitation is the inability to fully monitor external variables, particularly unsupervised physical activity outside of scheduled sessions. Some participants may have engaged in additional exercise independently, while others remained sedentary, potentially affecting the comparability of results. Another limitation involves the subjective nature of the pain assessment tool. The numerical rating scale (NRS) relies heavily on personal perception, which can be influenced by an individual's psychological or emotional state at the time of reporting. This subjectivity may have introduced variability and affected the consistency of the pain measurements.

Conclusion

The findings of this study demonstrate that both rheumatic and elderly gymnastic programs positively influence the reduction of joint pain among older adults. Prior to the intervention, most participants reported experiencing mild to moderate joint pain, which often disrupted their ability to perform daily activities. However, following regular participation in either rheumatic or elderly gymnastics, a significant decrease in joint pain was observed. These outcomes underscore the effectiveness of both exercise interventions as viable non-pharmacological approaches to alleviate joint stiffness, enhance mobility, and improve the overall quality of life in elderly individuals, particularly within institutional and social care settings.

Conflicts of Interest

No conflict of interest to declare.

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