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Orientation and mobility training for adults with low vision: a new standardized approach

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This series of articles for rehabilitation in practice aims to cover a knowledge element of the rehabilitation medicine curriculum. Nevertheless they are intended to be of interest to a multidisciplinary audience. The competency addressed in this article is 'The development of a theory-driven training program for practice.'

Abstract

Background: Orientation and mobility training aims to facilitate independent functioning and participation in the community of people with low vision.

Objective: (1) To gain insight into current practice regarding orientation and mobility training, and (2) to develop a theory-driven standardized version of this training to teach people with low vision how to orientate and be safe in terms of mobility.

Study of current practice: Insight into current practice and its strengths and weaknesses was obtained via reviewing the literature, observing orientation and mobility training sessions (n = 5) and interviewing Dutch mobility trainers (n = 18). Current practice was mainly characterized by an individual, face-to-face orientation and mobility training session concerning three components: crystallizing client's needs, providing information and training skills. A weakness was the lack of a (structured) protocol based on evidence or theory.

New theory-driven training: A new training protocol comprising two face-to-face sessions and one telephone follow-up was developed. Its content is partly based on the components of current practice, yet techniques from theoretical frameworks (e.g. social-cognitive theory and self-management) are incorporated.

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Discussion: A standardized, tailor-made orientation and mobility training for using the identification cane is available. The new theory-driven standardized training is generally applicable for teaching the use of every low-vision device. Its acceptability and effectiveness are currently being evaluated in a randomized controlled trial.

Keywords
Aged, intervention protocol, low vision, mobility limitation, rehabilitation

Introduction

In the next decades the number of older adults with multiple chronic health problems, including low vision, will increase substantially in Western countries.[1–3] Sense of sight is one of the most important sensory systems to contribute to daily functioning.[4,5] For instance, during travel, the majority of the environmental information is received through the visual system. Hence, if there is a loss in vision, participation in social and physical activities is hampered and negatively influences a person's mobility and quality of life.[6–9] So, there is a need for feasible interventions to reduce these negative effects of low vision among older adults.

To maintain travel independence people with low vision and blind people can learn new orientation and mobility skills to compensate for reduced visual information.[6] During orientation and mobility training, people with low vision or blind people are taught to ambulate and negotiate the environment safely and independently.[10–12] The training is often supplemented by the use of an assistive device meeting the need of the person with low vision[13] and facilitated by a trainer specialized in orientation and mobility instruction.[6,14]

Worldwide, orientation and mobility training for older adults with low vision is often part of low vision rehabilitation care, while the content of this training is rarely discussed and detailed descriptions of training programs in the literature are scarce.[14] In the Netherlands, facilitators of this training receive a general mobility instruction. This instruction contains 10 days of theoretical and practical training on mobility skills, orientation and mobility, traffic safety, public transport, assistive devices, psychological aspects of low vision, accessibility, riding a bike, etc.[12] Despite the presence of this national instruction on orientation and mobility for facilitators, there is no fixed protocol for orientation and mobility training and feasibility and effectiveness of this practice-based training are unknown.[15,16]

Although evaluation studies on orientation and mobility training for visually impaired people are scarce,[14] previous studies have shown beneficial effects of self-management approaches for persons with chronic conditions in general.[17–20] Therefore, a possible strategy to develop an effective theory-based orientation and mobility training is to improve the self-management abilities of visually impaired adults.[21] Self-management, initially defined as client's active participation in disease treatment, involves both education and learning skills associated with client's perceived problems.[22] Self-management interventions are developed on the basis of psychological theories, such as the social-cognitive theory, which aims to enhance client's self-efficacy beliefs.[18,22,23] Clients are taught skills to problem-solve difficulties and adopt adaptive strategies. These promising strategies may contribute to effective low vision rehabilitation care as well.

The main aim of the orientation and mobility training is to teach adults with low vision orientation and mobility skills. Teaching the use of the identification cane (also called symbol cane) may be a part of this training and is used as an example in this paper. Worldwide this cane is used to indicate one's low vision to others in specific situations, such as street crossings and crowded places.[24] The cane is white with red straps and is approximately 95 cm in length. Its prime function is signalling, and in contrast to the long cane (approximately 100–150 cm in length) it is less suitable for detection of low objects.

The objectives of this paper are twofold: (1) to gain insight into current practice regarding orientation and mobility training, and (2) to develop a

theory-driven standardized version of this training to teach people with low vision how to orientate and be safe in terms of mobility.

Current practice of orientation and mobility training

Between March and June 2007 author GZ consulted several sources to obtain insight into the orientation and mobility training as employed in low vision rehabilitation care.[15]

Source 1: national instruction for mobility trainers

The *National Handbook Specialization Course Mobility Instruction in the Netherlands* provided little information related to use of the identification cane.[12] According to the Handbook, the cane is used by people with low vision or by blind people with a guide dog. A person with low vision is eligible to use the identification cane if he or she is unable to safely cross a street due to vision problems and a long cane for detection of low objects is unnecessary. In addition, points of interest for the mobility trainer are: the assessment of the speed of traffic; factors that may influence clients' perception on the traffic (e.g. weather conditions or the presence of a cycle path); starting position for the client holding the identification cane before and during the street crossing; and functional vision.[12]

Source 2: orientation and mobility sessions

In April 2007 the first five orientation and mobility sessions in which the use of an identification cane was taught by a mobility trainer of a low vision rehabilitation centre in Sittard, a city in the south of the Netherlands, were observed. All observed sessions were individual, comparable meetings between the client and mobility trainer at the client's home. The clients included one blind young adult with a guide dog and four people aged 65 years or older who received training in the use of the identification cane. Regarding the content of the sessions, four elements were distinguished. First, trainer and client had a small conversation to get acquainted. Second, the client's difficulties regarding visual function, personal and domestic ADLs, activities outside of the home, hobbies and the (desired) use of an assistive device were evaluated. Third, the mobility trainer displayed a show-model of the identification cane and, if requested by the client, an identification cane was ordered by the mobility trainer and paid for by the client (cost: about 25 euros). Lastly, use of the cane was practised in the neighbourhood for approximately 15 minutes ($n = 1$) or a follow-up appointment to do so in the next session was scheduled.

Source 3: interviews with mobility trainers

To obtain information from mobility trainers, 18 trainers employed at different locations of three Dutch organizations for low vision rehabilitation care (i.e. 'Bartiméus', 'Sensis' and 'Visio' – the latter two are currently known as 'Royal Dutch Visio') who train clients in orientation and mobility while using an identification cane were interviewed. The mean age of the 18 interviewed mobility trainers was 36.2 years (SD 8.9 years); the majority were female ($n = 16$; 89%). Two-thirds ($n = 12$; 67%) of the mobility trainers were certified occupational therapists and 14 (78%) had participated in the Dutch national orientation and mobility instruction. Exactly half of the mobility trainers had more than five years of experience in facilitating orientation and mobility training.

The face-to-face interviews were performed by author GZ in May and June 2007 and were guided by a 27-item questionnaire assessing (1) the characteristics of the current training (e.g. which clients are eligible for the training), (2) the characteristics of the sessions (such as number, frequency, duration, format, location and content of the sessions), (3) aspects related to the identification cane (such as its purchase and delivery time), and (4) elements missing in the current training and opportunities for improvement. Quantitative data were analysed by means of descriptive statistics and themes and patterns regarding the content and limitations of the training were derived from the qualitative data.

Orientation and mobility training in identification cane use in the Netherlands comprised on average one or two sessions (range 1–5) with a variable

mean duration each (range 53–120 minutes) and a frequency of once per week. All training sessions were in an individual, face-to-face format and most trainers provided the training at the client's home (n = 14; 78%). According to the trainers the most frequently mentioned needs by the older people with low vision were crossing a street safely and being recognized as visually impaired in settings where people are unaware of the client's eyesight and may not act upon it.

Despite differences in performance of the training by the trainers, three intervention components were derived from their descriptions of the training's content: (1) crystallizing the clients' needs, (2) providing information (e.g. on the purpose of the identification cane and the techniques to handle the cane related to orientation and safe behaviour), and (3) training these techniques outdoors while the client applies the identification cane (e.g. holding the cane while crossing a street).[15]

> Although it appears straightforward, the training may not be underestimated. It is important to make an accurate assessment of the client's individual needs in terms of treatment, but also of learning style and working method. (Mobility trainer 7)

With respect to homework instructions, trainer and client mostly made no specific arrangements about the content and frequency of the homework. Instead of concentrating on homework activities, the client was solely advised to use the cane.

> I advise people to practise the use of the cane, but I don't know if they actually follow this advice. I would not call my advice 'homework'. I think making specific arrangements regarding practising with the cane is childish. (Mobility trainer 10)

Mobility trainers mentioned the rather passive role of the client in the training (e.g. regarding the purchase of the cane), recognizing unsafe situations and unsafe behaviour, and practising cane use between two training sessions. Furthermore, not accepting one's vision loss, feelings of shame, anxiety and frailty, and responses from other people were limiting factors for use of the cane by the client according to the trainers.

> The first experience of a client using the identification cane is important. Positive experiences, such as assistance from unknown people are stimulating factors for cane use by the clients. While negative experiences, which facilitated awareness of the consequences of vision loss such as unsafe feelings while crossing the street, may result in loss of confidence and the tendency not to use the cane. (Mobility trainer 13)

In addition, all trainers made recommendations regarding aspects important for an improved standardized training in the use of the identification cane. They mentioned for example: application of the training in the clients' living environment (n = 10); providing background information to the clients and their close acquaintances (e.g. on the use, costs and advantages of the identification cane) (n = 9); attention to psychosocial problems (e.g. problems with accepting their vision loss) (n = 9); attention to the diversity of the clients and their everyday surroundings (n = 8); inclusion of follow-up care (e.g. to evaluate the orientation and mobility training and monitor whether the clients' needs are met) (n = 4); and a checklist for the mobility trainer comprising information on techniques used and responsibilities of the mobility trainer (n = 3).

Overall, this study on current practice regarding orientation and mobility training for people with low vision and a recent review showed that there is no sound standard approach based on evidence-based guidelines.[14] Consequently a new standardized training based on theory was developed to teach people with low vision orientation and mobility skills.

New theory-driven orientation and mobility training

Aim of the training and trainer's responsibilities

The new standardized orientation and mobility training aims to facilitate safe and independent participation in the community by optimal use of one's abilities and to facilitate uptake of old or new activities. Overall, clients are taught to transfer

negative feelings regarding the performance of activities of daily living into positive, stimulating feelings (i.e. cognitive restructuring), to apply problem-solving in order to perform activities safely or search for safe alternatives if needed, to set goals to perform activities safely, and to apply orientation and mobility skills outdoors, such as use of the identification cane while crossing a street. Such experiences aim to increase feelings of control and self-confidence. This corresponds to theoretical frameworks (e.g. social-cognitive theory and self-management principles), which have previously been shown to be successful in other populations.[18–20] Table 1 shows the foundations for the development of the new standardized training.

The newly developed standardized orientation and mobility training is facilitated by a mobility trainer who studied the written protocol and subsequently received a 2-hour instruction on the training. The mobility trainer's responsibilities in order to reach the training goals are the actual application of the standardized training (e.g. provide the training according to the protocol), the stimulation of discussion regarding themes and skills addressed in the training (e.g. the benefits of the identification cane use), the encouragement of the formulation and performance of action plans (i.e. setting goals for performing activities safely), the stimulation of participation and input from the client (e.g. to assist the client in establishing an association between individual experiences and the training), and the stimulation of learning new behaviour by providing constructive and positive feedback. In addition, the mobility trainer has several responsibilities of a general nature, such as preparation of the training (e.g. read the client's medical record), ensure client's safety (e.g. avoid risky situations and search for a safer alternative) and clarify ambiguities (e.g. respond to client's questions). Given that most clients do not have a low vision device before the start of the training, the mobility trainer may assist the client in the purchase of a low vision device, for example an identification cane. Throughout the training attention to psychosocial issues (such as feelings of shame, acceptation issues, or fear) is incorporated and mobility trainers may refer clients who experience such problems severely to social or psychological care.

Characteristics and content of the training

The training consists of two face-to-face sessions in the client's home and one follow-up session by telephone over a period of five weeks (Table 1). Sessions 1, 2 and 3 have an approximate duration of 90, 80 and 25 minutes, respectively. The written protocol provides a step-by-step, detailed description of the content of each training session (see Table 2 and text below). In addition, several process and content-related worksheets provide an overview of important steps in the training and facilitate active involvement by the client. These worksheets serve as tools and actual writing on the worksheet (printed in large font) is optional. The latter was given that appropriately applying techniques such as restructuring thoughts, finding solutions and realistic planning of activities is considered important and not so much the actual writing, which can be difficult and time-consuming for clients with vision loss. A reference sheet with background information on the identification cane (e.g. on when to use the cane and one's rights and duties in traffic situations) is included for both the clients and their close acquaintances (i.e. significant others).

Session 1

The first, face-to-face session consists of six steps. The first step is aimed at increasing the client's confidence and for the mobility trainer to gain insight into the client's situation. Client and mobility trainer getting acquainted with each other (e.g. a short exchange of the client's background and case history).

> Give a brief explanation of your work as mobility trainer and tell the client what to expect from the training and what your expectations are from the client. (From protocol)

Active participation of the client is important, so trainer and client together crystallize and prioritize the client's needs related to activities of daily life in which difficulties regarding

Table 1. Foundations for the development of the new standardized, protocolized orientation and mobility training[a]

Current practice[b]	New standardized orientation and mobility training	
Point of departure: Lack of a well-described, evidence-based orientation and mobility protocol for training in use of the identification cane[b1,b3,b3a]	**Point of departure:** There is a need for evidence-based care within low vision rehabilitation. This requires a written protocol for orientation and mobility training for use of the identification cane that can be tested in an effect evaluation and applied during (continuing) education of mobility trainers	
Aim of the training: Not clearly described[b1,b1a]	**Aim of the training:** To facilitate safe and independent participation in the community by optimal use of one's abilities and to facilitate uptake of old or new activities	
Eligibility criteria: – unable to cross a street safely due to vision loss and a long cane for detection is unnecessary[b1a] – low vision people who do not experience difficulties with differences in obstacle heights[b3] – independent participation in traffic situations[b3] – recognition during activities of daily life desired[b3]	**Eligibility criteria:** – able to go outside, e.g. for a short walk or doing groceries, *and* – experiencing difficulty with safely crossing a street, *and/or* – experiencing difficulty with recognizing acquaintances outdoors, *and/or* – willing to become recognizable as a person with low vision by means of the identification cane, *and/or* – experiencing difficulty to avoid large obstacles due to low vision	
Characteristics: Number of sessions: variable, mostly 1 to 2 sessions[b2,b3] Trainers indicated that it is common to conduct 1 session but questioned whether this would lead to: – use of the cane in the client's daily life[b3] – use of the cane in an appropriate manner[b3]	**Characteristics:** Number of sessions: 3	Main rationale: Multiple sessions provide: – increased exposure / repetition – the opportunity to increase the level of difficulty of the training content (graded tasks / exposure)[c] – supervision of appropriate application of training content and adjusting incorrect use of the cane via feedback[c] – the identification of barriers for the new behavior and discussion how to overcome them[c]
Characteristics: Frequency: variable, mostly weekly (if multiple sessions were conducted)[b2,b3]	**Characteristics:** Frequency: every other week	Main rationale: Provides clients with sufficient time to incorporate the learned information and skills in regular activities of daily life (via action plans and contracting[c]) in between the sessions ('exposure in vivo')[c]

Table 1. (Continued)

Current practice[b]	New standardized orientation and mobility training	
Duration: Complete training time: variable (range 60-120 min)[b3] Training time indoors: variable (range 15-60 min)[b3]	Duration: Complete training time: – session 1: 90 min – session 2: 80 min – session 3: 25 min Training time indoors: – session 1: 60 min – session 2: 40 min – session 3: 25 min	Main rationale: Amount of time per session needed to execute the different training components, such as providing information, demonstrating the cane use, goal setting, providing feedback (see Training components below)
Format: – individual[b2,b3] – meeting between mobility trainer and client[b2,b3] – face-to-face[b2,b3]	Format: – individual – meeting between mobility trainer and client, but a significant other is invited to attend the training (if agreed upon by the client) – session 1 and 2: face-to-face – session 3: telephone contact for follow-up	Main rationale: – individual training allows tailoring of the sessions to the client-environment-specific needs – presence of significant other provides social support[c] – telephone contact allows for an efficient follow-up in order to supervise whether action plans are implemented and cane use is incorporated in regular activities of daily life (reviewing behavioral goals, providing feedback, stimulating practice).[c] Additionally, it allows evaluating the sessions, determining whether additional care is needed, summarizing the important points of interest of the training for the client following from the training, and providing encouragement[c]
Location: mostly client's home environment[b2,b3]	Location: client's home environment	Main rationale: Training in the client's home environment: – provides the trainer insight into the client's situation – allows situation-specific training of activities in one's own environment ('exposure in vivo')[c]

(Continued)

Table 1. (Continued)

Current practice[b]	New standardized orientation and mobility training	
Training components: 1) crystallizing the client's needs[b2,b3] 2) providing information, e.g. on walking aids, canes and techniques related to orientation and safe behaviour[b2,b3] 3) training techniques outdoors[b2,b3] Main limitations of current practice:[b3] – client's cane use is insufficiently stimulated due to: - a passive role for the client, e.g. regarding finding personal solutions - limited time to practice together with the client and by the client him/herself - limited attention to positive experiences - no attention paid to related (psychosocial) factors - no time for evaluation of the training - no arrangements regarding application of the cane in daily life - no follow-up after the training – lack of supporting materials, e.g.: - identification cane for the client and trainer to use during the training - a reference sheet for clients and their significant other(s) with information regarding the cane - written information or checklists for trainers	Training components: 1) crystallizing the client's needs 2) prioritizing the client's needs 3) providing information, e.g. on walking aids, canes and techniques related to orientation and safe behavior 4) formulating, performing and evaluating action plans 5) training techniques - related to orientation and safe behavior -outdoors while using the identification cane 6) formulating action plans / contracting Supportive materials include: – 2 identification canes for use during the training (1 for client and 1 for trainer) – for the trainer: a detailed written protocol of the training (including information regarding assessment traffic speed, factors influencing sight, position of the cane before and during street crossings, and functional vision[b1a]) and a checklist to mark whether the content of the training is executed	Main rationale: The added training components aim to stimulate active involvement of the client as the client: – identifies and acknowledges difficulties regarding certain activities – recognizes different levels of difficulty and learns to set graded tasks, if needed[c] – recognizes personal negative thoughts related to activities (including psychosocial factors) and learns how to reframe these into positive thoughts (cognitive restructuring) by searching for personal, realistic solutions to perform an activity safely (problem solving and action planning)[c] The role of the trainer includes: – providing information on consequences (costs and benefits of cane use)[c] – prompting the client to use the cane[c] – assistance in action planning / setting graded tasks and identifying and overcoming barriers for cane use[c] – providing instruction, general encouragement and specific feedback[c]

Table 1. (Continued)

Current practice[b]	New standardized orientation and mobility training	
	– for the client: 2 worksheets (prioritizing activities and planning activities) and a reference sheet with background information regarding the cane (also for significant others of the client)	– modeling the use of the cane[c] – creating positive experiences while practicing use of the cane[c] – discussing, evaluating and contracting regarding cane use in daily life[c]

[a]The identification cane is used as example

[b]Information on current practice regarding the orientation and mobility training with the identification cane was obtained from several sources:

[b1]Source: National and international literature[14]

[b1a]Specific source within the literature: Dutch National Handbook Specialization Course Mobility Instruction

[b2]Source: Orientation and mobility training sessions (n = 5)

[b3]Source: Interviews with mobility trainers (n = 18)

[b3a]Specific source within organizations associated with low vision rehabilitation: Board of the Dutch low vision rehabilitation centers and Program In Sight of ZonMw – The Netherlands Organization for Health Research and Development

[c]Based on theory: social-cognitive theory, control theory, operant conditioning, self-management, social support

Table 2. Content of the standardized orientation and mobility training[a]

Training	Content
Session 1	1. Crystallizing client's needs (10 min) – Acquaintance and introduction to the client – Client's background and case history – Prioritizing client' needs – Interim evaluation of appropriate travel aid and agreements for continued training 2. Providing information on identification cane use (10 min) – Clarify and discuss issues, e.g. consequences of use, advantages, disadvantages, availability, costs, rights and duties 3. Formulating action plan (15 min): 1) What activity is limited by the low vision? 2) Why is this activity limited? 3) How can the limitation of the activity be decreased and the activity safely performed? 4. Performing action plan (30 min) – Walk outside with identification cane and practice position of the identification cane – Trainer observes, and provides information and direct feedback (e.g. on responses from the environment) 5. Evaluating (10 min) – Evaluation of action plan – Evaluation of identification cane as appropriate travel aid – Evaluation of session 1 in general 6. Conclusion (15 min) – Prepare and repeat agreements for homework and session 2 – Summarize content of session 1 – close session 1 with one or two positive comments
Homework	independently performing action plan of session 1, formulating and performing new action plan (the latter is optional)
Session 2	1. Evaluating (15 min) – Review agreements of session 1 and homework – Discuss experiences of client 2. Formulating new action plan (15 min): 1. What activity is limited by the low vision? 2. Why is this activity limited? 3. How can the limitation of the activity be decreased?

Table 2. (Continued)

Training	Content
	3. Performing action plan session 1 (20 min) – Walk outside with identification cane – Trainer observes, and provides information and direct feedback 4. Performing new formulated action plan (20 min) – Walk outside with identification cane – Trainer observes, and provides information and feedback 5. Evaluating and conclusion (10 min) – Prepare and repeat agreements for homework and session 3 – Summarize content of session 2 – Close session 2 with one or two positive comments
Homework	independently performing action plans of session 1 and 2
Session 3	1. General evaluation (15 min) – Review agreements of session 1, session 2 and homework – Monitor and evaluate action planning 2. Agreements (10 min) – Evaluate and summarize particular points of interest of the training – Check if clients' needs are met (if not: arrangement of additional session) – Close session 3 with one or two positive comments

[a]The identification cane is used as example
Note: the duration of each session element are estimates and should be interpreted as a guideline.

Briefly name activities and their locations during which you experience difficulties in safe performance due to your vision loss	
Which activity do you consider difficult?	**Where?**
1. *To visit my sister using public transport*	*In town about 60 miles from my house*
2. *To walk to the post office*	*In the city centre about 5 blocks from my house*
3. *To play cards with friends*	*In the community centre about 2 miles from my house*
4. *To visit my friend*	*In town about 10 miles from my house*
5. *To go to the dentist*	*In the city centre about 7 blocks from my house*
6.	.....
7.	.....
8.	.....
Which activity is most important to you? (e.g. think about how often you perform the activity and the degree of safety for you and your environment)	
State the 3 activities that you consider most important (<u>in order of importance</u>):	
1. *To walk to the post office*	
2. *To visit my sister using public transport*	
3. *To play cards in the community centre*	

Figure 1. Worksheet for prioritizing client's needs (larger font in practice).

orientation and mobility are experienced. A worksheet may be used (Figure 1).

> Ask the client to formulate experienced difficulties in orientation and mobility tasks in daily life. Together with the client prioritize these activities, formulate which of the activities is most important while taking the degree of safety for the client and his or her environment into account. (From protocol)

The second step for the mobility trainer is to provide information on the identification cane (using the reference sheet), clarify and discuss issues regarding the identification cane, such as the advantages, disadvantages, costs and one's rights and duties in traffic situations.

> Ask the client about his or her first impression of the identification cane. Does the client see that the advantages of using the identification cane outweigh the disadvantages? Is the client willing to use the identification cane? (From protocol)

During step 3 the client, assisted by the mobility trainer, applies problem-solving strategies by formulating the activities of the action plan. A worksheet may be used (Figure 2). The action plan is based on an activity previously derived from (the worksheet of) prioritizing the client's needs, depending on several factors, such as complexity, feasibility or frequency of performance of the activity (Figure 1). The aim of the action plan is to set goals and to encourage individual problem solving, find personal, realistic solutions regarding the action, stimulate active participation of the client, assist the client in the evaluation of a specific action, and to achieve cognitive restructuring (i.e. transfer negative feelings regarding the performance of activities of daily living into positive, stimulating feelings).

> Use the activity most important to the client and let the client describe specific factors that may hamper the performance of the activity. Then, ask the client to describe how the activity can become more easy or safe. (From protocol)

Fourth, the activity most important to the client is performed in the actual setting during which the client practices how to hold and apply the identification cane correctly. For example, on the escalator in a department store or at a crosswalk on the street.

> Observe, provide and repeat information and give direct feedback to the client, for example on the

1. What activity is limited by the low vision?

Describe the activity.

"I no longer walk to the post office. I feel unsafe while crossing the intersection on the route to the post office."

2. Why is this activity limited?

Describe factors that hamper the activity, for example curbs, street crossings, road recognition, or circumstances such as daylight and weather conditions.

"The intersection on the way to the post office is a busy crossing and on the side of the street people park their car so I cannot see the traffic coming."

3. How can the limitation of the activity be reduced?

Describe how the activity can become more easy or safe.

"I could walk a safer, alternative route or find a safer spot to cross the street so the parked cars are not blocking my sight. Maybe when I also use the identification cane I will feel more confident about crossing this street, it may help me."

4. Perform the activity as described above. How did it go?

Describe or talk about your experiences. If the activity can be performed more easily or safer, fill out a new plan with the required individual actions.

"Together with the mobility trainer I walked my usual route to the post-office while using an identification cane. At the busy intersection we analyzed the traffic and its speed from each direction. Together we found a safe spot to cross the street, a bit further away from the corner. I also used an identification cane and I noticed car drivers yielded sooner than before."

Figure 2. Worksheet for action planning (larger font in practice).

> position of the cane or responses from the environment. (From protocol)

The mobility trainer uses the supplementary identification cane to model the behaviour. During step 5, the mobility trainer and client together evaluate the formulation and performance of the action plan activities in a quiet environment, for example at the client's home.

> Ask the client to express how he or she experienced using the identification cane and together reflect on the strengths and weaknesses of using the cane and the performance of the action plan as formulated. (From protocol)

If the activity was performed unsafely or in another way than desired, the client is stimulated to find new, appropriate solutions, so the action plan can be adjusted accordingly. Furthermore, thoughts, feelings and benefits of the client's use of the identification cane are discussed and the full session is evaluated. The sixth step includes the agreements for homework activities (i.e. contracting) and further preparations for session 2. Jointly, the trainer and client contract on the following homework activities: (1) performing the activity of the action plan (if the client is able to walk the route safely), (2) formulating and optionally, performing a new action plan, and (3) practising with the identification cane during one's individual activities of daily living. Furthermore, agreements on which days and how often the client will perform the homework activities are made to ensure the agreements are fulfilled. By means of repeating the activities of the action plan, client's self-management skills may improve.

> To end the session provide a short summary of the full session and close the session with one or two positive comments about the session to the client. For example, tell the client he or she carefully listened to the traffic before crossing the street. (From protocol)

Homework. In between sessions 1 and 2 the client must be actively engaged with the identification cane. To facilitate the client's awareness and mental

involvement, the client independently formulates a new action plan by evaluating a specific action, setting goals and finding personal, realistic solutions regarding the action. By means of independently performing the action plan of session 1 and the new action plan (optional) the client practises to use learned orientation and mobility skills.

Session 2

The second face-to-face session, which is scheduled two weeks after session 1, involves five steps. First, the agreements of session 1, the homework activities and the experiences of the client on the use of the identification cane are reviewed.

> Ask the client if he or she formulated a new action plan, if the first action plan was performed and whether the use of the identification cane was integrated into activities of daily living. If so, let the client share his or her experiences. If not, ask the client to explain this and together try to find a solution. (From protocol)

Second, a new action plan is formulated based on a new and more challenging activity described on the worksheet of prioritizing the client's needs (Figure 1). Steps 3 and 4 include the performance of the activity of the action plan formulated during session 1 and the new action plan, respectively. Once again, the mobility trainer observes, provides and repeats information, and gives direct feedback. The fifth step is the preparation and repetition of agreements for homework activities and session 3. Trainer and client contract on the following homework activities: (1) performing the activities of all previously formulated action plans, (2) formulating and optionally, performing a new action plan, and (3) integrating practising with the identification cane into activities of daily living. Furthermore, specific agreements on which days and how often the client will perform the homework activities are made to facilitate the agreements. Lastly, the mobility trainer provides a short summary of the full session and provides one or two positive comments about the session.

Homework. In between sessions 2 and 3 the client must be again actively engaged with the identification cane by means of independently performing action plans of all previous sessions, formulating and optionally, performing a new action plan, and integrating the use of the identification cane into activities of daily living.

Session 3

The third session is a telephone follow-up scheduled two weeks after session 2. The agreements of previous sessions and homework activities are reviewed. Particular points of interest of the training are summarized by the mobility trainer to facilitate the evaluation of the full training. In order to monitor the client's needs, it is important for the mobility trainer to check whether these needs are met.

> Ask the client's opinion about the training. Is the client able to safely and independently plan and perform outdoor activities, possibly by using an action plan? (From protocol)

If the client's needs are not met, an additional face-to-face session can be arranged. Again, the last session is closed with one or two positive comments (e.g. the client practised the use of the identification cane in between the training sessions).

Discussion

Because of the lack of a standardized, systematically evaluated orientation and mobility training for people with low vision this paper describes current practice regarding this training and presents a newly developed training. We used the identification cane as an example in this paper. Theories for behaviour change were used to develop the new training in addition to information and recommendations from trainers on the orientation and mobility training. This manuscript describing the training meets the previously reported need for publication of intervention details[17,25] in order to share experiences, facilitate accurate replication and application, and identify techniques or theoretical approaches that may explain observed effects. The new, well-structured and tailor-made training aims to facilitate safe and independent

participation in the community and the uptake of old or new activities of adults with low vision by stimulating optimal use of one's abilities. Self-management and cognitive behavioural techniques (such as, goal-setting, action planning, cognitive restructuring, individual problem-solving, finding personal, realistic solutions and providing direct feedback) are incorporated in the standardized orientation and mobility training and clients are actively involved in their own orientation and mobility rehabilitation process. The new theory-driven standardized training is generally applicable for teaching the use of every low vision device and may also serve as a framework for rehabilitation services other than those for people with low vision.

Compared with current practice, the standardized orientation and mobility training has at least two major strengths. First, the standardized training provides a structured, theory-based working method, which serves as an equal provision of service by mobility trainers. Techniques, such as problem-solving, are systematically taught to encourage clients to identify personal goals and find personal, realistic solutions during the orientation and mobility training, but also for the future, when the client may experience new problems (e.g. deteriorated vision or comorbidity). Second, psychosocial issues, such as dealing with vision loss or the use of an identification cane, are taken into consideration throughout the training. Comments of the mobility trainers as well as previous research emphasized the importance of attention to psychosocial issues in orientation and mobility training.[26,27] Overall, thoughts, feelings, benefits and experiences of the client's use of the identification cane are systematically discussed in the standardized training to overcome potential psychosocial issues.

A weakness of this study is the lack of involvement of older adults with low vision in the development of the standardized orientation and mobility training because of time restrictions of the study. Hence, the opinion of older adults with low vision with respect to this training is currently being investigated.[15] However, initial support for the new protocol has been obtained from three experts on orientation and mobility training from Dutch low vision rehabilitation centres and the research team. They reviewed the protocol regarding feasibility and acceptability in practice prior to its use in a randomized controlled trial; this led to minor changes in the protocol (e.g. rephrasing sentences).

Because of the lack of evidence of effectiveness, no specific recommendations concerning the application of the current practice or the standardized approach regarding the orientation and mobility training in practice can be made at this stage. Recommendations regarding future research include publishing manuscripts on the development and content of training programmes. For example, little is known about the content of rehabilitation programmes for people with low vision. Furthermore, studies of high methodological quality that investigate the effects and feasibility of orientation and mobility training are required.[14,15] A randomized controlled trial is currently being conducted to evaluate the standardized orientation and mobility training in identification cane use.[15] If the standardized training is shown to be feasible and is more or equally effective compared with current practice, the training will be embedded in the national instruction for Dutch mobility trainers and may be adopted by other low vision rehabilitation services worldwide. In the evaluation study effectiveness is assessed by clients' self-care activities in everyday life, functioning with respect to distance activities and mobility and a variety of secondary outcomes.[15]

Clinical messages

- There is no standardized or evidence-based protocol for orientation and mobility training in the use of the identification cane.
- This paper presents a standardized, yet tailor-made protocol based on self-management and cognitive behavioural techniques for older adults with low vision which may particularly be useful in rehabilitation practice.

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References

1. WHO. *Visual impairment and blindness*. Geneva: World Health Organization, 2009.
2. Lafuma A, Brezin A, Lopatriello S, et al. Evaluation of non-medical costs associated with visual impairment in four European countries: France, Italy, Germany and the UK. *Pharmacoeconomics* 2006; 24: 193–205.
3. Mojon-Azzi SM, Sousa-Poza A and Mojon DS. Impact of low vision on well-being in 10 European countries. *Ophthalmologica* 2008; 222: 205–212.
4. Salive ME, Guralnik J, Glynn RJ, Christen W, Wallace RB and Ostfeld AM. Association of visual impairment with mobility and physical function. *J Am Geriatr Soc* 1994; 42: 287–292.
5. Watson GR. Low vision in the geriatric population: rehabilitation and management. *J Am Geriatr Soc* 2001; 49: 317–330.
6. Brouwer DM, Sadlo G, Winding K and Hanneman MIG. Limitations in mobility: experiences of visually impaired older people. *Br J Occup Ther* 2008; 71: 414–421.
7. Guth D, Ashmead D, Long R, Wall R and Ponchillia P. Blind and sighted pedestrians' judgments of gaps in traffic at roundabouts. *Hum Factors* 2005; 47: 314–331.
8. Montarzino A, Robertson B, Aspinall P, et al. The impact of mobility and public transport on the independence of visually impaired people. *Vis Impair Res* 2007; 9: 67–82.
9. Wahl HW, Heyl V and Schilling O. The role of vision impairment for the outdoor activity and life satisfaction of older adults: a multi-faceted view. *Vis Impair Res* 2002; 4: 143–160.
10. Berndtsson I. Orientation and mobility. National standard for the low vision clinics in Sweden. 2001 http://www.syncentralerna.se/Document/Orientation_mobility.pdf (accessed February 2010).
11. Deverell L, Taylor S and Prentice J. *Orientation and mobility methods. Techniques for independent travel*. Melbourne: Guide Dogs Victoria, 2009.
12. van Doorn M, van Grinsven R., IJsseldijk M., Willemse C, van der Velde H and Peek P. *Handboek Specialisatiecursus Mobiliteitsinstructie*. 2006.
13. Dahlin-Ivanoff S, Sonn U. Use of assistive devices in daily activities among 85-year-olds living at home focusing especially on the visually impaired. *Disabil Rehabil* 2004; 26: 1423–1430.
14. Ballemans J, Kempen GIJM and Zijlstra GA. Orientation and mobility training for partially-sighted older adults using an identification cane: a systematic review. *Clin Rehabil* 2011; 25: 880–891.
15. Zijlstra GA, van Rens GH, Scherder EJ, et al. Effects and feasibility of a standardised orientation and mobility training in using an identification cane for older adults with low vision: design of a randomised controlled trial. *BMC Health Serv Res* 2009; 9: 153.
16. Zijlstra GAR, Rens GHMBv, Scherder EJA and Kempen GIJM (eds). *Development of a standardized protocol for orientation and mobility training in visually impaired older people*. National Harbor, MD: The Gerontological Society of America, 2008.
17. Barlow JM, Bentzen BL and Bond T. Blind pedestrians and the changing technology and geometry of signalized intersections: safety, orientation, and independence. *J Vis Impair Blind* 2005; 99: 587–598.
18. Newman S, Steed L and Mulligan K. Self-management interventions for chronic illness. *Lancet* 2004; 364(9444): 1523–1537.
19. Warsi A, Wang PS, LaValley MP, Avorn J and Solomon DH. Self-management education programs in chronic disease: a systematic review and methodological critique of the literature. *Arch Intern Med* 2004; 164(15): 1641–1649.
20. Barlow J, Wright C, Sheasby J, Turner A and Hainsworth J. Self-management approaches for people with chronic conditions: a review. *Patient Educ Couns* 2002; 48(2): 177–187.
21. Rees G, Keeffe JE, Hassell J, Larizza M and Lamoureux E. A self-management program for low vision: program overview and pilot evaluation. *Disabil Rehabil* 2010; 32: 808–815.
22. Lorig KR and Holman H. Self-management education: history, definition, outcomes, and mechanisms. *Ann Behav Med* 2003; 26: 1–7.
23. Bandura A. Self-efficacy: toward a unifying theory of behavioral change. *Psychol Rev* 1977; 84: 191–215.
24. Verstraten P, Oudshoorn J and van Grinsven R. *Mobiliteitsvragen van blinde en slechtziende ouderen. Dossierstudie naar hulpvragen en interventies*. Grave, Netherlands: Sensis, 2006.
25. Rees G, Saw CL, Lamoureux EL and Keeffe JE. Self-management programs for adults with low vision: needs and challenges. *Patient Educ Couns* 2007; 69: 39–46.
26. Becker S, Wahl HW, Schilling O and Burmedi D. Assistive device use in visually impaired older adults: role of control beliefs. *Gerontologist* 2005; 45: 739–746.
27. Seybold D. The psychosocial impact of acquired vision loss – particularly related to rehabilitation involving orientation and mobility. Paper presented at Vision 2005, London, UK, 2005, pp. 298–301.