Impact of visual impairment on the lives of young adults in the Netherlands: a concept-mapping approach

Ellen Bernadette Maria Elsman, Gerardus Hermanus Maria Bartholomeus van Rens and Ruth Marie Antoinette van Nispen

Department of Ophthalmology, VU University Medical Center, EMGO + Institute for Health and Care Research, Amsterdam, The Netherlands; Department of Ophthalmology, Elkerliek Hospital, Helmond, The Netherlands

ABSTRACT
Purpose: While the impact of visual impairments on specific aspects of young adults’ lives is well recognised, a systematic understanding of its impact on all life aspects is lacking. This study aims to provide an overview of life aspects affected by visual impairment in young adults (aged 18–25 years) using a concept-mapping approach.

Method: Visually impaired young adults (n = 22) and rehabilitation professionals (n = 16) participated in online concept-mapping workshops (brainstorm procedure), to explore how having a visual impairment influences the lives of young adults. Statements were categorised based on similarity and importance. Using multidimensional scaling, concept maps were produced and interpreted.

Results: A total of 59 and 260 statements were generated by young adults and professionals, respectively, resulting in 99 individual statements after checking and deduplication. The combined concept map revealed 11 clusters: work, study, information and regulations, social skills, living independently, computer, social relationships, sport and activities, mobility, leisure time, and hobby.

Conclusions: The concept maps provided useful insight into activities influenced by visual impairments in young adults, which can be used by rehabilitation centres to improve their services. This might help in goal setting, rehabilitation referral and successful transition to adult life, ultimately increasing participation and quality of life.

IMPLICATIONS FOR REHABILITATION
- Having a visual impairment affects various life-aspects related to participation, including activities related to work, study, social skills and relationships, activities of daily living, leisure time and mobility.
- Concept-mapping helped to identify the life aspects affected by low vision, and quantify these aspects in terms of importance according to young adults and low vision rehabilitation professionals.
- Low vision rehabilitation centres should focus on all life aspects found in this study when identifying the needs of young adults, as this might aid goal setting and rehabilitation referral, ultimately leading to more successful transitions, better participation and quality of life.

Introduction
Visual impairment occurs mainly in older age and, in 2010, affecting over 200 million people worldwide. However, the estimates of visually impaired people aged 14–49 years (i.e. >80 million) cannot be denied.[1] In the Netherlands, it is estimated that in 2009–17,800 persons aged 14–49 years had low vision.[2]

However, both global and national data on the prevalence of visual impairment in the youngest adults (e.g. 18–25 years) are lacking. In young adults, the transition to adulthood is often accompanied by various challenges,[3] especially when dealing with disabilities.[4] Young adults face important changes related to study, work and housing.[5–8] Dealing with a disability during changes in important life transitions might result in psychological distress[9] and interfere with developmental tasks.[10] This may lead to a less successful transition to adulthood, which can influence the physical, social and psychological potential of young adults, and their full participation in adult life.[11]

Therefore, having a visual impairment might present a risk to young adults for reduced participation and social exclusion. Moreover, young adults with low vision experience more difficulties in social interaction, and initiating and sustaining (romantic) relationships.[12–14] Similar to others with a disability, visually impaired young adults have fewer friends and are more likely to feel lonely than young adults without disabilities.[3,15–17] Furthermore, visually impaired young adults less often have a (paid) job compared to young adults without visual disabilities.[18,19] However, there is no gap in educational dropout and graduation rates to explain this difference.[19,20] Although external factors such as negative attitudes of employers and inaccessible work environments have also shown to be a major barrier to employment.[21,22]
With regard to participation, young adults most frequently face challenges related to mobility, domestic life, communication, interpersonal interaction and relationships, general tasks and demands, major life areas, and leisure activities. However, previous studies focused only on the impact of visual impairment on particular life aspects, such as social relations, intimate relations, study or work. With the exception of the investigation by Van Leeuwen et al. (2015), to our knowledge no study has focused on the impact of a visual impairment on the life of young adults as a whole. However, the study of Van Leeuwen et al. was a patient record study, and did not focus on the impact of a visual impairment on the life of young adults according to important stakeholders, i.e. young adults and professionals working with them. Qualitative research methods are commonly used to explore the context of health-related outcomes. For example in-depth interviews and focus group discussions have received much attention in health-related research. However, a variety of other participatory research methods exists. Concept-mapping is one of these methods, and it provides a way to quantify qualitative data to discover differences and similarities between stakeholders’ ideas. Concept-mapping is a structured, multi-step method which yields a conceptual framework about the stakeholder’s thoughts on the topic at hand and visualises how these thoughts are connected. Concept-mapping has been used for various purposes in health research, such as programme planning and programme evaluation, exploring risk factors and experiences, generating hypothesis and developing theory, and discovering critical issues in programme implementation. Furthermore, it has been used to gain insight in a variety of social and health contexts, including experiences with intimate partner violence, burden of low back and neck pain, barriers and facilitators for breast cancer screening, quality of radiation care. Moreover, concept-mapping has also been used to describe the impact of a visual impairment on the participation of children.

Since concept-mapping is a useful tool to clarify complex, diffuse and unclear concepts, such as participation, this study aims to elucidate which life aspects are affected by visual impairment in young adults aged 18–25 years using a concept mapping approach. The focus of this article is on young adults’ participation in activities, and participation needs and restrictions experienced by them.

Methods

Study participants

Invited to participate were young adults aged 18–25 years with a visual impairment and professionals specialised in working with visually impaired young adults. All young adults with a visual impairment were clients of two Dutch nationwide rehabilitation organisations, Royal Dutch Visio and Bartiméus. Young adults were approached by mail and/or email; the written information was provided using a clear and large font with extra spacing. A (digital) informed consent form was attached to the information letter. Young adults had the possibility to contact the researchers by telephone and email, which was mentioned in the letter. When informed consent was given, young adults received a phone call in which information was provided and procedures were explained. Participating young adults were selected consecutively on a voluntary basis. Young adults needed to have access to a computer, laptop, tablet or smartphone in order to participate. This could either be a private or public device, for example as seen in schools or libraries. Young adults were free to ask for assistance from acquaintances when participating in the study, and had the option to ask for guidance from one of the researchers. Professionals were employees of the two rehabilitation organisations who often worked with young adults, such as educational counsellors, vocational counsellors, mobility trainers and occupational therapists, psychologists or social workers. The contact persons of these organisations were asked to select representative professionals from various backgrounds, since most professionals tend to focus on their own areas of expertise.

This study was approved as an amendment to the study for the development of a questionnaire for children aged ≤18 years, the PAI-CY (children and youth), by the Medical Ethics Committee of the VU University Medical Center in Amsterdam and adhered to the tenets of the Declaration of Helsinki. All participants gave their written informed consent before the start of the study.

Concept-mapping procedure

Concept-mapping consists of five steps which are both qualitative and quantitative. In the first step, the brainstorm session, a seeding statement is used to generate statements. In this study, the following seeding statement was used: “Thinking as broadly as possible, generate statements about activities that young adults with a visual impairment would (independently) like to participate in.” The seeding statement was not limited to those activities influenced by a visual impairment, in order to generate a broad overview of statements and activities young adults with a visual impairment would like to participate in. Participating young adults received an email with the link to an online questionnaire which included the seeding statement together with questions about demographic variables. The email again included information on the procedure, and the contact information of the researchers was mentioned in case young adults required further information or guidance. The online questionnaire was compatible with most assistive software for visually impaired persons (e.g. enlargement programmes or text-to-speech programmes), although no specific adaptations to the online questionnaire programme were made to make it accessible with all assistive software available. However, the layout of the questionnaire was made user-friendly for people with a visual impairment by using a clear and large font. Young adults were stimulated to fill in the questionnaire by offering them the chance to win a gift card. Professionals received an email with the seeding statement and could reply their statements by email. All generated statements were checked, deduplicated and reported back to the participants through an online concept-mapping software programme (Concept Systems Inc., Ithaca, NY). To login to this software, participants received instructions by email, including a personal username and password. Because the concept-mapping software is internet-based, it is accessible with most assistive software programmes, for example enlargement programmes. However, it was not possible to make specific adaptations to the software to make it more user-friendly for young adults with a visual impairment, although young adults again were free to ask for help from acquaintances or ask one of the researchers for guidance. They were then offered guidance via telephone or a home-visit. However, none of the young adults made use of these options. Young adults were stimulated to complete the concept-mapping procedure by offering them another incentive. Participants sorted the generated statements in the second step and rated them in the third step. For the sorting procedure, participants created themes and assigned a name to each theme. Then, they sorted the statements within the themes. In step 3, participants were asked to rate the importance of the
generated statements on a scale from 0–10. In step 4, a concept map was computed by the software programme based on the obtained data.

Concept-mapping analysis

To analyse patterns among the generated, sorted and rated statements, the software programme uses three steps in the core analysis. First, the software creates a similarity matrix based on the sort data, which displays the number of participants who sorted each pair of statements together in themes. Next, the software uses multidimensional scaling of the similarity matrix, to locate each statement as a separate point on a map. Last, hierarchical cluster analysis of the multidimensional scaling coordinates divides the statements on the map into groups.[48] The result is a two-dimensional visual map grouping statements into a given number of clusters, illustrating content similarities and cluster priority. Items located close to one another form a cluster. The distance between the clusters and statements represents the similarity; the smaller the distance between clusters and statements, the more they are conceptually alike. The rating of statements is represented in the thickness of clusters; thicker clusters are more important than thinner clusters. Based on the names assigned to each theme by participants, the software chooses a name for each cluster, and gives suggestions for other names. In the final step, the concept map is interpreted and the number of clusters is revised, resulting in a concept map with a cluster number which best fits the data. The final stress of the concept map is calculated to see the statistical fit to the multidimensional scaling model. Lower stress values represent better statistical fit. Furthermore, intra-class correlation coefficients (ICC) were calculated to see the statistical fit to the multidimensional scaling model. A 10-cluster map was chosen, as this resulted in the best interpretation of clusters (Figure 1(a)). The high density of the dots within the clusters self-care, mobility, social network, going out, study and work, indicate high agreement in similarity between statements. However, dots in other clusters were less dense, indicating that these statements were more difficult to classify and less similar to other statements in the same cluster. The cluster numbers reflect the mean rating scores, with cluster 1 (study) being the most important. The statements within this cluster had a mean rating of 8.1 out of 10. Other clusters which were considered very important were fairs, workshop and information meetings, work, and going out. Digital/online and visual aids, explaining, and household were the least important clusters, as indicated by their cluster numbers. The ICC showed a moderate degree of reliability in the rating of young adults, with an average measure of 0.67 (p < 0.001).

Concept-mapping results young adults

Data from the concept-mapping procedure for young adults yielded a graphical presentation of all activities that young adults with a visual impairment would like to participate in (independently), and their interrelationships. The final stress of the map was 0.30, indicating sufficient statistical fit to the multidimensional scaling model. A 10-cluster map was chosen, as this resulted in the best interpretation of clusters (Figure 1(a)). The high density of the dots within the clusters self-care, mobility, social network, going out, study and work, indicate high agreement in similarity between statements. However, dots in other clusters were less dense, indicating that these statements were more difficult to classify and less similar to other statements in the same cluster. The cluster numbers reflect the mean rating scores, with cluster 1 (study) being the most important. The statements within this cluster had a mean rating of 8.1 out of 10. Other clusters which were considered very important were fairs, workshop and information meetings, work, and going out. Digital/online and visual aids, explaining, and household were the least important clusters, as indicated by their cluster numbers. The ICC showed a moderate degree of reliability in the rating of young adults, with an average measure of 0.67 (p < 0.001).

Results

Response and characteristics

A total of 22 young adults (41% male) responded to the invitation and filled in the online questionnaire (response rate 12%). Most young adults attended regular primary and secondary education, whereas three attended special primary education and six attended special secondary education. Twelve participants completed secondary education and nine participants completed higher education or university. One participant only completed primary education. Most young adults did not have a (part-time) job (59%).

Of the 16 professionals, 15 (73% female) replied to the email (response rate 94%) and generated statements. Their professional backgrounds were varied: social workers, (educational) ambulatory counsellors, educational or vocational managers and advisors, behavioural scientists (e.g. child psychologist) and occupational therapists.

Young adults generated a total of 59 statements in response to the seeding statement whereas professionals generated 260 statements. All statements were checked and deduplicated, resulting in 99 individual statements generated by young adults and professionals (Table 1).

In total, 26 young adults were invited to sort and rate the statements using the concept-mapping software. The sorting procedure was completed by seven young adults (27%), while nine young adults (35%) completed the rating procedure. Of the 16 professionals that were invited to sort and rate the statements, 12 (75%) completed the sorting procedure and 13 (81%) the rating procedure.

Concept-mapping results professionals

Data analysis of the professionals resulted in a concept map with nine clusters which represented best fit of the data, and displays what activities young adults with a visual impairment would like to participate in (independently) (Figure 1(b)). The final stress of the map was 0.20, indicating good statistical fit to the multidimensional scaling model. The high density of the dots indicates high agreement in similarity between statements in the clusters mobility, practical skills, study, social network, and work. Within the clusters related to computer, leisure time and peer contact, the dots were more scattered, indicating less agreement in similarity. Statements in the cluster work were regarded as most important by professionals; computer and study were also rated as very important. Statements in the cluster hobbies/sport/leisure time were considered the least important. The mean rating of statements in this cluster was 7.3 out of 10. Professionals had a high degree of reliability in their ratings, as indicated by the ICC average measure of 0.83 (p < 0.001).

Differences and similarities in concept maps

In the concept map of professionals the cluster names mobility, social network, study and work were similar to those in the concept map of young adults. However, within these clusters, professionals and young adults sorted the statements differently (Table 1). Both young adults and professionals indicated that the clusters relating to work and study were the most important. The statements knowing how to tell employers about visual
Table 1. Overview of the generated statements, importance of the statements and identified themes by young adults and professionals.

| Generated statements | Statements generated by: | Statements cluster number by: | Statements rating by: |
|----------------------|--------------------------|-----------------------------|------------------------|
|                      | Young adults | Professionals | Young adults | Professionals | Young adults | Professionals | Total |
| 1. WORK – 4 statements; mean importance 8.58 |             |                      |             |                |             |                      |       |
| Having a paid (part-time) job | X | X | 4 | 4 | 8.3 | 8.8 | 8.6 |
| Applying for a job independently | X | X | 4 | 4 | 8.7 | 8.6 | 8.6 |
| Knowing how to tell employers about visual impairment | X |             | 7 | 4 | 8.3 | 9.1 | 8.8 |
| Recognizing colleagues |            | X | 3 | 4 | 8.3 | 8.3 | 8.3 |
| 2. STUDY – 17 statements; mean importance 8.30 |             |                      |             |                |             |                      |       |
| Knowing who to approach when employers have questions | X |             | 7 | 3 | 8.0 | 7.9 | 8.0 |
| Finding appropriate study | X |             | 3 | 3 | 8.3 | 9.3 | 8.9 |
| Exchanging information about jobs and internships | X |             | 7 | 3 | 8.2 | 8.0 | 8.1 |
| Going to a job fair especially for people with a functional impairment | X |             | 7 | 3 | 6.1 | 7.2 | 6.7 |
| Participating in webinars/workshops about study and work | X |             | 3 | 3 | 7.3 | 7.5 | 7.4 |
| Knowing where to find information about laws and legislation regarding work | X |             | 7 | 3 | 7.4 | 8.4 | 8.0 |
| Getting information about studies and the possibilities to attend with a visual impairment | X |             | 7 | 3 | 7.9 | 8.9 | 8.5 |
| Finishing a study successfully | X | X | 3 | 3 | 9.3 | 9.1 | 9.2 |
| Participating in career investigations which take into account functional impairments | X |             | 7 | 3 | 7.9 | 8.3 | 8.1 |
| Carrying out my work decently | X |             | 3 | 4 | 9.2 | 9.0 | 9.1 |
| Knowing where to find support when looking for a job | X |             | 4 | 3 | 7.8 | 8.3 | 8.1 |
| Going to a workshop or info day about studying with a (visual) impairment | X |             | 3 | 3 | 7.7 | 7.6 | 7.6 |
| Following course materials | X |             | 3 | 3 | 8.4 | 8.8 | 8.6 |
| Finding a job where appreciated | X |             | 7 | 4 | 9.4 | 9.2 | 9.3 |
| Receiving advice about work pressure | X |             | 7 | 3 | 8.7 | 8.9 | 8.8 |
| Participating in matchmaking events with future employers | X |             | 7 | 4 | 8.0 | 8.1 | 8.0 |
| Following courses | X |             | 3 | 3 | 8.8 | 8.6 | 8.7 |
| 3. INFORMATION AND REGULATIONS – 5 statements; mean importance 8.14 |             |                      |             |                |             |                      |       |
| Participating in a course about software programmes needed for study | X |             | 4 | 3 | 6.2 | 7.8 | 7.2 |
| Following a study independently | X |             | 3 | 3 | 8.6 | 9.2 | 8.9 |
| Managing things related to study | X |             | 3 | 3 | 7.9 | 8.2 | 8.1 |
| Making homework | X |             | 3 | 3 | 7.9 | 8.7 | 8.4 |
| Participating in activities in which information about laws, regulations and funding is provided, and the influence of compensation for internships, traveling and other earnings have on these funding | X |             | 8 | 3 | 7.7 | 8.5 | 8.2 |
| 4. SOCIAL SKILLS – 10 statements; mean importance 7.96 |             |                      |             |                |             |                      |       |
| Inviting friends | X |             | 6 | 15 | 8.2 | 8.5 | 8.4 |
| Knowing teammates | X |             | 6 | 6 | 6.6 | 7.5 | 7.1 |
| Meeting other people in the bar | X |             | 6 | 6 | 6.6 | 7.5 | 7.1 |
| Meeting new friends | X |             | 6 | 6 | 6.9 | 8.7 | 8.0 |
| Starting and maintaining a relationship with a partner | X |             | 6 | 6 | 8.4 | 9.2 | 8.9 |
| Visiting friends | X |             | 6 | 15 | 8.2 | 8.5 | 8.4 |
| Establishing and maintaining social contacts | X |             | 6 | 6 | 8.6 | 8.8 | 8.7 |
| Knowing what is expected when having a relationship | X |             | 6 | 6 | 4.7 | 8.2 | 6.8 |
| Participating in social activities | X | X | 6 | 6 | 8.7 | 8.8 | 8.7 |
| Dating | X |             | 6 | 6 | 6.1 | 8.6 | 7.6 |
| 5. LIVING INDEPENDENTLY – 13 statements; mean importance 7.91 |             |                      |             |                |             |                      |       |
| Cooking independently | X | X | 1 | 11 | 7.9 | 8.5 | 8.2 |
| Managing finances | X |             | 1 | 11 | 8.1 | 8.5 | 8.3 |
| Putting on make-up | X |             | 1 | 11 | 5.7 | 7.5 | 6.7 |
| Living independently | X |             | 1 | 11 | 7.9 | 9.2 | 8.7 |
| Knowing which items are needed in the kitchen | X |             | 1 | 11 | 6.0 | 7.4 | 6.8 |

(continued)
| Generated statements | Statements generated by: | Statements cluster number by: | Statements rating by: |
|----------------------|--------------------------|-------------------------------|------------------------|
|                      | Young adults | Professionals | Young adults | Professionals | Total |
| Online banking independently | X | 1 | 12 | 8.7 | 8.3 | 8.5 |
| Shopping for groceries independently | X | X | 1 | 11 | 8.1 | 8.4 | 8.3 |
| Knowing which recipes are appropriate | X | X | 10 | 11 | 5.8 | 6.8 | 6.4 |
| Knowing how to organise my house | X | X | 10 | 11 | 6.8 | 7.7 | 7.3 |
| Paying independently | X | X | 1 | 11 | 8.7 | 8.7 | 8.7 |
| Picking out clothes independently | X | X | 1 | 11 | 8.3 | 8.2 | 8.3 |
| Organizing administration independently | X | X | 1 | 11 | 8.4 | 8.3 | 8.4 |
| Managing housekeeping | X | 1 | 11 | 8.4 | 8.2 | 8.3 |
| 6. ICT | 6 statements; mean importance 7.83 |
| Finding appropriate software for computer and telephone | X | 9 | 12 | 6.6 | 8.5 | 7.7 |
| Knowing which visual aids are available | X | X | 9 | 12 | 7.7 | 8.1 | 7.9 |
| Arriving at school/university independently | X | X | 5 | 12 | 7.7 | 9.1 | 8.5 |
| Practicing with (digital) aids | X | X | 1 | 12 | 7.6 | 8.2 | 7.9 |
| Exchanging experiences about visual aids | X | X | 9 | 11 | 6.1 | 7.5 | 7.0 |
| 7. SOCIAL/RELATIONSHIPS | 11 statements; mean importance 7.80 |
| Explaining consequences of visual impairment | X | X | 7 | 13 | 8.3 | 8.8 | 8.6 |
| Meeting neighbours | X | X | 8 | 6 | 6.8 | 7.2 | 7.0 |
| Participating in student life | X | X | 3 | 13 | 7.0 | 8.3 | 7.8 |
| Presenting in business and private atmosphere | X | X | 4 | 13 | 7.6 | 8.5 | 8.1 |
| Exchanging experiences with peers | X | X | 8 | 13 | 6.8 | 7.8 | 7.4 |
| Feeling secure | X | X | 9 | 15 | 8.4 | 8.2 | 8.3 |
| Not standing out as “different” | X | X | 8 | 6 | 8.1 | 7.7 | 7.9 |
| Preventing feelings of loneliness | X | X | 9 | 13 | 6.9 | 8.0 | 7.5 |
| Being equal to people without a visual impairment | X | X | 9 | 13 | 9.4 | 8.8 | 9.1 |
| Knowing about sexuality and intimacy | X | X | 8 | 6 | 4.7 | 8.5 | 7.0 |
| Knowing where activities for peers are organised | X | X | 8 | 6 | 6.6 | 7.5 | 7.1 |
| 8. SPORT AND ACTIVITIES | 11 statements; mean importance 7.61 |
| Doing an appropriate sport | X | 2 | 15 | 7.7 | 7.8 | 7.8 |
| Planning a daytrip | X | X | 2 | 15 | 8.2 | 7.5 | 7.8 |
| Going on a weekend trip | X | X | 2 | 15 | 7.1 | 7.5 | 7.3 |
| Listening or making music | X | X | 2 | 14 | 8.2 | 6.9 | 7.5 |
| Exploring sport possibilities | X | X | 2 | 15 | 6.2 | 7.8 | 7.2 |
| Sporting independently | X | X | 2 | 14 | 8.4 | 7.6 | 8.0 |
| Joining a sports club | X | X | 2 | 15 | 6.7 | 7.8 | 7.4 |
| Knowing where holidays for peers are organised | X | X | 9 | 15 | 6.6 | 6.6 | 6.6 |
| Going on holiday with friends | X | X | 6 | 15 | 8.7 | 8.2 | 8.4 |
| Participating in nightlife | X | X | 6 | 15 | 7.0 | 8.5 | 7.9 |
| Going to a terrace | X | 6 | 15 | 8.1 | 8.0 | 8.0 |
| 9. MOBILITY | 9 statements; mean importance 7.58 |
| Cycling independently | X | X | 2 | 2 | 6.3 | 6.5 | 6.4 |
| Exploring neighbourhood independently | X | X | 5 | 2 | 8.0 | 8.5 | 8.3 |
| Knowing where to find support for traveling by public transport independently | X | X | 10 | 14 | 6.4 | 8.5 | 7.6 |
| Finding the way to an unknown location | X | X | 2 | 2 | 8.6 | 7.6 | 8.0 |
| Knowing whether to drive a scooter | X | X | 10 | 2 | 3.0 | 6.5 | 5.1 |
| Traveling with public transport independently | X | X | 2 | 2 | 7.6 | 8.5 | 8.1 |
| Traveling independently | X | X | 2 | 2 | 7.7 | 8.4 | 8.1 |
| Shopping independently | X | X | 2 | 11 | 8.1 | 8.0 | 8.0 |
| Finding the way in school or university | X | 5 | 12 | 8.4 | 8.6 | 8.5 |

(continued)
Table 1. Continued

| Statements generated by: | Statements cluster number | Statements rating by: | Young adults | Professionals | Young adults | Professionals | Total |
|-------------------------|---------------------------|-----------------------|--------------|---------------|--------------|---------------|-------|
| 10. LEISURE TIME        |                           |                       |              |               |              |               |       |
| –                       |                           |                       |              |               |              |               |       |
| Moving around in bar safely |                       |                       | 5            |               | 14           |               | 6.6   |
| Going to a theatre, musical or film independently following the show |                       |                       | X            | X             | 6            |               | 7.6   |
| Traveling internationally |                       |                       | 2            |               | 14           |               | 8.3   |
| Booking holidays at an (online) travel agency |                       |                       |              | X             | 14           |               | 7.2   |
| Finding the agreed bar |                           |                       | 5            |               | 14           |               | 7.7   |
| 11. HOBBY               |                           |                       |              |               |              |               |       |
| –                       |                           |                       |              |               |              |               |       |
| Judging the appropriateness of a lunchroom or restaurant |                       |                       |              | X             | 14           |               | 6.7   |
| Following the latest fashion trends |                       |                       |              | X             | 14           |               | 5.1   |
| Following TV series |                           |                       |              | X             | 14           |               | 2.7   |
| Knowing where to find appropriate help |                       |                       |              | X             | 14           |               | 7.2   |
| Reading books |                           |                       |              | X             | 14           |               | 6.9   |
| Gaming independently |                           |                       |              | X             | 2            |               | 3.9   |
| Using social media |                           |                       |              | X             | 6            |               | 7.6   |
| Making choices in what to do |                       |                       |              | X             | 15           |               | 7.0   |

*Generated statements are not an official forward-backward translation.

Cluster numbers: 1 = self-care; 2 = mobility; 3 = study; 4 = work; 5 = going out; 6 = social network; 7 = arts, workshops and information meetings; 8 = explaining; 9 = digital/online and visual aids; 10 = household;

Combined concept map

When data of professionals and young adults were combined and a new concept-mapping analysis was performed, a combined concept map of 11 clusters was considered best (Figure 1(c)). The final stress of the map was 0.21, indicating good statistical fit to the multidimensional scaling model. Although some cluster names corresponded with those in the concept maps of both young adults and professionals (such as mobility, study and work), statements in these clusters did not always correspond with statements in the concept map of both young adults or professionals. The high density of the dots in the clusters study, living independently, social/relationships and hobbies. On the other hand, three statements (3%) were rated by young adults as being rather more important compared with ratings by professionals (Table 1, indicated with d). These statements concerned listening or making music, finding the way to an unknown location and travelling internationally. Independent samples t-tests showed that five statements differed significantly in importance between professionals and young adults (\( p < 0.001 \)). The difference in the rating of statements between young adults and professionals was on average \(-0.57\), indicating that young adults rated the statements as being somewhat less important. Despite the small average difference, 29 statements (29%) were rated by young adults as being rather less important compared with ratings by professionals (rating difference 1.0 or more) (Table 1, indicated with d). These statements were mostly found in the clusters of the combined concept map social skills, living independently, social/relationships and hobby. On the other hand, three statements (3%) were rated by young adults as being rather more important compared with ratings by professionals (Table 1, indicated with d). These statements concerned knowing which recipes are appropriate, knowing about sexuality and intimacy, knowing whether to drive a scooter following the latest fashion trends. The differences in rating were also apparent when comparing the concept maps of young adults and professionals. The mean ratings of professionals ranged from 7.3 for hobbies/sport/leisure time to 8.7 for work. In comparison, the mean ratings of young adults ranged from 5.7 for household to 8.1 for study. Thus, young adults considered some of the statements to be less important than professionals. Table 1 presents a list of all 99 generated statements regarding activities included in the concept-mapping procedure, together with the clusters to which they were assigned by participants and their mean rating scores.
The cluster numbers reflect the mean rating scores of young adults and professionals, with cluster 1 being the most important (work; mean score 8.6) and cluster 11 the least important (hobby; mean score 6.8). There was a strong correlation between young adults and professionals for the rating of statements within the clusters ($r = 0.7$, $p = 0.017$) (Figure 2). Both groups considered work to be most important; information and regulations is the second most important according to professionals and the third most important according to young adults. Both groups also considered hobby to be the least important. The largest difference in rating was found for the cluster social skills, which is prioritised third based on the ratings of professionals and eighth based on
the ratings of young adults. For the clusters social skills and computer, independent samples t-tests showed that the mean rating of young adults differs significantly from that of professionals ($p = 0.034$ and $p = 0.038$, respectively).

**Discussion**

In this study, three concept maps were developed detailing the life aspects affected by a visual impairment in young adults aged 18–25 years. The concept maps show that a visual impairment in this life stage influences work, study, social skills and relationships, living independently, computer, mobility and various leisure time activities. Since young adults with a visual impairment are at risk for having an unsuccessful transition, it is important that rehabilitation services consider them as a separate group.

This study shows that the life stage of young adults with visual impairments is most influenced by activities related to study and work. This supports the evidence that study and work are major themes in the lives of young adults with disabilities.[49,50] For example, a study linking the rehabilitation needs of visually impaired young adults to the ICF found that most needs (23.8%) could be linked to the chapter "major life areas" of the activity and participation component; this chapter includes education and work, and most needs prioritised around higher education and options for work.[24]

Attending postsecondary education and being employed are considered to be normative social roles by young adults.[51] Moreover, attending postsecondary education is regarded as an investment in future employment and an improvement in potential income,[52,53] whereas other studies show that working results in economic and residential independence.[54]

Information and regulations was another cluster considered to be important in the combined concept map. This cluster is related to work and study, since it contains statements regarding successfully following a study, including completing homework and knowing how to use specialised software, and managing things related to study. One statement contains information about laws, regulations and allowances for people with a visual impairment. Although this cluster has only five statements, the mean importance of this cluster is high. A study on the priority of goals in adults aged 18–55 years also showed that goals related to regulatory and information were in the top 10 priority list based on importance and difficulty.[55]

The cluster social skills was also considered important, but mostly among professionals. Training in social skills is considered important for people with a visual impairment, because lacking these skills might affect their ability to succeed in their work and social life.[7,56] However, developing social skills can be challenging, since contextual cues and honest feedback from others might be lacking. Furthermore, sighted people might behave inappropriately, and society as a whole might have a negative attitude towards visual impairments.[57]

Recently, internet and technological applications have led to new opportunities and manners for social interaction.[58] Social interaction in online environments does not require interpretation of non-verbal and contextual cues, and visual impairments are less obvious. The popularity of internet and other online applications was apparent in a study among visually impaired adolescents aged 13–17 years, who stated that they had plenty of friends online.[46] A similar result was found by Gold et al., who reported that about 75% of the participants stayed in touch or socialised using online applications;[59] since the opportunities and popularity of social network sites has expanded,[60] these numbers are probably even larger now. Thus, young adults with a visual impairment are probably as likely to socialise online as their sighted peers. Nevertheless, visually impaired young adults experience challenges related to social participation and inclusion in peer groups, building social and intimate relationships, and participation in leisure activities,[13,61] at least in real-life. Social relationships are important in dealing with visual impairment[13] and may be especially important in the transition to adulthood and the related changes that take place.

In this study, the less important clusters were related to sports, activities, mobility, leisure time and hobbies. With respect to sports, activities, leisure time and hobbies, our results support the study of Van Leeuwen et al., in which only 27 rehabilitation needs recorded in patient files (3.6%) could be linked to
To our knowledge this is the first study to describe the impact of visual impairment on all life aspects of young adults aged 18–25 years and to provide a comprehensive overview of the life aspects affected. Earlier studies focused on specific aspects of life, such as social relations, intimate relations, and study or work. Gaining a fuller understanding of all life aspects and activities that are influenced by having a visual impairment. Professionals rated 29 statements at least 1.0 higher than did the young adults. In particular, five statements were rated significantly higher by professionals than by young adults; these statements concerned driving a scooter, dealing with sexuality or intimacy, finding appropriate software, expectations when in a relationship, and following the latest fashion trends. This knowledge may increase the awareness of professionals that young adults might have other issues to deal with when they approach a rehabilitation centre.

The individualised method of concept mapping can also be considered a strength. Due to their visual impairment and the logistic difficulties caused by this impairment, it was hardly feasible for young adults to participate in face-to-face brainstorm sessions in a group. These young adults preferred a non-invasive digital approach, which was also more feasible for the professionals. Therefore, it was decided to employ an online concept-mapping procedure, in which professionals individually generated statements by e-mail and young adults generated statements in response to an online questionnaire. Subsequently, participants rated and sorted the statements individually using the online software. Although the online procedure limited group discussion and participant interaction, the use of online brainstorm sessions, and sorting and rating software to increase feasibility and response, has been reported.[30,46,66] Using this personalised, non-invasive digital approach, more clients and professionals were willing to participate in the study (the initial face-to-face group brainstorm session yielded only one participant), thereby providing more generalisable results.

Several limitations also need to be addressed. All young adults were clients of a multidisciplinary rehabilitation centre (MRC) and participated on a voluntary basis in this study, which could have biased the information provided. However, it would be almost impossible to find young adults who are not registered at a MRC, since Dutch health care stipulates that visually impaired people must be informed about the existence of MRCs and their services, which often involves referral to these MRCs. However, this selection process does limit the generalisability of the results.

Another limitation was the low response rate of young adults to participate in the brainstorm of this study, although considered sufficient for concept-mapping.[31] This might have resulted in overlooking information of non-responders, which could be different from the information provided by participants in the brainstorm phase. Furthermore, we did not have any information on aspects affected allows to better quantify them in terms of importance to young adult lives, as was done in this study. To accomplish this, a seeding statement was used to generate activities young adults with a visual impairment would like to participate in. The seeding statement was not limited to only those activities impaired by low vision, but was aimed at identifying all activities, in order to generate a broad overview of activities young adults value in their lives. When the seeding statement focused on those activities which are impaired by low vision, too much emphasis would be placed on activities which are severely limited by visual impairment, while it is likely that young adults with a visual impairment encounter limitations to some extent in participation in a broad range of activities. The approach used in this study is comparable to the universal application of the International Classification of Functioning, Disability and Health (ICF), which is also not limited to activities influenced by impairment to identify problems in, for example, participation.[65]

A second strength is that the perspective of both young adults and professionals was taken into account. These two perspectives revealed both differences and similarities in ideas towards life aspects and activities that are influenced by having a visual impairment. Professionals rated 29 statements at least 1.0 higher than did the young adults. In particular, five statements were rated significantly higher by professionals than by young adults; these statements concerned driving a scooter, dealing with sexuality or intimacy, finding appropriate software, expectations when in a relationship, and following the latest fashion trends. This knowledge may increase the awareness of professionals that young adults might have other issues to deal with when they approach a rehabilitation centre.

The individualised method of concept mapping can also be considered a strength. Due to their visual impairment and the logistic difficulties caused by this impairment, it was hardly feasible for young adults to participate in face-to-face brainstorm sessions in a group. These young adults preferred a non-invasive digital approach, which was also more feasible for the professionals. Therefore, it was decided to employ an online concept-mapping procedure, in which professionals individually generated statements by e-mail and young adults generated statements in response to an online questionnaire. Subsequently, participants rated and sorted the statements individually using the online software. Although the online procedure limited group discussion and participant interaction, the use of online brainstorm sessions, and sorting and rating software to increase feasibility and response, has been reported.[30,46,66] Using this personalised, non-invasive digital approach, more clients and professionals were willing to participate in the study (the initial face-to-face group brainstorm session yielded only one participant), thereby providing more generalisable results.

Several limitations also need to be addressed. All young adults were clients of a multidisciplinary rehabilitation centre (MRC) and participated on a voluntary basis in this study, which could have biased the information provided. However, it would be almost impossible to find young adults who are not registered at a MRC, since Dutch health care stipulates that visually impaired people must be informed about the existence of MRCs and their services, which often involves referral to these MRCs. However, this selection process does limit the generalisability of the results.

Another limitation was the low response rate of young adults to participate in the brainstorm of this study, although considered sufficient for concept-mapping.[31] This might have resulted in overlooking information of non-responders, which could be different from the information provided by participants in the brainstorm phase. Furthermore, we did not have any information on
visual acuity or diagnosis of participants in this study. Although this can be considered a limitation, concept-mapping is a qualitative research method, thus having a representative sample is often not the aim which is given highest priority. Moreover, a questionnaire will be developed based on the information gathered in this study which will be tested extensively in a large sample of young adults, thereby testing the representativeness of the information provided.

The results of the combined concept map were influenced slightly more by the results of professionals than by those of young adults, because more professionals participated in the sorting (12 professionals vs. 7 young adults) and rating (13 professionals vs. 9 young adults) procedure. Although there is no strict limit on the number of participants involved, it is advised to have 10–20 participants (i.e. a workable number). Despite the tailored methodological approach, response rates among young adults were low. Of the 26 young adults eligible for sorting and rating the statements, only seven sorted the statements and nine rated them. This might have been caused by limitations in the accessibility and user-friendliness of the programmes used. However, the face-to-face brainstorm and concept-mapping workshops initially envisaged yielded only one participant, and young adults stated to prefer a digital approach instead. Furthermore, the response rate is comparable to similar studies, and in total 19 participants sorted the statements and 22 participants rated them. These numbers are within or slightly above the recommended number of participants for concept-mapping.

Finally, the group of respondents taking part in the brainstorm session, and the sorting and rating of the statements was not always identical. Some participants only responded to the brainstorm question and did not sort or rate the statements, whereas others performed the brainstorm and rated the statements, but without sorting them. Furthermore, five participants were not included in the brainstorm session, but did rate and sort the statements in the subsequent step. However, according to Trochim, it is not necessary that all participants take part in every step of concept-mapping, even though this facilitates understanding of the process. In this study, no participant reported that the procedures were unclear. Furthermore, this approach enabled more people to be involved in this study, which helps to provide a broader understanding.

Conclusions and implications

In conclusion, this study shows that professionals and young adults particularly value activities related to work and study. Furthermore, social skills and (social) relationships are considered important, as are activities of daily living and computer. Less important, but mentioned in the statements, are activities related to sport, hobby, leisure time and mobility. Since young adults with a visual impairment are at risk of an unsuccessful transition, it is important that rehabilitation services consider young adults as a separate group. This study provides a more comprehensive understanding of the life aspects affected by a visual impairment in young adults. Our ongoing research focuses on developing and validating a new questionnaire based on the results of this study, to measure, evaluate and monitor participation needs of visually impaired young adults. This questionnaire may help low vision rehabilitation centres with goal setting and rehabilitation referral of young adults. Ultimately, this might increase the participation of young adults with a visual impairment, a more successful transition to adult life and improvement in their quality of life.

Acknowledgements

We greatly thank all participating young adults and professionals for their contributions.

Disclosure statement

The authors declare that they have no conflict of interest.

References

[1] WHO. Global data on visual impairments 2010. Geneva, Switzerland: WHO; 2012.
[2] Keunen JEE, Verezen CA, Imhof SM, et al. Toename in de vraag naar oogzorg in Nederland 2010–2020. Ned Tijdschr Geneeskd. 2011;155:A3461.
[3] Huurre TM, Aro HM. Psychosocial development among adolescents with visual impairment. Eur Child Adolesc Psychiatry. 1998;7:73–78.
[4] Stewart D, Freeman M, Law M, et al. Transition to adulthood for youth with disabilities: evidence from literature. In: Stone JH, Blouin M, editors. International Encyclopedia of Rehabilitation. New York: CIRRIE; 2010.
[5] Nurmi JE. Age-differences in adult life goals, concerns, and their temporal extension: a life course approach to future-oriented motivation. Int J Behav Dev. 1992;15:487–508.
[6] Wehman P. Life beyond the classroom: transition strategies for young people with disabilities. Baltimore: Brookes Publishing Co.; 2006.
[7] Sacks SZ, Wolfe KE. Teaching social skills to students with visual impairments: research to practice. New York: AFB Press; 2006.
[8] Kef S, Dekovic M. The role of parental and peer support in adolescents well-being: a comparison of adolescents with and without a visual impairment. J Adolesc. 2004;27:453–466.
[9] Rous B, Hallam R, Harbin G, et al. The transition process for young children with disabilities: a conceptual framework. Infants Young Child. 2007;20:135–148.
[10] Boerner K, Wang SW, Cimarolli VR. The impact of functional loss: nature and implications of life changes. J Loss Trauma. 2006;11:265–287.
[11] Kelly B. ‘Don’t box me in’: disability, identity and transitions to young adult life. Belfast: Queen’s University Belfast in partnership with Barnardo’s NI; 2013.
[12] Kef S. Psychosocial adjustment and the meaning of social support for visually impaired adolescents. J Vis Impair Blind. 2002;96:22–37.
[13] Kef S, Bos H. Is love blind? Sexual behavior and psychological adjustment of adolescents with blindness. Sex Disabil. 2006;24:89–100.
[14] Pfeiffer JP, Pinquart M. Attainment of developmental tasks by adolescents with visual impairments and sighted adolescents. J Vis Impair Blind. 2011;105:33–44.
[15] Koster M, Pijl SJ, Nakken H, et al. Social participation of students with special needs in regular primary education in the Netherlands. Int J Disabil Dev Ed. 2010;57:59–75.
[16] Pijl SJ, Frostad P, Flem A. The social position of pupils with special needs in regular schools. Scan J Educ Res. 2008;52:387–405.
[17] Pinquart M, Pfeiffer JP. Associations of extroversion and parental overprotection with forming relationships with
peers among adolescents with and without visual impairments. J Vis Impair Blind. 2011;105:96–107.

[18] Capella-McDonnall M. Predictors of employment for youths with visual impairments: findings from the second national longitudinal transition study. J Vis Impair Blind. 2011;105:453–466.

[19] Shaw A, Gold D, Wolff K. Employment-related experiences of youths who are visually impaired: how are these youths faring? J Vis Impair Blind. 2007;101:7–21.

[20] Nagle KM. Transition to employment and community life for youths with visual impairments: current status and future directions. J Vis Impair Blind. 2001;95:725–738.

[21] Crudden A, McBroome LW. Barriers to employment: a survey of employed persons who are visually impaired. J Vis Impair Blind. 1999;93:341–350.

[22] McDonnell MC, O’Mally J, Crudden A. Employer knowledge of and attitudes toward employees who are blind or visually impaired. J Vis Impair Blind. 2014;108:213–225.

[23] Salminen AL, Karhula ME. Young persons with visual impairment: challenges of participation. Scand J Occup Ther. 2014;21:267–276.

[24] Van Leeuwen LM, Rainey L, Kef S, et al. Investigating rehabilitation needs of visually impaired young adults according to the international classification of functioning, disability and health. Acta Ophthalmol. 2015;93:642–650.

[25] Sofaei S. Qualitative methods: what are they and why use them? Health Serv Res. 1999;34:1101–1118.

[26] Stockler A, McLeroy KR, Goodman RM, et al. Toward integrating qualitative and quantitative methods: an introduction. Health Educ Q. 1992;19:1–8.

[27] Adler ES, Clark R. How it’s done: an invitation to social research. Belmont (CA): Wadsworth; 1999.

[28] Bernard HR. Social research methods: qualitative and quantitative approaches. Thousand Oaks, CA: Sage; 2000.

[29] Miles M, Huberman M. Qualitative data analysis. Thousand Oaks (CA): Sage; 1994.

[30] Buchbinder R, Batterham R, Elsworth G, et al. A validity-driven approach to the understanding of the personal and societal burden of low back pain: development of a conceptual and measurement model. Arthritis Res Ther. 2011;13:R152.

[31] Trochim WMK. An introduction to concept mapping for planning and evaluation. Eval Program Plann. 1989;12:1–16.

[32] Trochim WMK, Linton R. Conceptualization for planning and evaluation. Eval Program Plann. 1986;9:289–308.

[33] Burke JG, O’Campo P, Peak GL, et al. An introduction to concept mapping as a participatory public health research method. Qual Health Res. 2005;15:1392–1410.

[34] Windsor LC. Using concept mapping in community-based participatory research: a mixed methods approach. J Mix Methods Res. 2013;7:274–293.

[35] Jonker IE, Jansen CCJM, Christians MGM, et al. Appropriate care for shelter-based abused women: concept mapping with Dutch clients and professionals. Violence against Women. 2014;20:465–480.

[36] Reaveley N, Livingston J, Buchbinder R, et al. A systematic grounded approach to the development of complex interventions: the Australian workhealth program-arthritis as a case study. Soc Sci Med. 2010;70:342–350.

[37] Weinstein LC, LaNoue M, Hurley K, et al. Using concept mapping to explore barriers and facilitators to breast cancer screening in formerly homeless women with serious mental illness. J Health Care Poor Underserved. 2015;26:908–925.

[38] McFall SL, Ureda J, Byrd TL, et al. What is needed for informed decisions about prostate cancer screening: perspectives of African-American and Hispanic men. Health Educ Res. 2009;24:280–291.

[39] Beyer KKM, Comstock S, Seagren R, et al. Explaining place-based colorectal cancer health disparities: evidence from a rural context. Soc Sci Med. 2011;72:373–382.

[40] Ahmad F, Mahmood S, Pietkiewicz I, et al. Concept mapping with South Asian immigrant women: barriers to mammography and solutions. J Immigr Minor Health. 2012;14:242–250.

[41] Nijman JL, Sixma H, van Priest B, et al. The quality of radiation care: the results of focus group interviews and concept mapping to explore the patient’s perspective. Radiother Oncol. 2012;102:154–160.

[42] van Randeraad-van der Zee CH, Beurskens AJHM, Swinkels RAHM, et al. The burden of neck pain: its meaning for persons with neck pain and healthcare providers, explored by concept mapping. Qual Life Res. 2016;25:1219–1225.

[43] Rosas SR, Camphausen LC. The use of concept mapping for scale development and validation in evaluation. Eval Program Plann. 2007;30:125–135.

[44] Osborne RH, Elsworth GR, Whitfield K. The health education impact questionnaire (heiQ): an outcomes and evaluation measure for patient education and self-management interventions for people with chronic conditions. Patient Educ Couns. 2007;66:192–201.

[45] Aarons GA, Sommerfeld DH, Chi BH, et al. Concept mapping of PMTCT implementation challenges and solutions across 6 sub-Saharan African countries in the NIH-PEPFAR PMTCT implementation science alliance. J Acquir Immune Defic Syndr. 2016;72:S202–S206.

[46] Rainey L, Elsam EB, van Nispen RM, et al. Comprehending the impact of low vision on the lives of children and adolescents: a qualitative approach. Qual Life Res. 2016;25:2633–2643.

[47] Bruining J, van Nispen R, Knol D, et al. Low vision rehabilitation plans comparing two intake methods. Optom Vis Sci. 2012;89:203–214.

[48] Kane M, Trochim WMK. Concept mapping analysis. In: Kane M, Trochim WMK, editors. Concept mapping for planning and evaluation. Thousand Oaks (CA): Sage Publications, Inc.; 2007.

[49] Stewart D. Evidence to support a positive transition into adulthood for youth with disabilities. Phys Occup Ther Pediatr. 2006;26:1–4.

[50] Newman L, Wagner M, Knokey AM, et al. The post-high school outcomes of young adults with disabilities up to 8 years after high school. In: NCSEER, editor. A report from the National Longitudinal Transition Study-2 (NLTS2). Menlo Park (CA): SRI International; 2011.

[51] Cohen P, Kasen S, Chen HG, et al. Variations in patterns of developmental transitions in the emerging adulthood period. Dev Psychol. 2003;39:657–669.

[52] Mincer J. Human capital and the labor market: a review of current research. Educ Res. 1989;18:27–34.

[53] Hughes C. Transition to adulthood: supporting young adults to access social, employment, and civic pursuits. Ment Retard Dev Disabil Res Rev. 2001;7:84–90.

[54] Braun M, Traue HC, Frisch S, et al. Emotion recognition in stroke patients with left and right hemispheric lesion:
results with a new instrument - the FEEL Test. Brain Cogn. 2005;58:193–201.

[55] Bruijning JE. Implementation and application of the D-AI [PhD Thesis]. Amsterdam, the Netherlands: 2013.

[56] Sacks SZ, Kekelis LS, Gaylord-Ross RJ. The development of social skills by blind and vision impaired students. New York: AFB Press; 1992.

[57] Kim YI. The effectiveness of assertiveness training in enhancing the social skills of adolescents with visual impairments. J Vis Impair Blind. 2003;97:285–314.

[58] Kendrick D. Staying on course: interviews with students who are blind. Access World. 2007;8.

[59] Gold D, Shaw A, Wolfe K. The social lives of Canadian youths with visual impairments. J Vis Impair Blind. 2010;104:431–443.

[60] Turpijn L, Kneefel S, Van der Veer N. Nationale social media onderzoek 2015. Amsterdam, the Netherlands: Newcom Research & Consultancy; 2015.

[61] Rosenblum LP. Perceptions of the impact of visual impairment on the lives of adolescents. J Vis Impair Blind. 2000;94:434–445.

[62] Rainey L, van Nispen R, van Rens G. Evaluating rehabilitation goals of visually impaired children in multidisciplinary care according to ICF-CY guidelines. Acta Ophthalmol. 2014;92:689–696.

[63] Trochim WMK, editor. The reliability of concept mapping. Paper presented at the Annual Conference of the American Evaluation Association; Dallas, Texas; 1993.

[64] Massof RW, Ahmadian L, Grover LL, et al. The activity inventory: an adaptive visual function questionnaire. Optom Vis Sci. 2007;84:763–774.

[65] WHO. The international classification of functioning, disability and health: ICF. Geneva: World Health Organization; 2001.

[66] Schell SF, Luke DA, Schooley MW, et al. Public health program capacity for sustainability: a new framework. Implement Sci. 2013;8:15.

[67] Pope C, Ziebland S, Mays N. Qualitative research in health care. Analysing qualitative data. BMJ. 2000;320:114–116.

[68] Wheeler FC, Anderson LA, Boddie-Willis C, et al. The role of state public health agencies in addressing less prevalent chronic conditions. Prev Chronic Dis. 2005;2:A12.

[69] Brownson RC, Kelly CM, Eyler AA, et al. Environmental and policy approaches for promoting physical activity in the United States: a research agenda. J Phys Act Health. 2008;5:488–503.