



## Physical activity for people with visual impairments: systematic review

### Actividad física para personas con discapacidad visual: revisión sistemática

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#### Abstract

**Introduction:** Promoting physical activity is essential for the physical, mental, and social health of people with visual impairments. **Objective:** To describe the various physical activity interventions for people with visual impairments, in order to determine their characteristics, effectiveness, and impact. **Methodology:** A systematic review was conducted following the PRISMA 2020 guidelines. **Results:** The systematic review found that people with visual impairments are less physically active and more sedentary than their peers without disabilities. Successful interventions, such as personalized exercise programs and technologies, improved physical activity and self-esteem. **Discussion:** Although there are substantial barriers to physical activity participation for individuals with visual impairments, successful interventions can promote physical activity and improve well-being. Accessibility and individualized programs were significant barriers, highlighting the need for inclusive strategies tailored to the needs of this

population. **Conclusions:** The systematic review highlights the need to develop individualized and effective interventions to increase physical activity in people with visual impairments. Despite accessibility limitations or a lack of resources, strategies that focus on social support and inclusion can improve participation.

**Keywords:** Exercise; blindness; adapted interventions; quality of life.

#### Resumen

**Introducción:** La promoción de la actividad física es fundamental para la salud física, mental y social de las personas con discapacidad visual. **Objetivo:** Describir las distintas intervenciones de actividad física en personas con discapacidad visual, para determinar sus características, efectividad e impacto. **Metodología:** Se llevó a cabo como una revisión sistemática siguiendo la guía PRISMA 2020. **Resultados:** La revisión sistemática halló que las personas con discapacidad visual son menos activas físicamente y más sedentarias que sus compañeros sin discapacidad. Las



intervenciones exitosas, como los programas de ejercicio personalizado y las tecnologías, mejoraron la actividad física y la autoestima. **Discusión:** Aunque existen barreras sustanciales para la participación en la actividad física para las personas con discapacidad visual, las intervenciones exitosas pueden fomentar la actividad física y mejorar el bienestar. La accesibilidad y los programas individualizados fueron barreras importantes, lo que destaca la necesidad de estrategias inclusivas dirigidas a las necesidades de esta población. **Conclusiones:** La revisión sistemática evidencia la necesidad de desarrollar intervenciones individualizadas y eficaces para incrementar la actividad física en personas con discapacidad visual. A pesar de las limitaciones de accesibilidad o falta de recursos, las estrategias que trabajen el soporte social y la inclusión pueden mejorar la participación.

**Palabras clave:** Ejercicio; ceguera; intervenciones adaptadas; calidad de vida.

### Introduction

Physical activity is a cornerstone of the holistic development of all human beings. It offers proven benefits that extend beyond physical health, emotional well-being, and social cohesion, as recognized by the World Health Organization in the Global Strategy on Physical Activity and Sport. (Ruiz et al. 2023) reinforce this view, noting that sports practice not only improves overall well-being but also strengthens psychological capacities. However, this right is not for everyone.

Blind people face constant barriers that limit their participation, leading to

inactivity and the accompanying psychological well-being problems (Setijono et al. 2024).

Given this situation, inclusion is a fundamental value. However, Alcaraz et al. (2022) point out that, when analyzing scientific publications, many interventions to promote physical activity in this group are not sufficiently effective or adapted.

Maldonado et al. (2024) agree that, although these programs have increased in importance over the last decade, the lack of critical analysis hinders their development. Therefore, it is necessary to develop programs, as Pereira et al. (2021) state, that not only increase levels of physical activity but also improve the overall quality of life for people with visual impairments, ensuring their participation.

Evidence shows that the most effective interventions are complex and multifaceted. These typically include personalized exercise programs, group classes, regular check-ups, and even virtual interfaces tailored to individual needs. Osorio et al. (2017) and González & Baños (2012) indicate that the effect is achieved by increasing levels of physical activity, self-efficacy, intrinsic motivation, and time spent on moderate-to-vigorous physical activity. The key to success lies in adaptation strategies that enable full



participation. This involves modifying sports rules, materials, and equipment, and training coaches and teachers in inclusive methods (Seron et al. 2012).

Ogarrio et al. (2021) point out that personalized interventions that adapt to the needs and preferences of participants are more likely to succeed, allowing them to experience the benefits of physical activity safely and effectively. Further analysis reveals that there are barriers and facilitators that shape participation.

Muñoz & Martínez (2022) identify the main barriers as inaccessibility to sports facilities, a lack of adapted programs, a shortage of trained personnel, and negative societal attitudes. These barriers not only restrict access but also impact mental and emotional health, creating a vicious cycle of inactivity and isolation.

Conversely, facilitators include the creation of inclusive programs that consider individual needs, social support from family and friends, and the training of professionals in adaptation techniques (Molina et al., 2014). Recognizing and addressing both aspects is crucial for improving inclusion and well-being.

Effective interventions are therefore fundamental. Zamora & Marín (2021) emphasize that implementing an educational model focused on inclusion and

equity creates an environment that promotes equal opportunities. Programs such as adapted fitness, swimming, and inclusive sports, which use guidance techniques and promote socialization, have improved not only physical activity levels but also people's confidence and reduced their isolation, addressing important dimensions of well-being such as mental health and self-esteem (González et al. 2018).

To ensure the effectiveness of these interventions, adaptation strategies are vital. The Theory of Planned Behavior (TPB) has been widely used in this field, explaining the beliefs, attitudes, and norms that determine the intentions of people with disabilities to engage in physical activity.

This theoretical perspective can reveal individual obstacles and develop strategies to promote an active lifestyle (Úbeda et al. 2018). In practice, modifications can include sound-emitting materials, such as noise balls, or textured markers to manipulate the environment (Abduljaber et al. 2022).

Finally, training facilitators and incorporating participant feedback into program design ensures that interventions are relevant and effective, promoting the inclusion and empowerment of people with

visual impairments to lead active and fulfilling lives (Avalos et al. 2021).

The purpose is to systematically analyze physical activity interventions for people with visual impairments, describing their main methodological characteristics, critically evaluating their effectiveness in improving physical fitness and psychosocial well-being, and synthesizing the scientific evidence to make recommendations that improve the design of future programs for this population.

### **Materiales y Método**

This study is conducted as a systematic review following the PRISMA guidelines (2020) (Hinojosa et al. 2025). The objective is to synthesize the evidence on physical activity interventions for people with visual impairments. A comprehensive search will be carried out in academic databases, and the methodological quality of the selected studies will be assessed in order to provide conclusions based on solid evidence (Mercê et al., 2025).

#### **Search Procedure**

For the systematic review, several academic databases were chosen: Web of Science, PubMed, SciELO, and RedALyC (Izquierdo et al., 2025). This selection is due to the importance of these databases in

the field of physical activity and visual impairment, their multidisciplinary nature, and the fact that they publish peer-reviewed studies, thus ensuring the quality of the articles consulted.

The search will cover the period from 2010 to 2025 to include the most recent and relevant studies in the field. The search will be conducted in both Spanish and English to ensure a representative sample of the literature and allow for the inclusion of more studies.

#### *Population.*

To optimize the search, keywords and descriptors related to physical activity and visual impairment were used. The Boolean operators AND, OR, and NOT were employed to combine and filter search terms. For example, combinations such as "physical activity" AND "visual impairment," "interventions" OR "adapted programs," and "barriers" NOT "off-topic" were used (Agus et al., 2025).

The search strategy was structured to be reproducible and clear, and will be included as an appendix if it is extensive. Furthermore, filters will be used to ensure that only peer-reviewed and open-access articles are included, thus guaranteeing the

quality and availability of the collected information (Núñez et al., 2025).

This systematic approach to searching for scientific literature will allow us to compile an evidence base on physical activity interventions for people with visual impairments and thus improve the quality and rigor of our systematic review.

#### *Selection criteria*

For this systematic review, we established selection criteria to ensure that the included studies truly reflect the experience of physical activity and sedentary behavior in adults and children with visual impairment. We sought randomized controlled trials, as this design helps us obtain valid and reliable results. It is important that there be a control group to compare how different interventions affect participants. We also required studies with clear inclusion criteria to ensure they focus on the visually impaired population.

Appropriate analysis is essential for meaningful results, and we want them to be presented clearly, including both relevant quantitative and qualitative data. To ensure fairness in the assessment, blinded evaluators were used, which helped minimize any bias. Finally, we excluded studies that focused specifically on visual impairment.

#### *Exclusion criteria*

The exclusion criteria for this systematic review focus on ensuring that our research is relevant and specific, as outlined by Bustos et al. (2025). Studies that do not focus exclusively on visual impairment, as well as those that do not provide quantitative data on physical activity levels and sedentary behavior, will be excluded. We will also exclude studies that do not use objective measures or that rely solely on unvalidated surveys (Hoyo et al., 2025). Studies analyzing mixed populations not focused on visual impairment and those not published in peer-reviewed journals or not available in English or Spanish will also be excluded. This methodology will help us prioritize the most relevant and highest-quality evidence for our review.

#### *Data extraction and reliability*

Data extraction will be carried out rigorously and systematically to ensure the accuracy and integrity of the information extracted from the included studies. We will use a standardized data extraction form, where information on participants, interventions, physical activity measures, and outcomes will be collected. To increase the reliability of the process, we will involve an external researcher to oversee data extraction (Paramitha et al. 2025).



This method not only reduces bias but also improves our review, allowing us to better synthesize the existing evidence on physical activity interventions for people with visual impairments. Finally, we aim to provide robust conclusions that improve the inclusion and well-being of this population, as proposed by Gamonales et al. (2018).

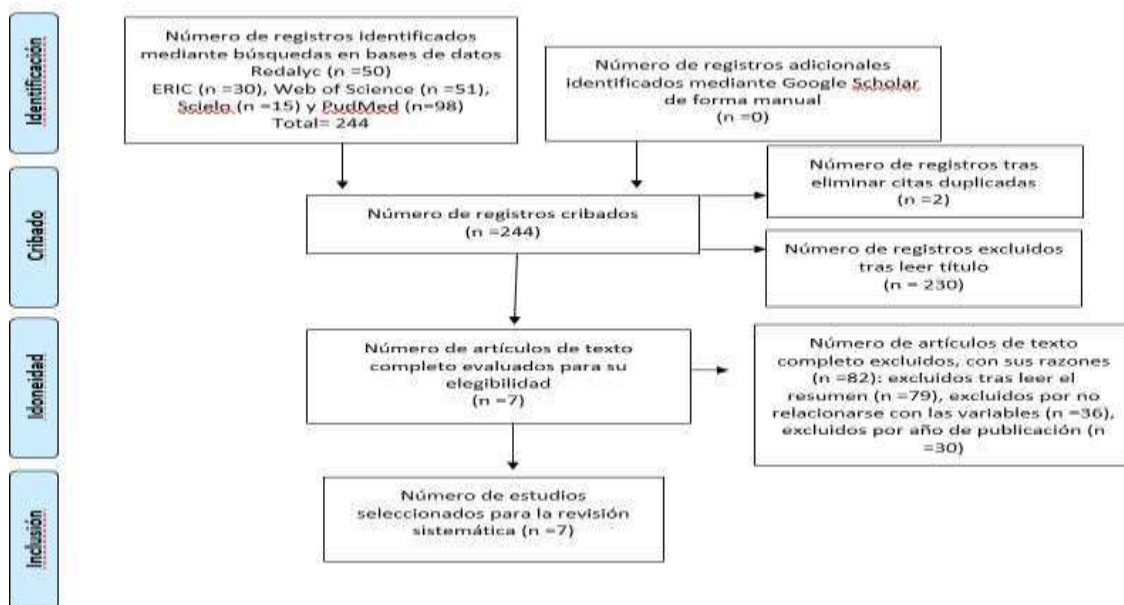
#### *Quality assessment and level of evidence*

Quality assessments will be conducted using standardized tools, such as the PEDro scale, which allowed for a rigorous analysis of the documents from the studies included in the systematic review. This approach will ensure that the review's conclusions are based on the best available evidence and that the strengths and weaknesses of each evaluated study are reflected (Bloemen et al. 2014).

### **Resultados**

The initial search yielded 244 records from different databases: Redalyc (n = 50), ERIC (n = 30), Web of Science (n = 51), SciELO (n = 15), and PubMed (n = 98). Despite a manual search in Google Scholar, no further records were found. After this step, the records were screened, retaining 242 for further review after removing duplicate citations. After reviewing the titles, 230 records that did not meet our relevance criteria were removed (Peris et al., 2025).

Of the remaining articles, 12 full texts were reviewed for eligibility. Finally, 81 articles were excluded for various reasons: 78 were excluded after reading their abstracts, 36 did not meet our variables of interest, and 30 were excluded due to their publication year (Faúndez et al., 2025). As a result of this process, seven studies were selected that met the inclusion criteria and addressed physical activity interventions for people with visual impairments. This method ensures that our review is based on the best available evidence.



**Figure 1. Flowchart for selecting “n” in the included studies according to PRISMA 2020 (Page et al, 2021)**

### **Effects of physical activity on people with visual impairment**

The reviewed studies highlight the benefits of physical activity for people with visual impairments, along with its limitations and potential to improve their quality of life. Research by Kirk et al. (2022) also indicates that blind adults are less physically active and more sedentary than their sighted peers, underscoring the need for interventions to promote physical activity and reduce sedentary behavior.

Furthermore, research by Smith et al. shows that visual impairments are associated with a high risk of physical inactivity, particularly in men and older adults, suggesting that interpersonal activities and cognition may affect participation in

physical activity. Additionally, Adhikari et al. (2025) demonstrate that children with visual impairments participate less in vigorous physical activity than their sighted peers, highlighting the need to develop specific school-based programs to promote adapted physical activity.

These results indicate that physical activity can improve the health and quality of life of people with visual impairments, but they also highlight the need to develop inclusive strategies that address the specific barriers faced by people with visual impairments. In conclusion, tailored interventions and social support can improve participation in physical activity and, consequently, the well-being of people with visual impairments.



**Tabla 1: Lista de estudios incluidos con puntuaciones de calidad**

Autores y variables	A	B	C	D	E	F	Total/puntos	Nivel/calidad
Pan et al (2020)	2	2	1	2	2	2	11	HQ
Kirk et al (2022)	2	2	2	1	2	2	11	HQ
Smith et al (2021)	2	2	1	2	2	2	11	HQ
Cai et al (2021)	2	2	2	2	0	2	10	HQ
Adhikari et al (2025)	2	2	2	1	2	2	11	HQ
Tatsuta et al (2022)	2	2	2	1	2	2	11	HQ
Calero et al (2019)	2	2	2	2	1	2	11	HQ

A. Randomized controlled trial.

B. Control group.

C. Clear inclusion criteria.

D. Appropriate statistical analysis.E. Resultados reportados.

F. Evaluadores ciegos.

**Tabla 2: Características de los estudios analizados**



Authors/variables	Study design/Intervention (duration)/Covariates	Sample /Age (years)/ Country	Groups/Measures of physical activity/Intensity	Visual assessment measures and instruments	Results
Pan et al (2020)/ investigated the levels and patterns of physical activity (PA) and sedentary behavior (SB)	A 7-day cross-sectional design was used with GT3X accelerometers, without intervention, considering covariates such as sex and day of the week.	32 adults with visual impairment (VI) and 32 without VI in Taiwan. The average age of the participants ranged from 20 to 60 years.	Dos grupos: con DV y sin DV. La actividad física se midió con acelerómetro, enfocándose en tiempo de sedentarismo o y tipos de ejercicio en diferentes intensidades (LPA, MPA, VPA).	Evaluation carried out using standardized tests, but the extract does not detail the specific instruments, it only mentions the comparison between adults with and without visual impairment.	Adults with visual impairment (VI) exhibited greater sedentary behavior, with less than 20% achieving 30 minutes of moderate or vigorous activity daily. Women with VI were the most affected. These differences are associated with barriers such as dependence on assistance and lack of accessibility.
Kirt et al (2022)	This cross-sectional	The sample consisted of	No comparative	Vision classification	The BIVIPA-2 scale proved




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Model of the Theory of Planned Behavior (motivation al behaviors, attitudes, subjective norms, perceived control, intention, and physical activity) used confirmatory factor analysis and structural equation modeling to evaluate the relationships between theoretical variables and physical activity. Data was collected through questionnaire s over a 3-month period.

Covariates: Demographic variables: level of vision (US Association of Blind Athletes classification ), gender, ethnicity/race , age.

236 visually impaired adults, with an average age of 47.05 years, predominantly women (68.2%), white (83.5%) and with B1 vision (52.1%), all in the United States.

groups were specified in the sample, which is primarily from a single country. Physical activity was measured using the IPAQ-SF questionnaire adapted for the visually impaired population, focusing on moderate-to-vigorous intensity (MVPA).

(B1 to B4) based on the US Association of Blind Athletes system.

valid after refinement. Attitude predicts the intention to engage in physical activity, while subjective norms, related to social support, directly predict physical activity—a finding possibly unique in this population. In contrast, perceived control was not a significant predictor, and the theory of planned behavior showed limited utility in explaining physical

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						activity behavior in adults with visual impairment.
Smith et al. (2021), Visual Impairment and Physical Activity	This is a secondary analysis of cross-sectional data collected between 2002 and 2004 in the World Health Survey (WHS).	This is a Association s were evaluated in a sample of 199,110 adults ≥18 years from 36 LMICs. Covariates included: age (18–44, 45–64, ≥65), sex, wealth quintiles, smoking, obesity, and chronic conditions (angina, arthritis, diabetes).	Physical activity (PA) was measured using the IPAQ questionnaire e, recording weekly minutes of moderate-to-vigorous PA, with an adequacy criterion set at at least 150 minutes per week. A subgroup analysis was also performed according to age (18–44, 45–64, ≥65 years) and sex.	Visual impairment was self-reported as severe or extreme when attempting to see at a distance of approximately 20 meters. Physical activity was assessed using the IPAQ questionnaire, which inquires about days and minutes of moderate and vigorous activity in the previous week. Potential mediators such as unemployment, anxiety, depression,	Visual impairment is associated with a higher likelihood of low physical activity (PA), according to a meta-analysis that showed an odds ratio (OR) of 1.53 (95% CI 1.38–1.71) for those reporting visual impairment. This association is stronger in men (OR ≈ 1.72) and in people over 65 years of age (OR ≈ 1.95). The	



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cognition, relationship  
interpersonal between poor  
activities, and vision and  
sleep/energy low blood  
were also pressure was  
assessed moderately  
through homogeneous  
questionnaires, in low- and  
generating middle-  
health/function income  
scores on a scale countries  
of 0 to 100, (LMICs) with  
where higher a  
values indicate heterogeneity  
poorer  $I^2 \approx 53\%$ .  
function.. Furthermore,  
mediators  
such as  
interpersonal  
activities,  
cognition, and  
sleep/energy  
explain more  
than 10% of  
this  
association,  
while factors  
such as  
unemployme  
nt, anxiety,  
and  
depression

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							contribute to a lesser extent.
Cai et al (2021)	Cross-sectional study within the Baltimore Longitudinal Study of Aging (BLSA), with adults ≥50 years. Clinical assessments of vision and objective physical activity were performed using accelerometry over 7 days. Covariates: age, sex, race, education, body mass index (BMI), diabetes, other comorbidities, smoking, depression, usual gait	603 adults ≥50 (mean 73.5 years; 55.6% women; 68.7% white). Visual impairment: impaired visual acuity (>20/40) in 24.0%, impaired central visual acuity (CBVA) in 10.9%, and impairments in contrast visual fields (5.0%), and stereo acuity (15.3%).	Accelerometer worn on the wrist (ActiGraph GT9X or similar) for 7 days.	Present visual acuity and best corrected visual acuity (VA and BCVA), contrast sensitivity, visual fields, and stereoacuity were measured using standardized tests (Snellen charts/ophthalmoscopy for VA, Pelli-Robson contrast testing, perimetry for visual fields, and stereoscopic depth testing).	Poorer visual contrast sensitivity, and visual fields were associated with fewer activity counts, less active time, and greater activity fragmentation (p < 0.05). Participants with impaired visual acuity had 19.2 and 29.3 fewer minutes of daily activity (p = 0.05 and p = 0.03, respectively). Impaired visual fields were associated with 268,636 fewer activity		



	speed, and cognitive status (MCI/AD).				counts (p = 0.02) and 46.2 fewer minutes of active time per day (p = 0.02). The differences in activity levels were most significant between 6 a.m. and 12 a.m. and 6 p.m. (p < 0.05).
Adhikari et al. (2025)	Comparative cross-sectional study using an actigraph to measure physical activity (PA) over one week. Covariates: age, sex, time of day, and the interaction between vision and time of day;	100 children with visual impairment (VI) and 100 with normal vision, matched for age and sex, aged 7 to 17 years. Neál	Groups: VI (n = 83 with valid data) and normal sight (n = 77 with valid data). PA measurements: average counts per minute (cpm), proportion of waking time spent sedentary, light,	Complete eye examination by a pediatric ophthalmologist. Visual acuity (VA) in each eye; VI classification according to BCVA; blindness classification (NLP/LP) was grouped into VI.	Children with visual impairment showed less overall physical activity than children with normal vision, with fewer counts per minute and less time spent in moderate/vigorous activity, especially during the



additional adjustments were made for potential confounding factors in the model (age, sex, time of day).

moderate, and vigorous. Intensity: Puyau algorithm was used to classify activity as sedentary (<800 cpm), light (800–3199 cpm), moderate (3200–8199 cpm), and vigorous (>8200 cpm).

school day. Both groups spent a significant portion of their time sedentary (~40%), but the VI group spent more time in light physical activity and less in high-intensity physical activity throughout the day, with the most noticeable differences during school. These results were obtained using an actigraph over one week in 100 pairs of children from Nepal, analyzed with mixed



					models, and adjusted for age, sex, and time of day.
Tatsuta et al. (2022) identified the main variables as moderate-to-vigorous physical activity time, self-confidence, walking speed, and exercise habits.	This was a cross-sectional study without a specific intervention, evaluating at a single point in time, and considering covariates such as age, sex, health status, and type of visual impairment.	The sample consisted of 169 adults with visual impairment in Japan, with median ages of approximately 36–46 minutes of moderate-to-vigorous physical activity per day, depending on the age group.	Groups were analyzed by age and sex, measuring moderate-to-vigorous physical activity in minutes per day to compare with recommendations, focusing on moderate-to-vigorous activity.	Self-administered questionnaires were used to determine the severity and type of visual impairment, as well as to assess habits and functionality.	Most participants met the WHO recommendations, but few achieved the 60 minutes per day recommended in Japan, and factors such as self-confidence and walking speed were associated with greater physical activity.
Calero et al. (2019), focused on motor development and sensory skills.	This is a descriptive, cross-sectional, and correlational study with an 8-month intervention based on	Twenty children between 6 and 10 years old with deafblindness participated in the study	The children formed a group that performed individually designed adapted physical activities,	Motor skills tests were used to evaluate locomotion, balance, and fine motor skills before and after the intervention.	Significant improvements in motor abilities were observed, with an increase in the number of children who



adapted games.	at the “Mariana de Jesús” Special Institute in Ecuador.	with pre- and post- intervention assessments using specific tests.	performed adequately, and statistical validation of the progress achieved.
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**Abreviaturas:** PA: Physical Activity, BS: Sedentary Behavior, VI: Visual Impairment, BIVIPA-2: Beliefs about Physical Activity, IA: Activity Intention, A: Attitudes, NS: Subjective Norm, PC: Perception of Control, DV: Visual Impairment, PA: Levels of Physical Activity, M: Mediators, VA: Visual Acuity, SC: Contrast Sensitivity, FV: Visual Fields, CA: Activity Counts, MA: Active Minutes, FA: Activity Fragmentation, PAO: Objective Physical Activity, VI: Visual Impairment, I: PA Intensity, MVPA: Moderate to Vigorous Physical Activity, SE: Self-efficacy, VC: Walking Speed, HE: Exercise Habits, AFA: Adapted Physical Activity, HM: Motor Skills

### Discussion

The results of the reviewed studies show a complex association between physical activity (PA) and visual impairment, with aspects that both limit and improve the quality of life for people with visual impairment. In the study by Chien et al. (2022), adults with visual impairment were found to be less physically active and more sedentary than their peers without impairment. This pattern suggests that visual impairment can be a significant barrier to achieving physical activity recommendations, consistent with the findings of Kirk et al. (2022), who found that the theory of planned behavior (TPB)

partially predicts physical activity intention in blind adults, but subjective norms proved to be a good predictor of PA.

Similarly, the study by Smith et al. (2021) emphasizes that visual difficulties are associated with a higher risk of inactivity, especially in men and older adults. These results are consistent with the research by Cai et al. (2021) showed that poorer visual acuity and other measures of vision were correlated with less active time and more fragmented activity patterns. This underscores the importance of implementing targeted interventions that address these limitations and encourage



increased physical activity, particularly in vulnerable groups such as the elderly.

The comparison of physical activity levels between children with and without visual impairment, presented by Adhikari et al. (2024), suggests that children with visual impairment engage in less vigorous physical activity, especially during school hours. This indicates the urgent need to develop adapted physical activity programs in school settings that promote the inclusion and participation of these children, as noted in the recommendations by Tatsuta et al. (2022), which identify significant factors, such as self-efficacy, that influence adherence to physical activity.

Finally, the study by Calero et al. (2019) shows that adapted physical activities improve motor skills in deafblind children, demonstrating the need for individualized interventions. In summary, these studies show that, despite the barriers to physical activity for people with visual impairments, strategies can be developed to improve their quality of life and promote an active lifestyle. A multidisciplinary approach involving healthcare professionals, educators, and families is needed to create and implement effective and accessible programs for this population.

These results highlight the need for more longitudinal and interventional studies that examine how different support models and modified programs can improve physical activity and, ultimately, the health and well-being of people with visual impairments.

### **Limitations and strengths**

The systematic review has some limitations and strengths that should be considered when interpreting the results. Among the limitations is the heterogeneity of the included studies, which prevents the results from being generalized to the entire population with visual impairment.

In addition, many studies are based on small and non-random samples, which can introduce bias and limit the generalizability of the results. On the other hand, most of the analyzed studies used objective measures (accelerometers) of physical activity, which provide accurate data on activity and sedentary patterns. Another strength is the heterogeneity of the locations and populations studied, from children to adults with different degrees of visual impairment, and therefore allows observation of how the effects of physical activity vary in this population. In conclusion, despite its limitations, the strengths of this review open the door to future research that

explores physical activity interventions for people with visual impairment in detail.

### Declaration of Interest

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