

**Research Article**

Barriers to the use of assistive devices in physically challenged people in rural areas: A cross-sectional study

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ABSTRACT

Physically challenged individuals in rural areas face multiple barriers in utilizing assistive devices that are essential for improving their independence and quality of life. These barriers can be physical, social, economic, or related to inadequate information and support. Recognizing and addressing these constraints is crucial for ensuring the effective integration of assistive technology in rural rehabilitation and healthcare practices.

A cross-sectional study was conducted at District Disability Rehabilitation Center and Dr. Vitthalrao Vikhe Patil Foundation's Physiotherapy OPD, Ahilyanagar, over one year using purposive sampling. One hundred participants using assistive devices and meeting inclusion criteria were selected. Individuals with intellectual or hearing impairments or non-cooperative behaviour were excluded to assess relevant outcomes in eligible participants. Data collection involved direct interviews and observation, considering various socioeconomic and educational backgrounds among participants.

In this study involving 100 physically challenged participants, 42% experienced physical barriers such as inadequate strength, 29% had inadequate knowledge regarding device use, 30% faced financial limitations, and 13% lacked family support. Additionally, 47% reported fear of falling, 68% encountered environmental barriers, 48% noted rough roads, 35% absence of slope, 14% poor visual lightening, 22% negative attitude of people towards disability.

In rural areas, physically challenged individuals face significant barriers to assistive device use, including inadequate strength, lack of knowledge, financial constraints, inadequate family support, unfriendly physical environments, and prevailing social stigma, highlighting the need for improved education, accessibility, and support systems to enhance their independence and quality of life.

Keywords: Assistive devices, physically challenged people, Amputation.

INTRODUCTION

Amputation is defined as the removal of a body part that has lost its functions because of trauma, chronic infection, or vascular disorders [1]. Amputation is considered a major life-changing event because it leads to permanent disability. The number of amputations cases are supposed to be increased due to an increase in age expectation of living and to the increased incidence of diabetes and cardiovascular conditions. Walking with a prosthesis influences the heart rate and oxygen consumption [2].

The difference that separates amputation from other surgical operations is its ability to cause deteriorations in body image, relations with family and work, as well as vocational competence. Since the reactions to amputation are very different, the

reactions and problems are also different. Difficulties related to the patient's lifestyle, use of prosthesis, self-perception, plans for the future, and participation in social situations are common after amputation. Pain can be a major issue after total or partial limb amputation, with reported incidences up to 8% for finger amputation and 85% for major limb amputation. Pain can originate in the amputated stump, which is mostly described as residual limb pain (RLP) or as a result of phantom limb pain (PLP) [3].

The International Classification of Functioning, Disability and Health (ICF) describe human functioning in terms of body structures, body functions, activities, and participation. It states that disability is a condition that is influenced by the interaction

between persons with health conditions and their environment. Assistive devices (Ads) can help individuals with disabilities compensate for lost functions, increase their independence, develop their potential, and thus enhance their quality of life [4]. Assistive Technology (AT) is an emerging field in the context of healthcare and well-being across the world. It is defined as the application of organized scientific knowledge and skills related to assistive products (Aps), which includes systems and services to improve the functioning and independent living of a person with at least one or more functional difficulties or disabilities [5]. Assistive technology (AT) has been commonly used in developed countries to help individuals with disabilities overcome obstacles when seeking medical treatment, pursuing education, obtaining employment or caring for families, and obtaining equal opportunities to participate in society.

Accessibility is a measure of the extent to which a product or service can be used by a person with a disability as effectively as it can be used by a person without that disability. Over a billion of the world's population has some form of disability. They are the world's largest minority. This figure is on a constant increase due to an increase in the population as well as the medical advances that have decreased mortality due to old age. At the same time, PwDs are experiencing a lack of access to technologies due to visual, hearing, mental, and/or other impairments that make it difficult to operate various devices. Other groups facing accessibility issues are illiterate and elderly populations. AT in the home environment and/or body-worn systems that monitor people's movement might contribute to an increased sense of safety and security at home. However, their use can raise ethical anxieties as little is known about how older persons perceive assistive and monitoring technologies. In developing countries such as India, the road to accessibility is a long, winding one. Although in recent times assistive devices have been extensively prescribed, there are few evaluations of the barriers to their utilization. The purpose of this paper is to identify the potential barriers faced by the people with disabilities in using the AT by conducting survey and by reviewing the available literature.6 Assistive device non-use among individuals with disabilities is often attributed to issues in service provision and user satisfaction with assistive devices. However, systematic research on the service quality and satisfaction of assistive devices among disabled populations is lacking. Priority should be given to providing mobility aids and other basic equipment for people with multiple disabilities to enhance the effectiveness and pertinence of assistive services. The capacity for post-installation maintenance of assistive technologies and the accessibility of services should be improved to ensure that disabled people can continuously benefit from assistive devices. Extensive educational and publicity activities should be carried out to raise people's awareness of the importance of pre-assembly assessment, training services, and post-assembly maintenance services. The importance of disease prevention, early

intervention, and rehabilitation to reduce the disability rate has been emphasised [13].

Disability is an important public health issue. It is defined as any restriction or lack of ability to perform an activity in a manner or within the range considered normal for human beings, resulting from impairment of an organ. Disability is complicated by additional medical, psychological, or environmental factors and can significantly affect the quality of life. The social and cultural consequences of a disability lead to the handicap of an individual. According to the National Sample Survey Organization (NSSO), the number of disabled persons in India constituted about 2% of the total population with a total of 14,085,000 disabled residing in rural areas and 4,406,000 disabled in urban areas. Among different types of disabilities, the prevalence for locomotor disability was noted to be highest in the country – 1046 in rural and 901 in urban per 100,000 persons. Of these, about 13% were severely disabled as they could not perform self-care, even with aid/appliance [14].

A focused examination is crucial for developing strategies to address these multi-dimensional barriers. Identifying and understanding the specific personal, familial, and environmental factors hindering assistive device use in rural India is necessary to plan interventions that are contextually relevant. Such insights can inform policymakers, rehabilitation professionals, and community stakeholders so they can tailor their efforts towards improving accessibility, user education, and environmental modifications. Ultimately, this can help reduce the risk of injury, enhance independence, and improve the overall quality of life for physically challenged individuals in rural areas.

Need for study

Physically challenged individuals living in rural areas face several barriers that limit the effective use of assistive devices, despite their importance in improving mobility, independence, and quality of life. In India, a large proportion of persons with locomotor disabilities reside in rural regions where access to rehabilitation services, assistive technology, and follow-up care is limited. Although assistive devices are increasingly prescribed, their long-term use and satisfaction remain suboptimal.

Factors such as poverty, illiteracy, lack of awareness, social stigma, inadequate family support, poor training, and financial constraints contribute to improper use or abandonment of devices. Environmental barriers, including uneven terrain, inaccessible infrastructure, and poor lighting, further restrict safe and effective mobility in rural settings.

There is limited systematic evidence identifying and quantifying these barriers in rural populations. Therefore, this study is needed to explore the personal, social, and environmental factors affecting assistive device use, to support evidence-based rehabilitation planning, policy development, and interventions aimed at improving independence and quality of life among physically challenged individuals in rural areas [1-10].

MATERIAL AND METHOD

The present study followed a cross-sectional study design and was conducted at the District Disability Rehabilitation Centre (DDRC), DVVPF’s Ahmednagar, and the Physiotherapy Outpatient Department (OPD). Purposive sampling was employed, and the study was carried out over a period of one year, including a total of 100 participants. The inclusion criteria comprised individuals using assistive devices, persons with any type of disability except hearing impairment, individuals aged above 8 years, and those with a disability of 40% or more, while the exclusion criteria included individuals with intellectual impairment or disability, persons with hearing impairment, and those who were uncooperative during the study. Data collection was done using a self-made questionnaire prepared in the Marathi language, with responses recorded using a pen. The dependent variable of the study was the barriers faced by persons with disabilities in the use of assistive devices, including personal, social, economic, and environmental barriers.

Procedure

Ethical Committee Approval was obtained from IEC before beginning the study. Screening was done as per inclusion and exclusion criteria. The data collection sheet and consent form was filled by people with physical challenges. An orientation was given regarding the purpose, procedure and benefits of the study to the physically challenged people. The components of the scale were performed on the persons in clinical setup. Age from 8yrs and above were included. Scale was performed on the patients with disability who came for the treatment at District Disability Rehabilitation Centre, Ahilyanagar.

Outcome measure

A self-developed structured questionnaire was used as the outcome measure to assess barriers to the use of assistive devices among physically challenged individuals. The questionnaire comprised two domains physical barriers and environmental barriers with five dichotomous (Yes/No) items in each domain. It also captured basic demographic and device-related information, including type and percentage of disability, type of assistive device, and duration of use. The questionnaire was administered through direct interview to ensure clarity and comprehension among participants with varying literacy levels. Content and face validity of the tool were established through review by subject experts in physiotherapy, ensuring relevance, clarity, and appropriateness of the items for the study population [10-16].

Statistical analysis

Data obtained from the self-developed structured questionnaire were analysed using descriptive statistical methods. As the variables were categorical in nature, frequencies and percentages were calculated to summarise the distribution of physical and environmental barriers to assistive device use among the study participants. The analysis was performed on a sample of 100 physically challenged individuals, and each response was expressed as a proportion of the total sample. The findings were

presented using tables and graphical representations to facilitate clear interpretation of the results. Inferential statistical analysis was not undertaken, as the primary objective of the study was to describe the prevalence and pattern of perceived barriers rather than to establish associations or causal relationships [17].

RESULT

In this study involving 100 physically challenged participants, 42% experienced physical barriers such as inadequate strength, 29% had inadequate knowledge regarding device use, 30% faced financial limitations, and 13% lacked family support. Additionally, 47% reported fear of falling, 68% encountered environmental barriers, 48% noted rough roads, 35% absence of slope, 14% poor visual lighting, 22% negative attitude of people towards disability [6].

Physical Barriers

Table 1: Shows number of physically challenged people facing inadequate strength while using an assistive device

Sr. No.	Percentile
YES	42%
NO	68%

Figure 1: Feeling of reduced strength while using assistive devices

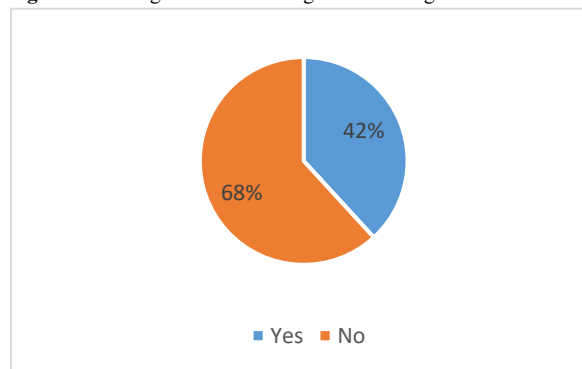


Table 2: Shows the number of physically challenged people having inadequate knowledge to use an assistive device

Sr. No.	Percentile
YES	29%
NO	71%

Figure 2: Incomplete information about using assistive devices

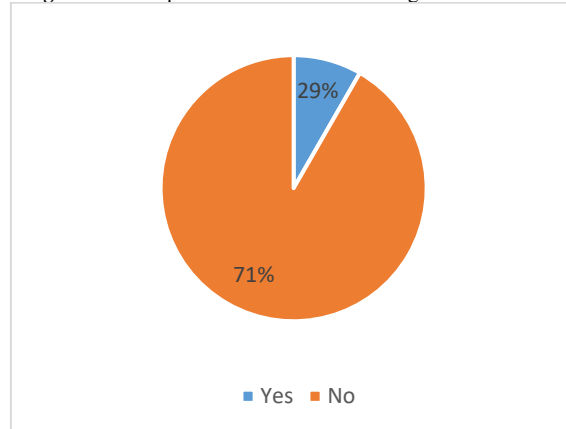


Table 3: Shows number of physically challenged people having financial limitations to afford assistive device

Sr. No.	Percentile
YES	30%
NO	70%

Figure 3: Financial difficulties in purchasing assistive devices

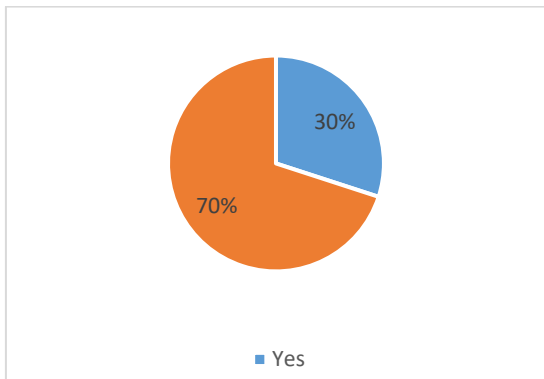


Table 4: Shows number of physically challenged people having inadequate family support

Sr. No.	Percentile
YES	13%
NO	87%

Figure 4: Family support

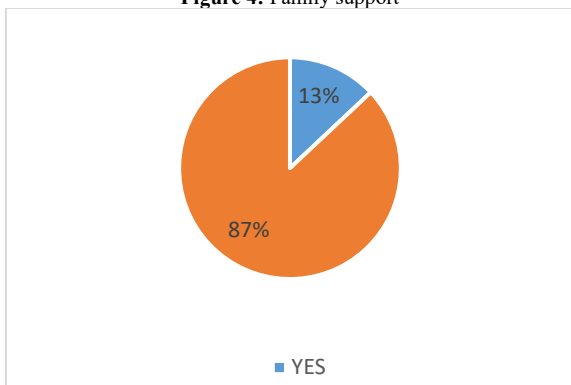
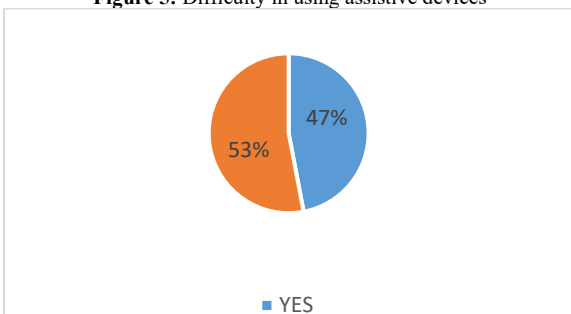


Table 5: Shows number of physically challenged people having fear of fall while using assistive device

Sr. No.	Percentile
YES	47%
NO	53%

Figure 5: Difficulty in using assistive devices



Environmental Barriers

Table 6: Shows the number of physically challenged people who get bothered by absence of elevators and lifts in the hospital while using an assistive device

Sr. No.	Percentile
YES	68%
NO	32%

Figure 6: Lack of elevators in hospitals and multi-storey buildings

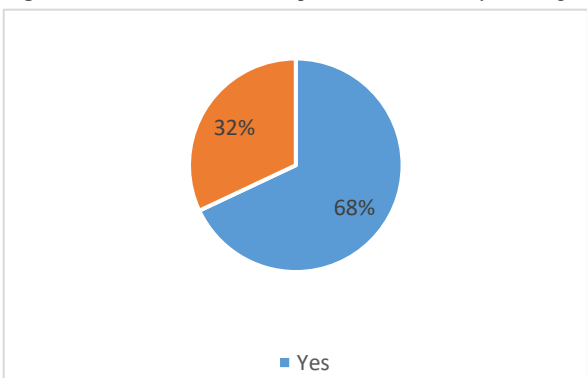


Table 7: Shows number of physically challenged people who get bothered by rough roads while using assistive device

Sr. No.	Percentile
YES	48%
NO	52%

Figure 7: Bumpy roads

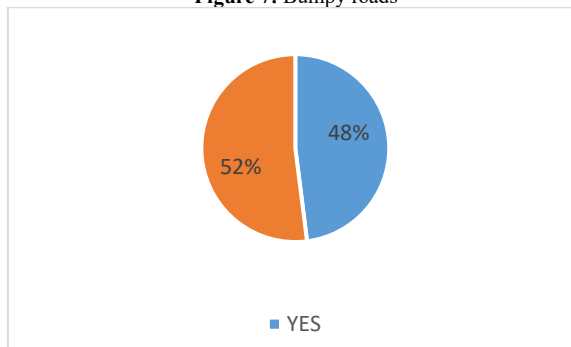


Table 8: Shows number of physically challenged people who get bothered by absence of slope while using assistive device

Sr. No.	Percentile
YES	35%
NO	65%

Figure 8: Ups and downs

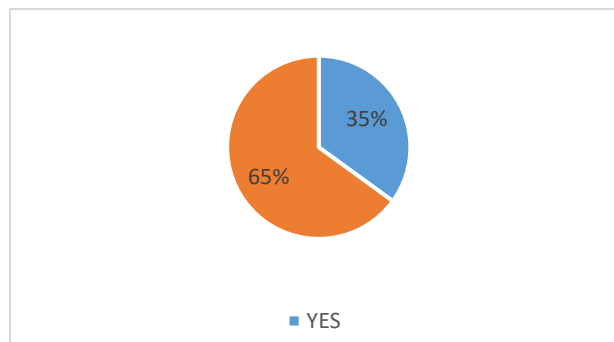


Table 9: Shows the number of physically challenged people who get bothered by poor visual lighting

Sr. No.	Percentile
YES	14%
NO	86%

Figure 9: Incompetent guide

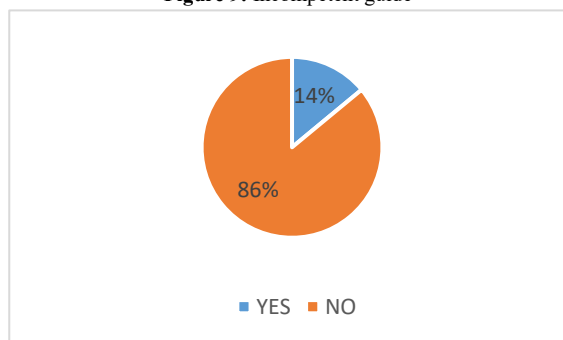
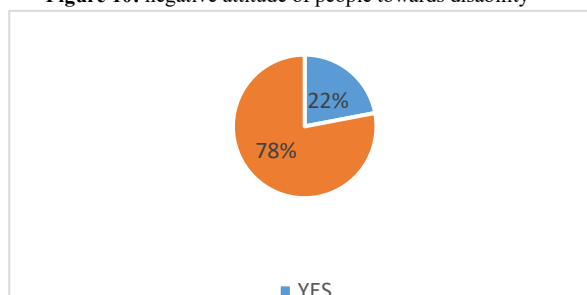


Table 10: Shows number of physically challenged people facing negative attitude of people towards disability

Sr. No.	Percentile
YES	22%
NO	78%

Figure 10: negative attitude of people towards disability



DISCUSSION

The aim of the study was to find out the barriers to the use of assistive devices in physically challenged people in rural area. To accomplish the aim, 100 physically challenged people were screened throughout the year. Physical and environmental barriers encountered while using assistive devices (any device) were observed. The questionnaire used for the study included 10 Yes/No questions, of which the first five questions addressed physical barriers (inadequate strength, inadequate knowledge, financial limitations to afford the device, family support, and fear of falling), and the next five questions addressed environmental barriers (absence of lifts, absence of slopes, rough roads, poor visual lighting, and negative attitudes of people towards disability) [18].

Graphs were plotted by calculating the percentile value of each question in the questionnaire. The first question was about the inadequate strength of a person while using an assistive device. Most of the people who were willing to participate came with a locomotor disability, like transtibial amputation. Therefore, they were lacking in strength. In the study, 42% people faced inadequate strength as a barrier. (Percentage: Yes= 42%, No=68%). Next question was about inadequate knowledge of a person to use an assistive device. The study setting was DDRC Ahmednagar, a city surrounded by rural population. Most of the people were illiterate. Illiteracy can impact a lot when it comes to using something new. Some people didn't even know what they are using exactly. And if they knew about the device, they didn't know how to use it properly. Out of 100 people 29% found to have an inadequate knowledge to use the assistive device. (Percentage: Yes=29%, No=71%). In a study author, Amitabh Kishor Dwivedi, from Jaipur Occupational Therapy College, mentioned that "Lack of awareness about new assistive devices was a major hindrance in using AT by elderly population in India [7].

Third question was about financial limitations of an individual to afford an assistive device. People who participated in the study were mostly farmers. Some of them were not even working, as they were totally dependent on their family members. Elderly people faced this issue than the younger ones. And if they manage to get an assistive device, the next thing they had to face was repairing cost and sufficient knowledge to use it. This problem was hindering 30% of the physically challenged people. (Percentage: Yes =30%, No=70%). Amitabh Kishor Dwivedi also mentioned that even if people manage to get these devices the next major issue is the repairing and maintenance of the device which is again very costly and unaffordable for such people. Next question was about lack of family support. Some people have a negative mindset for disability [19].

So, they do not support these physically challenged people. Out of 100 people 13% had an issue of inadequate family support. (Percentage: Yes=13%, No=87%). Last physical barrier was fear of fall while using an assistive device. It was observed that

highest physical barrier faced by these people was fear of fall. It happens due reduced strength in the body, difficulty to bear weight on single side of the body, specially in the people with lower limb amputation. Additionally, if the roads are slippery or uneven, if the floor at home is slippery the chances of getting fear of fall becomes more. Most of the physically challenged people get bothered by this issue even though they are trained or have sufficient knowledge to use it. 47% people were bothered by this problem. (Percentage: Yes=47%, No=53%). In the study, Laura A Rice, Alexander Fliflet said that, falls are a concern for older adults who use wheelchairs and scooters [21].

Next comes the Environmental barriers, which were also highlighted by Cathrine Widehamma et.al, [8]. Environmental barriers include absence of lifts, absence of slopes, rough roads, poor visual lightening, and negative attitude of people towards disability. When a disabled person travels through the environment, they face different challenges. In the study, we have focused on the above barriers and the results showed that the environmental barriers are bothering more than the personal ones. First environmental barrier was absence of lifts in the hospital. This was the most faced barrier compared to the others. People shared their own experience like how exactly it becomes difficult to manage without lifts. Suppose someone is using wheelchair who have been diagnosed with PPRP (Post olio residual paralysis), how could he manage without lifts? Another example is of an amputee, below knee or above knee, using crutch or walker, how could he climb stairs? Even though he or she learns to climb stairs with crutch, it is time consuming and increases risk of falls. In the study, 68% physically challenged people faced this problem. (Percentage: Yes =68%, No=32%) Third environmental barrier was about absence of slopes in the hospital. Absence of slopes was bothering the people who were using wheelchair or battery-operated tricycle or a walker. With these devices it becomes difficult to climb stairs. Wheelchair comes with two wheels like bicycle, people first need to get trained about its use, like clockwise or anticlockwise direction. People cannot climb stairs with wheelchair without assistance. Same with walker and battery-operated tricycle. Sometimes a walker can climb 2-3 stairs, but this remains difficult in many cases. In the study, 35% people got bothered by absence of slopes in the hospital. (Percentage: Yes =35%, No =65%) It seemed easier for these people to manage wheelchair kind of assistive devices independently. Next environmental barrier was about rough roads. That was a quite serious issue for these physically challenged people, as this could lead to injury and further serious complications. Uneven surfaces lead to problems like difficulty to maintain balance, difficulty in weight bearing, fall and others. To avoid these problems people should use an assistive device suitable for them with proper training and care. Als, roads should be clear and non-slippery so that chances of injuries would be less. (Percentage: Yes=48%, No=52%) [20].

Third environmental barrier was about absence of slopes/ramps in the hospital. The absence of slopes in hospitals hindered mobility for 35% of users with wheelchairs, battery-operated tricycles, or walkers, making stair navigation difficult without assistance. Slopes enabled more independent movement for these individuals. (Percentage: Yes =35%, No =65%) [23].

The next question concerned poor visual lighting. According to the results, 14% of participants faced this issue, which can also contribute to injuries. (Percentage: Yes= 14%, No= 86%) Twenty-two percent of participants experienced negativity because of their disability. This negativity was often due to the external appearance of the individual. For example, when an amputee (transfemoral or transtibial) visits a place, people first notice their leg, which can make the person feel different from others. Hence, this is also one of the problems faced by people with physical disabilities (Percentage: Yes = 22%, No = 78%) [23].

As per the data analysed with the help of a disability questionnaire, the study demonstrated that physically challenged people in rural areas face barriers to assistive device use due to lack of knowledge, financial limitations, family support, environmental issues, and fear of stigma or falling. Improving education, accessibility, and support can reduce these barriers and empower disabled individuals [24].

Limitations

This study was restricted to 100 physically challenged people living in the rural area.

CONCLUSION

In rural areas, physically challenged individuals face significant barriers to assistive device use, including inadequate strength, lack of knowledge, financial constraints, inadequate family support, unfriendly physical environments, and prevailing social stigma, highlighting the need for improved education, accessibility, and support systems to enhance their independence and quality of life.

Conflict of interest

The author declared no conflict of interest.

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