

## Using Talking Mats to support conversations with communication vulnerable people: A scoping review

S.E.A. Stans<sup>a,\*</sup>, R.J.P. Dalemans<sup>a</sup>, L.P. de Witte<sup>b</sup> and A.J.H.M. Beurskens<sup>a,c</sup>

<sup>a</sup>Zuyd University of Applied Sciences, Faculty of Health, Heerlen, The Netherlands

<sup>b</sup>Centre for Assistive Technology and Connected Healthcare, University of Sheffield, Sheffield, UK

<sup>c</sup>Maastricht University, Research School CAPHRI, Maastricht, The Netherlands

### Abstract

**Background:** Talking Mats™ is a framework developed to support communication with communication vulnerable people.

**Objective:** The objective was twofold: to provide an overview of the objectives, target groups and settings for which Talking Mats has been used (Part 1), and an overview of empirical scientific knowledge on the use of Talking Mats (Part 2).

**Methods:** In this scoping review scientific and grey literature was searched in PubMed, Cinahl, Psycinfo, Google, and Google Scholar. Articles that described characteristics of Talking Mats or its use were included. For Part 2, additional selection criteria were applied to focus on empirical scientific knowledge.

**Results:** The search yielded 73 publications in Part 1, 12 of which were included in Part 2. Talking Mats was used for functional objectives (e.g. goal setting) and to improve communication and involvement. Part 2 showed that Talking Mats had positive influences on technical communication, effectiveness of conversations, and involvement and decision making in conversations. However, the level of research evidence is limited.

**Conclusions:** Talking Mats can be used to support conversations between professionals and communication vulnerable people. More research is needed to study the views of people who are communication vulnerable and to study the effects of Talking Mats.

*Keywords: Communication, Talking Mats, augmentative and alternative communication, communication vulnerable people, scoping review, communication disability*

### 1. Introduction

Effective communication is essential in healthcare [3,4]. However, conversations between communication vulnerable people and professionals are problematic, and the communicative difficulties of communication vulnerable people lead to major challenges in achieving self-advocacy and participation in healthcare decision making [5,6]. Different definitions of communication vulnerable people have been proposed in the literature [8,9]. We define them as those who struggle to communicate in a particular environment due to a medical condition. They experience difficulties in expressing their needs and/or in understanding information. Communication may be their primary disability, or their communication issues may be secondary to another disability. Limitations in any of the several areas of functioning can lead to someone being classified as communication vulnerable; for example, those with sensory, emotional, physical and cognitive difficulties [12].

Augmentative and alternative communication (AAC) tools can enable communication vulnerable people to express themselves and understand others, supporting self-advocacy. Such tools can also support professionals in understanding clients and enabling a partnership. This paper uses the broad definition of AAC by Clarke and Bloch [13], which incorporates different forms of AAC: formal communication aid systems (e.g. voice output communication aids), conventional semiotic systems (e.g. handwriting), as well as unaided resources (e.g. gesture) and commonplace objects (e.g. maps or letters).

Talking Mats<sup>1</sup> is an AAC tool that cannot be classed under a specific type of AAC, but seems to have the potential to support a wide range of communication vulnerable people. Talking Mats is a visual framework, which has been developed in the United Kingdom. Its main features are that it visualises views (feelings, opinions) and choices in a conversation, and structures the conversation [14]. The process of using Talking Mats is as follows (see Fig. 1):

1. Central topic symbol: The two persons having the conversation decide on a topic they want to talk about and place a symbol representing this topic at the bottom of the mat (for example, "activities you want to learn").
2. Option symbols: A set of option symbols related to the central topic is available (for example, "cooking", "gardening", and "biking"). The professional/caregiver presents option symbols one by one to the person who is communication vulnerable asking them how they feel or think about this option.
3. Top scale symbols: The top scale symbols indicate the person's feeling or opinion (for example, "positive", "don't know", and "negative"). The communication vulnerable person can indicate their feelings or opinions about each option by placing the option symbol under the top scale. The professional/caregiver then asks questions to confirm this placement. The person who is communication vulnerable is always meant to be in control by indicating the placement of the symbols through verbal cues, pointing, or eye movement [15].
4. Visual summary: The professional/caregiver recapitulates the discussion and asks for more confirmation regarding the feelings/opinions expressed by the person. The mat presents a visual summary of the conversation (the mats are often photographed at the end of the conversation to preserve the content of the conversation) [16].

---

<sup>1</sup>Talking Mats is the registered trademark of the Talking Mats Centre, Stirling University Innovation Park, Stirling FK9 4NF, Scotland., UK. See [www.talkingmats.com](http://www.talkingmats.com).

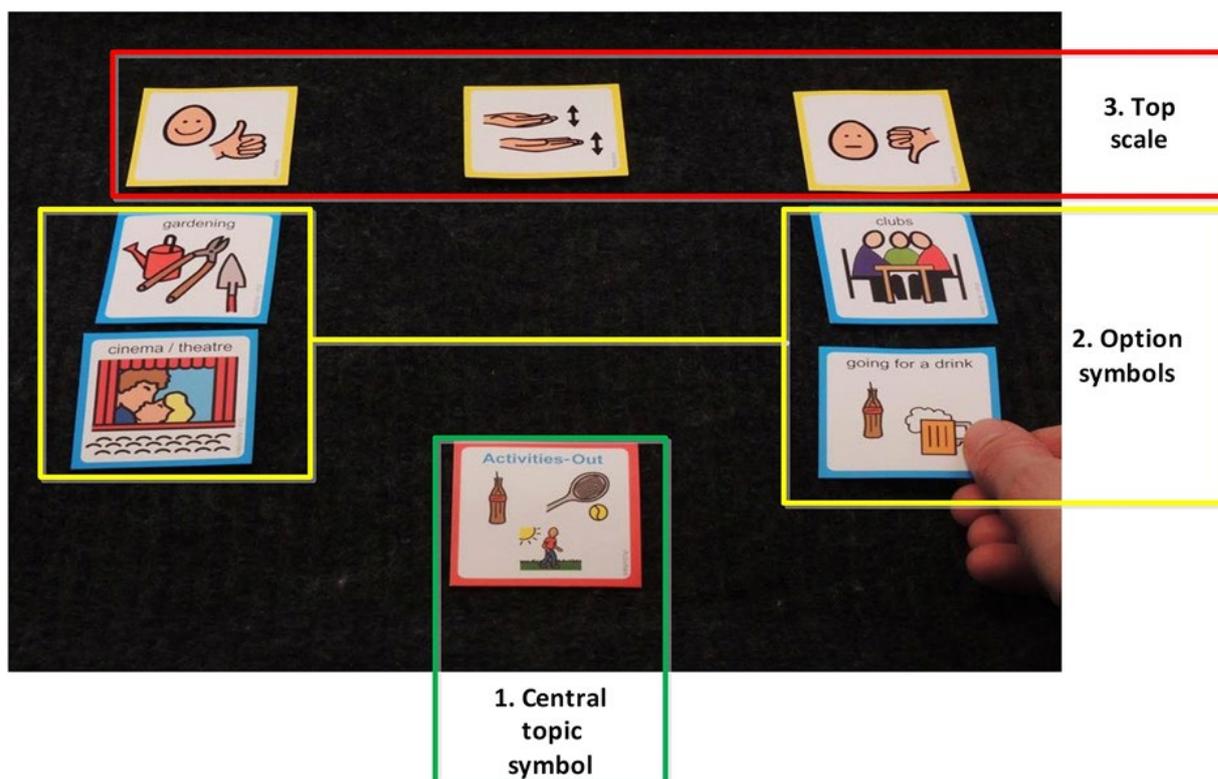


Fig. 1. Example of a completed Talking Mats. The materials used originate from Talking Mats limited organisation.

Talking Mats has been variously characterised as a low-technology tool [17], a visual framework [18], a procedure [14], a technique [19], a resource [20], or a method [21]. It has been used with different target groups, including people with dementia but also children. The literature is also inconsistent about the objectives for which one should use Talking Mats, for example for a casual conversation or for therapy goal setting [10,11,22]. Furthermore, there is no review available about the evidence for the effects of Talking Mats on different target groups. While Talking Mats seems to be used widely in the UK, an overview of its objectives, the target groups and settings for which it can be used, and its effectiveness is lacking.

Talking Mats is a different form of AAC than conventional AAC tools, as it both uses visualisation and provides a structure for a conversation. Studying the characteristics and use of Talking Mats and evidence for its effectiveness is therefore valuable for both research into AAC and for professionals and clients in healthcare. An overview of such knowledge about Talking Mats is needed to provide healthcare professionals with information about whether, when, and how they can use Talking Mats. The purpose of this scoping review is twofold: to provide an overview of the objectives, settings, and target groups in which Talking Mats has been used (Part 1), and an overview of the empirical scientific knowledge about the use of Talking Mats (Part 2).

## 2. Methods

This review was guided by the methodological framework for scoping reviews by Arksey and O'Malley [23]. Scoping reviews are suitable for studying the current state of knowledge on a topic, in order to comprehensively and systematically map the relevant literature, and identify key concepts and gaps in research [24]. The present literature review included two parts:

- Part 1: An overview of the objectives, settings and target groups for which Talking Mats has been used, for which we included peer reviewed and grey literature.
- Part 2: An overview of empirical scientific knowledge about the use of Talking Mats within the objectives identified in Part 1. For this part, only peer-reviewed scientific literature was included.

The methods used in this scoping review are described below according to the stages of the Arksey and O'Malley framework, making a distinction between Parts 1 and 2.

### 2.1. Identifying relevant studies

A combination of search methods was used, including (a) the scientific databases PubMed, Cinahl, and Psychinfo, (b) the electronic search engine Google (including Google Scholar), (c) a publication list on the "Talking Mats Limited" website (the organisation that developed Talking Mats) [25]. The search term "Talking Mats" was used, restricted to title and abstract in the scientific databases, and as a free text word combination in Google (and Google Scholar). The search was restricted to materials published in English, Dutch, and German (the foreign languages with which the researchers are familiar) and published between 1998 and 2016 (Talking Mats appeared in the literature for the first time in 1998). The search using Google and Google Scholar was continued until saturation (no new articles after 100 hits). Duplicates were immediately ignored. The search was used for both Parts 1 and 2, and was completed in December 2016.

### 2.2. Study selection

During the study selection for Part 1, one researcher (SS) identified publications in which Talking Mats was mentioned in the title or abstract. The selected articles were then read and screened independently at full-text level by two researchers (SS and RD). Full-text articles were included if characteristics of Talking Mats were described, and/or if Talking Mats was used as an intervention in a study. Articles were excluded at fulltext level if Talking Mats was merely mentioned, without being described, used, or studied. Due to the broad scope of Part 1, we imposed no restrictions on research type during the selection phases. After the inclusion of full texts, the researchers screened the reference lists of the selected articles for additional relevant publications. When necessary, two other researchers (AB & LD) were involved in the consensus process during the selection.

To focus specifically on scientific literature in Part 2, additional selection criteria were applied to the fulltext publications included in Part 1. These selection criteria were: publication in a peer-reviewed journal, empirical study, and evaluation of the use of Talking Mats described in the study aims. The researchers used no restriction for research type, as scoping reviews are suitable for studying broad topics, and the inclusion of information in scoping reviews is not limited by the methodological quality of the research [23,24]. Two researchers (SS, RD) independently performed the selection process, and differences of opinion were discussed until consensus was reached. When necessary, two other researchers (AB and LD) were involved in the consensus process.

### *2.3. Charting the data and collating, summarising and reporting the results*

For Part 1, one researcher (SS) charted the data by reading and extracting descriptive data (i.e. year, author, country, target group, setting). Thereafter, an analysis focussing on the objectives of Talking Mats was performed by two researchers (SS, RD), following the principles of conventional content analysis [26]. First, text related to the objectives of the use of Talking Mats was highlighted in the publications. Second, these text fragments were given codes describing the type of objective they described. Third, these codes were arranged in overarching themes relating to the objectives of Talking Mats.

For Part 2, we extracted from each publication the author, year, country, aim of the study, participants and setting, target population and settings, objectives of Talking Mats, methods, and results. The results of the studies were then described, linked to the objectives of Talking Mats identified in Part 1. Furthermore, an overview was made of quality-related elements that had (+) or had not (-) been included in the publications. To achieve this we used lists based on the Critical Appraisal Skills Programme's (CASP) tool [27,28]. For mixed methods studies, both lists were used. One researcher (SS) applied these lists, and checked unclear cases with a second researcher (RD).

### *2.4. About Talking Mats*

Talking Mats is a commercially available tool. It was originally developed by a group of speech and language pathology researchers to support people with cerebral palsy in the UK [29]. Based on positive experiences, it has since also been used in research and practice for many different target groups [30,31]. The literature indicates that Talking Mats provides a structure in which topics/options are broken down into small units or chunks. Such a structure can enable a person to consider topics or options in relation to each other, focusing solely on the essential words/topics. This could also reduce cognitive load, help people process concepts more easily, reduce distractibility, and reduce memory demands [5,11,14,32]. Talking Mats can be applied to discuss a specific topic, and is intended to be a supplement to a person's individual communication skills and strategies [11].

Talking Mats has been described as a flexible communication framework, which should be used as a dynamic process that changes and reflects the person's opinions at a specific time [33]. According to published descriptions, Talking Mats does not replace verbal, non-verbal, or other AAC-supported communication, but aims to support these communication modes in conversations by using a picture-based framework [21]. The literature indicates that Talking Mats can encourage a person to use different channels for communication: auditory (talking about views), as well as tactile (placing symbols on a mat) and visual (symbols for the theme, the options, and choices) [32]. The main feature of Talking Mats is that it visualises views (feelings, opinions) and choices in a conversation, also described as "building a picture of your views" [14]. A visual summary of the choices made as a result of the conversation is then displayed on the mat [16].

### 3. Results

Seventy-three articles were included in Part 1. After the additional selection criteria had been applied, 12 publications were included in Part 2. See Fig. 2 for a detailed summary of the abstract, full text, and inclusion numbers.

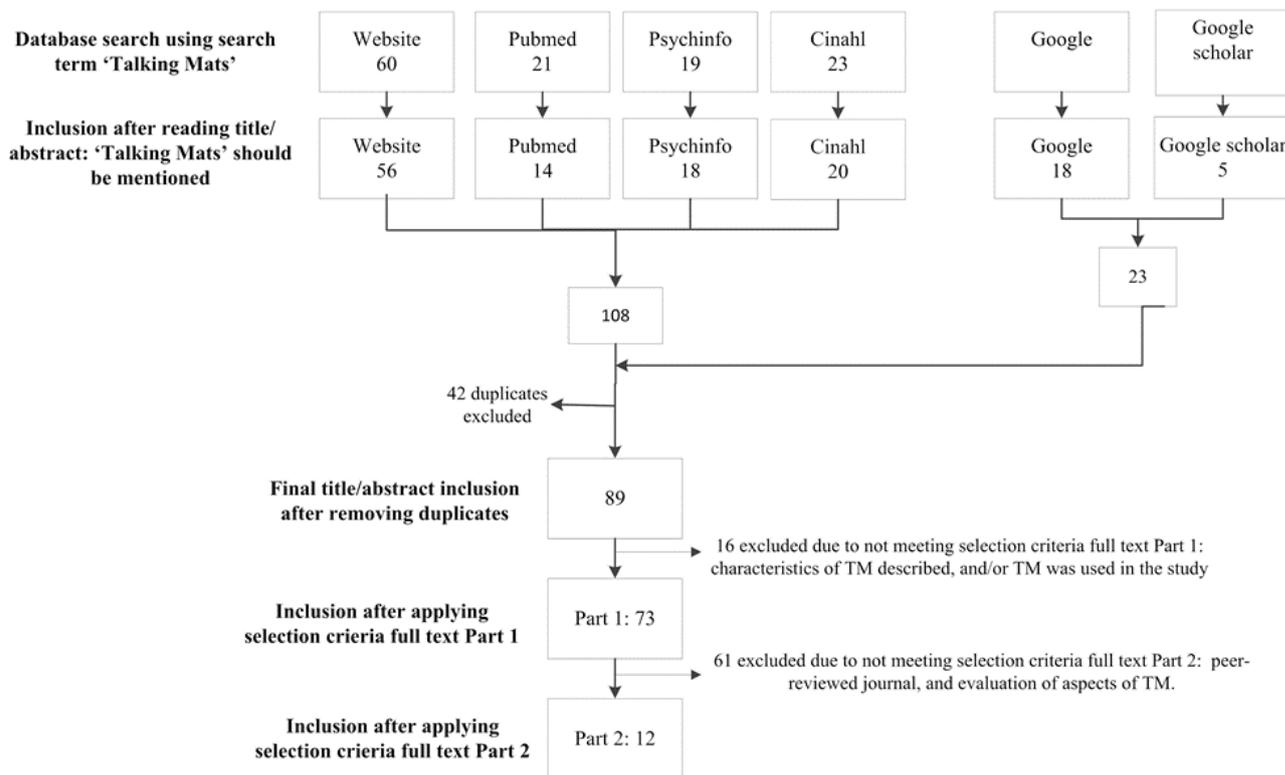


Fig. 2. Number of studies included in the review during each phase.

#### 3.1. Part 1: Overview of the objectives, settings and target groups for which Talking Mats has been used

Part 1 included publications from several countries: the UK (62 publications), Sweden (4 publications), South Africa (4 publications), Norway (1 publication), Malta (1 publication), and the Netherlands (1 publication). Included were peer-reviewed journal articles, research reports, book chapters, website reports, and conference abstracts. The objectives for which Talking Mats has been used, as well as an overview of settings and target groups are described below. A full overview of the details of the included articles can be found in Table 1.

Table 1  
Literature sources included in Part 1, arranged per target group

Author, year, country	Title	Setting	Objectives of Talking Mats	Type of publication
<b>Target group: specific communication disabilities (mild to severe)</b>				
Boa and Mac-Fadyen, 2003, UK [45]	Goal setting for people with communication difficulties.	Rehabilitation service	Expressing views <sup>1</sup> Facilitating involvement <sup>2</sup>	Journal article
Bornman and Murphy, 2006, UK & SA [33]	Using the ICF in goal setting: clinical application using Talking Mats.	-	Goal setting <sup>3</sup> Expressing opinions <sup>1</sup> Thinking <sup>1</sup> Facilitating involvement <sup>2</sup>	Peer reviewed journal article
Beringer et al., 2013, South Africa [52]	The self-determined and partnerpredicted topic preferences of adults with aphasia To describe a useful strategy for interviewing and gathering as much data as possible from participants with complex communication needs in interview studies.	SLP and physical therapy practice	Goal setting <sup>3</sup> Expressing views <sup>1</sup>	Peer reviewed journal article
Buchholz et al., 2016, Sweden [53]		Research	Research and projects <sup>3</sup> Expressing views <sup>1</sup> Research and projects <sup>3</sup>	Congress paper
Dinwoody and Macer, 2010, UK [54]	Talking Mats for literacy target setting.	Independent residential provision	Expressing views <sup>1</sup> Facilitating involvement in decisions <sup>2</sup> Goal setting <sup>3</sup>	Journal article
Gillespie et al., 2010, UK [55]	Divergences of perspective between people with aphasia and their family caregivers. The ICF as a common language for rehabilitation goal-setting: comparing client and professional priorities.	Home environment	Facilitating involvement <sup>2</sup> Research and projects <sup>3</sup>	Peer reviewed journal article
Harty et al., 2011, SA [37]		Acute rehabilitation centre	Facilitating involvement <sup>2</sup> Goal setting <sup>3</sup>	Peer reviewed journal article
Murphy, 1998, UK [29]	Talking Mats: speech and language research in practice.	Residential setting	Thinking and understanding <sup>1</sup> Expressing views <sup>1</sup> Research and projects <sup>3</sup>	Journal article
Murphy, 1998, UK [56]	Helping people with severe communication difficulties to express their views: a low tech tool.	-	Research and projects <sup>3</sup>	Journal article
Murphy, 2000, UK [1]	Enabling people with aphasia to discuss quality of life.	Home environment, acute ward and long stay nursing home or hospital ward	Expressing views and thoughts <sup>1</sup> Diagnostics <sup>3</sup>	Peer reviewed journal article
Murphy, 2002, UK [57]	A focus on social issues. a response to Balandin.	-	Expressing views <sup>1</sup> Diagnostics <sup>3</sup>	Peer reviewed journal article
Murphy, 2006, UK [35]	Perceptions of communication between people with communication disability and general practice staff.	GP consultation practice	Facilitating involvement <sup>2</sup>	Peer reviewed journal article
Murphy, 2009, UK [49]	Talking Mats: a study of communication difficulties and the feasibility and effectiveness of a low tech communication framework.	-	Numerous objectives described	Doctorate thesis

Table 1, continued

Author, year, country	Title	Setting	Objectives of Talking Mats	Type of publication
Murphy and Boa, 2012, UK [16]	Using the WHO ICF with Talking Mats to enable adults with long-term communication difficulties to participate in goal setting.	Interdisciplinary community rehabilitation team	Expressing views <sup>1</sup> Facilitating involvement <sup>2</sup> Goal setting <sup>3</sup>	Peer reviewed journal article
Murphy and Cameron, 2006, UK [40]	The acute hospital experience for adults with complex communication needs.	Acute hospital	Expressing opinions <sup>1</sup> Research and projects <sup>3</sup>	Website report
Murphy et al., 2012, UK [58]	Using Talking Mats to see each other's point of view.	Home environment	Expressing views <sup>1</sup> Facilitating involvement <sup>2</sup> Research and projects <sup>3</sup>	Journal article
Pettit et al., 2016, South Africa [59]	The perspectives of adults with aphasia and their team members regarding the importance of nine life areas for rehabilitation: A pilot investigation.	Neurological rehabilitation facilities	Goal setting <sup>3</sup>	Peer reviewed journal article
<b>Target group: People with learning disabilities</b>				
Bell and Cameron, 2003, UK [60]	The assessment of the sexual knowledge of a person with a severe learning disability and a severe communication disorder.	Multidisciplinary team	Expressing views <sup>1</sup> Facilitating involvement <sup>2</sup> Diagnostics <sup>3</sup>	Peer reviewed journal article
Bell and Cameron, 2007, UK [14]	From dare I say. . .? to I dare say: a case example illustrating the extension of the use of Talking Mats to people with learning disabilities who are able to speak but unwilling to do so.	Adult resource facility	Expressing views <sup>1</sup> Facilitating involvement <sup>2</sup> Conflicts and differences of opinions <sup>3</sup>	Peer reviewed journal article
Bell et al., 2009, UK [61]	Differential diagnosis of dementia in the field of learning disabilities: a case study.	Home environment	Facilitating involvement in decisions <sup>2</sup> Goal setting <sup>3</sup>	Peer reviewed journal article
Brewster, 2004, UK [19]	Putting words into their mouths? Interviewing people with learning disabilities and little/no speech.	-	Expressing views <sup>1</sup> Thinking and understanding <sup>1</sup> Research and projects <sup>3</sup>	Peer reviewed journal
Brown et al., 2000, UK [62]	Respite review: obtaining the views of the users.	Residential respite units	Expressing views <sup>1</sup> Facilitating involvement <sup>2</sup> Research and projects <sup>3</sup>	Journal article
Bunning, 2016, UK [63]	Co-production and pilot of a structured interview using Talking Mats <sup>R</sup> to survey the television viewing habits and preferences of adults and young people with learning disabilities.	Day center, respite care facility	Facilitating involvement <sup>2</sup> Research and projects <sup>3</sup>	Peer reviewed journal article
Bunning et al., 2009, UK [48]	Communication and empowerment: a place for rich and multiple media?	Special school	Expressing views <sup>1</sup> Facilitating involvement <sup>2</sup> Research and projects <sup>3</sup>	Peer reviewed journal article
Bunning and Steel, 2007, UK [39]	Self-concept in young adults with a learning disability from the Jewish community.	Education college for people with a learning disability	Improving communication <sup>1</sup> Facilitating involvement <sup>2</sup> Research and projects <sup>3</sup>	Peer reviewed journal article

Table 1, continued

Author, year, country	Title	Setting	Objectives of Talking Mats	Type of publication
Cameron and Boa, 2009, UK [64]	Advocating partnership.	Independent advocacy services	Expressing views <sup>1</sup> Facilitating involvement <sup>2</sup> Research and projects <sup>3</sup>	Journal article
Cameron and Murphy, 2001, UK [42]	Views of young adults at the time of transition.	School/day centre	Expressing views, feelings, opinions <sup>1</sup> Facilitating involvement <sup>2</sup> Goal setting <sup>3</sup>	Journal article
Cameron and Murphy, 2002, UK [2]	Enabling young people with a learning disability to make choices at a time of transition.	SLP learning disability service centre	Expressing views, feelings, opinions <sup>1</sup> Facilitating involvement <sup>2</sup>	Peer reviewed journal article
Cameron and Murphy, 2006, UK [65]	Obtaining consent to participate in research: the issues involved in including people with a range of learning and communication disabilities.	Research	Research and projects <sup>3</sup>	Peer reviewed journal article
Cameron et al., 2004, UK [66]	Talking Mats: a focus group tool for people with learning disability. Paper presented at CM 2003 national symposium Lancaster University.	Local community services, housing associations etc.	Expressing views and feelings <sup>1</sup> Facilitating involvement <sup>2</sup> Goal setting <sup>3</sup>	Journal article, conference paper
Germain, 2004, UK [38]	An exploratory study using cameras and Talking Mats to access the views of young people with disabilities on their out-of-school activities.	Special school	Expressing views <sup>1</sup> Facilitating involvement <sup>2</sup> Activity choices <sup>3</sup>	Peer reviewed journal article
Macer and Fox, 2010, UK [17]	Using a communication tool to help clients express their health concerns.	Secure facility	Thinking and understanding <sup>1</sup> Facilitating involvement <sup>2</sup> Diagnostics <sup>3</sup>	Journal article
Mitchell, 2010, UK [67]	"I know how I feel": listening to young people with life-limiting conditions who have learning and communication impairments.	Hospice	Facilitate interaction <sup>1</sup> Facilitating involvement <sup>2</sup> Research and projects <sup>3</sup>	Peer reviewed journal article
Murphy and Cameron, 2008, UK [5]	The effectiveness of Talking Mats with people with intellectual disability.	SLP practice	Expressing feelings <sup>1</sup> Facilitating involvement <sup>2</sup> Diagnostics <sup>3</sup> Social processes <sup>3</sup>	Peer reviewed journal article
Small et al., UK [68]	An ecological approach to seeking and utilising the views of young people with intellectual disabilities in transition planning.	Transition from school or college	Expressing views <sup>1</sup>	Peer reviewed journal article
Watson et al., 2003, UK [6]	Don't just make the font bigger. How can people with learning disabilities become more involved in life planning?	Local group run by and for people with learning disabilities	Expressing views <sup>1</sup> Facilitating involvement in decisions <sup>2</sup> Goal setting <sup>3</sup>	Peer reviewed journal article
<b>Target group: People with dementia</b>				
Cox et al., 2008, UK [15]	Communication and dementia: how effective is the Talking Mats approach?	Home environment, sheltered housing, residential care home	Expressing opinions <sup>1</sup> Facilitating involvement <sup>2</sup> Research and projects <sup>3</sup>	Peer reviewed journal article
Hubbard et al., 2003, UK [69]	Including older people with dementia in research: challenges and strategies.	Institutional care	Research and projects <sup>3</sup>	Peer reviewed journal article

Table 1, continued

Author, year, country	Title	Setting	Objectives of Talking Mats	Type of publication
Macer and Murphy, 2009, UK [70]	Training care home staff to use Talking Mats with people who have dementia.	Home care	Facilitating involvement <sup>2</sup> Research and projects <sup>3</sup>	Research report
Macer, 2011, UK [71]	Talking Mats: training for home care staff.	Home care	Expressing views <sup>1</sup> Thinking and understanding <sup>1</sup> Research and projects <sup>3</sup>	Peer reviewed journal article
Murohy, 2014, UK [72]	Talking Mats and Families Living with Dementia.	Alzheimer centers	Expressing views <sup>1</sup> Facilitating involvement <sup>2</sup> Research and projects <sup>3</sup>	Journal article
Murphy et al., 2010, UK [7]	The effectiveness of the Talking Mats framework in helping people with dementia to express their views on wellbeing.	Home environment, sheltered housing, residential care home	Numerous objectives described	Peer reviewed journal article
Murphy et al., 2007, UK [18]	Communication and dementia: how Talking Mats can help people with dementia to express themselves.	Home environment, care settings	Thinking and understanding <sup>1</sup> Facilitating involvement <sup>2</sup> Goal setting <sup>3</sup> Activity choices <sup>3</sup>	Research report
Murphy et al., 2007, UK [30]	Using Talking Mats to help people with dementia to communicate.	Institutional care	Numerous objectives described	Research report
Murphy et al., 2010, UK [34]	Talking Mats help involve people with dementia and their carers in decision making.	Institutional care	Expressing views <sup>1</sup> Facilitating involvement in decisions <sup>2</sup> Goal setting <sup>3</sup>	Research report
Murphy et al., 2012, UK [73]	Talking Mats and involvement in decision making for people with dementia and family carers.	Home environment	Facilitate interaction <sup>1</sup> Expressing views <sup>1</sup> Facilitating involvement <sup>2</sup> Goal setting <sup>3</sup>	Research report
Murphy and Oliver, 2013, UK [22]	The use of Talking Mats to support people with dementia and their carers to make decisions together.	Home environment	Expressing views <sup>1</sup> Facilitating involvement <sup>2</sup> Goal setting <sup>3</sup>	Peer reviewed journal article
Reitz and Dalemans, 2016, The Netherlands [36]	The Use of Talking Mats by Persons with Alzheimer in the Netherlands: Increasing Shared Decision – Making by Using a Low-Tech Communication Aid.	Nursing home	Expressing views <sup>1</sup> Facilitating involvement <sup>2</sup>	Peer reviewed journal article
<b>Target group: Frail older people</b> Murphy et al., 2005, UK [74]	Enabling frail older people with a communication difficulty to express their views: the use of Talking Mats <sup>TM</sup> as an interview tool.	Care homes	Expressing views <sup>1</sup> Facilitating involvement <sup>2</sup> Research and projects <sup>3</sup>	Peer reviewed journal article
Tester et al., 2003, UK [75]	Exploring perceptions of quality of life of frail older people during and after their transition to institutional care. Research Findings 24.	Institutional care	Expressing views and feelings <sup>1</sup> Diagnostics <sup>3</sup>	Research report

Table 1, continued

Author, year, country	Title	Setting	Objectives of Talking Mats	Type of publication
<b>Target group: People with Huntington's disease</b>				
Ferm et al., 2012, Sweden [21]	Communication between Huntington's disease patients, their support persons and the dental hygienist using Talking Mats.	Dental hygienist practice	Expressing opinions <sup>1</sup> Facilitating involvement <sup>2</sup> Goal setting <sup>3</sup> Diagnostics <sup>3</sup>	Book chapter
Ferm et al., 2010, Sweden [10]	Using talking Mats to support communication in persons with Huntington's disease.	Home environment	Expressing views <sup>1</sup> Thinking and understanding <sup>1</sup> Goal setting <sup>3</sup> Social processes <sup>3</sup>	Peer reviewed journal article
Hallberg et al., 2013, Sweden [11]	Talking Mats in a discussion group for people with Huntington's disease.	Activity centre	Expressing views and feelings <sup>1</sup> Facilitating involvement <sup>2</sup> Research and projects <sup>3</sup>	Peer reviewed journal article
<b>Target group: Children with and without communication impairments</b>				
Borg et al., 2015, Malta [76]	A User and Their Family's Perspective of The Use of a Low-Tech Vs A High-Tech AAC System.	Communication and Technology Unit	Expressing views and thoughts <sup>1</sup> Expressing opinions <sup>1</sup> Research and projects <sup>3</sup>	Peer reviewed journal article
Hooton and Westaway, 2008, UK [77]	The voice of the child with Down syndrome.	Mainstream schools	Expressing views <sup>1</sup> Thinking and understanding <sup>1</sup> Facilitating involvement <sup>2</sup> Goal setting <sup>3</sup>	Peer reviewed journal article
Midtlin et al., 2014, Norway [78]	What communication strategies do AAC users want their communication partners to use? A preliminary study.	Local Schools	Expressing views <sup>1</sup> Research and projects <sup>3</sup>	Peer reviewed journal article
Nilsson et al., 2012, SE [41]	Assessing children's anxiety using the modified short state-trait anxiety inventory and Talking Mats: a pilot study.	Day surgeries	Expressing views and thoughts <sup>1</sup> Diagnostics <sup>3</sup>	Peer reviewed journal article
Turner, n.d. [79]	Case study: empowering vulnerable children and their parents using Talking Mats.	Child and family centre (children with trauma)	Facilitating involvement <sup>2</sup> Research and projects <sup>3</sup>	Website report
Whitehurst, 2006, UK [20]	Liberating silent voices: perspectives of children with profound and complex learning needs on inclusion.	Residential special school	Thinking and understanding <sup>1</sup> Expressing views and feelings <sup>1</sup> Facilitating involvement <sup>2</sup> Research and projects <sup>3</sup>	Peer reviewed journal article
Wright, 2008, UK [31]	Researching the views of pupils with multiple and complex needs. Is it worth doing and whose interests are served by it?	Mainstream secondary school	Expressing opinions <sup>1</sup> Thinking and understanding <sup>1</sup> Research and projects <sup>3</sup>	Peer reviewed journal article

Table 1, continued

Author, year, country	Title	Setting	Objectives of Talking Mats	Type of publication
<b>Various target groups</b>				
AAC Scotland, 2012, UK [80]	Material training course Talking Mats.	-	Numerous objectives described	Book training course
Boa, 2005, UK [81]	"You will know when it feels right".	Multidisciplinary community rehabilitation team	Thinking and understanding <sup>1</sup> Facilitating involvement <sup>2</sup> Goal setting <sup>3</sup>	Journal article
Barrie and Miller, 2010, UK [82]	Talking Points – a personal outcomes approach: using Talking Mats.	Talking Mats training	-	Research report
Boardman et al., 2015, UK [83]	When you can't talk about it: Using Talking Mats to enable an offender with communication difficulties to express his thoughts and beliefs.	Probation	Expressing views <sup>1</sup> Facilitating involvement <sup>2</sup>	Peer reviewed journal article
Glendinning et al., 2014, UK [84]	Ambiguity in practice? Carers' roles in personalised social care in England.	Social care departments	Research and projects <sup>3</sup> Expressing views <sup>1</sup>	Peer reviewed journal article
Gridley et al., 2014, UK [85]	Good practice in social care: the views of people with severe and complex needs and those who support them.	Organizations of and for people with complex needs	Research and projects <sup>3</sup>	Peer reviewed journal article
Ferm et al., 2015, UK [86]	Negotiating disagreement in picture symbol supported decision making.	Parkinson Foundation	Research and projects <sup>3</sup> Expressing views <sup>1</sup>	Journal article
Murphy, 1999, UK [87]	Enabling people with motor neurone disease to discuss their quality of life.	Home environment	Expressing views and feelings <sup>1</sup> Diagnostics <sup>3</sup>	Journal article
Murphy and Boa, 2012, UK [88]	Presentation: using the WHO ICF with talking mats as a goal setting tool.	-	Numerous objectives described	Congress presentation
Murphy and Cameron, n.d., UK [89]	Communication disability and crime.	-	Expressing views and feelings <sup>1</sup>	Internet report
Murphy and Cameron, 2005, UK [32]	Talking Mats. A resource to enhance communication.	Numerous settings described	Numerous objectives described	
Murphy and Mackay, 2015, UK [90]	Will anyone listen to us? What matters to young people with complex and exceptional health needs and their families during health transitions.	Home environment and institutional setting	Research and projects <sup>3</sup> Expressing views <sup>1</sup>	Research report
Murphy et al., 2003, UK [43]	Helping people make decisions about PEG feeding.	Rehabilitation	Expressing views and opinions <sup>1</sup> Facilitating involvement in decisions <sup>2</sup> Goal setting <sup>3</sup>	Journal article
Murphy and Strachan, 2011, UK [50]	Talking Mats: extending the reach into goal setting practices for health and social care staff in Edinburgh.	Day centres	Facilitating interaction <sup>1</sup> Thinking and understanding <sup>1</sup> Facilitating involvement <sup>2</sup> Goal setting <sup>3</sup>	Research report

The country indications are based on the description of the university or institution that was mentioned in the literature sources, which may have led to incorrect labelling. The use of "-" indicates that no information about this theme was found in the literature. Column objectives: <sup>1</sup>: communication; <sup>2</sup>: facilitating involvement; <sup>3</sup>: functional use. Abbreviations: n.d. : no date available; GP: general practitioner; SLP: speech-language pathologists; UK: United Kingdom. Each article's journal was checked to verify whether it is a peer-reviewed journal. If not, it is labelled as a journal article. Research reports are reports about a study not yet published in a journal but on websites. The studies are presented in alphabetical order per target group.

### 3.1.1. Objectives

Three main themes emerged regarding the objectives of using Talking Mats: facilitating communication, facilitating involvement, and functional use. Figure 3 provides an overview of these themes and subthemes.

*Facilitating communication.* Within the theme of “facilitating communication”, the following subthemes were identified: facilitating expression, facilitating interaction, and facilitating thinking and understanding by structuring conversations into small units [5,21,34]. The subtheme of facilitating expression included expressing opinions, thoughts, or feelings [5,21,34].

*Facilitating involvement.* The “facilitating involvement” theme included facilitating involvement in interactions with individuals or groups, and facilitating involvement in decision-making [33,35,36].

*Functional use of Talking Mats.* Six subthemes were identified with regard to “functional use of Talking Mats”:

- Goal setting: enabling people to identify, set, and review their own goals [37].
- Enabling people to make activity choices [30,38], including exploring which activities people want to do on a daily basis [30,38].
- Supporting people’s participation in research and projects [39,40]. For example, Talking Mats could support the process of obtaining consent for research. Talking Mats could also support an interview procedure or project meeting, or make standard questionnaire items accessible to communication vulnerable people [39,40].
- Facilitating a diagnostic process [41]. For example, Talking Mats was used to assess anxiety in children before an operation [41].
- Improving social processes [30,32]. For example Talking Mats could help people get to know someone or develop and maintain relationships [30,32].
- Resolving conflicts and differences of opinion [14,42].

### 3.1.2. Settings and target groups

The use of Talking Mats was described in a wide variety of settings, such as home environments, institutional care, rehabilitation, schools, and prisons. Target groups for which Talking Mats was used were:

- people with specific communication difficulties (17 publications);
- people with learning disabilities (19 publications);
- people with dementia (12 publications);
- Older people who are frail (2 publications);
- people with Huntington’s disease (3 publications);
- children with and without communication impairments (7 publications);
- “Various target groups”, i.e. describing research in different settings with target groups not specifically mentioned, or not part of the above target groups (13 publications).

Related to the target groups for which Talking Mats can be used are the skills required to use it. The following skills were reported:

- Physical skills to indicate the placement of the symbols, such as hand pointing or eye movements [32,42].
- Sufficient vision to see the picture symbols [2,14, 42].
- Cognitive skills to understand the symbols [42, 43] and to understand the verbal instructions containing two or three information-carrying words [14,31,32].
- Expressive skills to indicate a reliable yes/no (verbal or non-verbal) [14,42].

Talking Mats can be tailored to the specific needs of target groups. The types and number of symbols, and the size, colour, and texture of the symbols and mat can be adjusted depending on the person's communication challenges. For example, one can use a range of two to five top scale symbols (e.g. like/ dislike), depending on the person's cognitive ability. In most cases, Picture Communication Symbols (PCS™), Talking Mats Communication Symbols [25], Sclera's pictograms [44], or photographs are used for the symbols. Some symbol sets have been developed to reflect the World Health Organization's International Classification of Functioning, Disability and Health (ICF) model, describing 9 different neutral domains of activity and participation [33,45,46].

Talking Mats is a partner-assisted communication framework. Although the intention of Talking Mats is to put the person who is communication vulnerable in control as much as possible, the communication partner has considerable influence [19]. The communication partner preselects the conversation topics and therefore has control over which items/topics are visually presented, and thus which topics are communicated about [19]. Furthermore, the quality of the conversation when using Talking Mats, e.g. the effects on facilitating communication and facilitating involvement, depends greatly on the support of the communication partner [10]. Factors that could possibly impact the quality of using Talking Mats are: the conversation partners' questioning style; their prompting or making assumptions [19]; their preparation of the topics and symbols [1]; and their awareness of the symbols' abstract nature [16,47]. Ferm and colleagues [10] described that Talking Mats presupposes a speaking partner who is open-minded and respectful and who knows how to use Talking Mats.

### *3.2. Part 2: Overview of the research evidence on the effects of using Talking Mats*

Twelve articles reported research evidence for Talking Mats. The details of these articles are presented in Table 2. We found no systematic reviews, randomized controlled trials or cohort studies. There were seven cross-over studies in which the patients had a conversation without Talking Mats and a conversation with Talking Mats (numbers of patients ranging from 4 to 48) and five descriptive case series (numbers of patients ranging from 9 to 12). One of the case series was a qualitative study, another used mixed methods. Six of the 12 studies were carried out by researchers involved in Talking Mats Limited organization.

The studies in Part two focused on the target groups: people with aphasia, learning disabilities, dementia or Huntington's disease, and children. No studies in Part 2 examined the skills required to use Talking Mats which were discussed in Part 1.

Tables 3 and 4 present an overview of the quality elements identified in the included publications. The qualitative studies often did not report the qualitative methods and data analyses in detail (Table 3), nor how the relationship between researcher and participants may have influenced the qualitative data gathering and analysis. In the quantitative studies, the design was often not described (Table 4). Moreover, in several studies the sample size was not justified and a convenience sample was mostly used.

The results are presented for each objective of Talking Mats: facilitating communication, facilitating involvement, and functional use of Talking Mats. Some studies reported on multiple objectives and are therefore described under several headings.

Table 2  
Part 2. Results of empirical research about Talking Mats

Author, year, country	Aim of the study	Participants and setting	Method	Data collection	Outcome measures	Results related to Talking Mats.
Cameron and Murphy, 2002, UK [2]	Examine whether Talking Mats could be successfully used for young people with a learning disability	$n = 12$ ; young people with a learning disability; SLP service	Qualitative descriptive design (pilot study)	Video observations, photographs, field notes, follow up visit	Coding framework Follow up: agreement with mat	Researcher observations: All participants were able to use Talking Mats to some extent for expressing views on the choices in their lives. Ten participants were able to complete mats on 6 topics. No pattern observed of randomly or alternately assigning symbols on the mat. Enjoyment of using Talking Mats was confirmed. Cognitive mapping mats: illustrations of the Talking Mats.
Ferm et al., 2010, UK [10]	Examine whether Talking Mats is suitable for people in advanced stages of HD	$n = 5$ ; people with HD; living at home	Descriptive intervention study, quantitative and qualitative. Cross over design	Video observations, photograph 3 conditions: Talking Mats, structured conversation (SC), unstructured conversation (USC)	Quantitative: Effectiveness framework of functional communication (EFFC), and duration conversation. Qualitative: experiences of the communication partners (researchers)	Quantitative: 2 out of 5 people reached acceptable communicative effectiveness. The mean score for effectiveness was significantly higher for Talking Mats (11.33) compared with USC(7.20) and SC(10.00) (Wilcoxon Signed Rank test, $SD$ 3.42, $p < 0.05$ ). The themes, interests, and activities, reached acceptable communicative effectiveness. Talking Mats (28.13 min.) had a significantly longer mean duration compared with USC (3.67 min.) ( $SD$ 5.57, $p < 0.05$ ), but not compared with SC (15.19 min.) ( $SD$ 5.57, $p = 0.08$ ). Qualitative: experiences conversation partners (researchers).
Germain, 2004, UK [38]	Using cameras and Talking Mats as research tools to elicit the views of young people with disabilities on out-of-school activities	$n = 9$ children (16 years old); special school for children with learning difficulties	Descriptive design (pilot study)	Talking Mats photo placing, repeating Talking Mats photo placing, interviews with parents	Validation Talking Mats photo placing	Repeating Talking Mats photo placing: Few changes were made in photo placing during the second visit of 4 participants, 7% of the photos were placed under a different symbol. All parents confirmed that Talking Mats provided an accurate record of the out-of-school activities of their child.
Hallberg et al., 2013, SE [11]	Evaluate function of Talking Mats in a discussion group for people with HD	$n = 4$ ; people with HD and their group leader; activity centre	Mixed method, qualitative and quantitative	Video observations group discussion, individual interviews Two conditions: discussion with and without Talking Mats	Quantitative: EFFC, number follow up questions, length main questions. Qualitative: opinions	Quantitative: Significantly higher total scores on the effectiveness framework for Talking Mats ( $p < 0.05$ ) for all participants. At group level all indicators except engagement were higher for Talking Mats (Wilcoxon Signed Ranked test, $p < 0.05$ ). Follow up questions: leader asked significantly more follow up questions for Talking Mats ( $p < 0.05$ ). Qualitative: positive experiences related to: easiness, remembering, talking, and controlling discussion. Two participants experienced difficulty with handling the pictures. Discussions leader: Talking Mats helped leader to understand opinions and stay on topic. However discussion without use of Talking Mats was experienced as more self-sustaining, felt more natural and less controlled. Talking Mats discussion was experienced as less spontaneous, needing a lot of preparation and time consuming.

Table 2, continued

Author, year, country	Aim of the study	Participants and setting	Method	Data collection	Outcome measures	Results related to Talking Mats
Harty et al., 2011, SA [37]	Investigate clients and professionals' perception of the importance of ICF activities and participation domains for inclusion in rehabilitation	$n = 12$ ; people with acquired communication disorder; $n = 20$ : rehabilitation professionals; acute rehabilitation centre	Comparative design	Video observations, photographs Separate Talking Mats interviews with clients and professionals	Professional and client ratings of importance of nine ICF activities and participation domains	No statistically significant differences for ratings of importance of ICF domains across participant groups when using Talking Mats (Friedman analysis, no statistical data available).
Murphy, 2000, UK [1]	Examine the feasibility of using Talking Mats with people with aphasia to express views on quality of life	$n = 12$ ; people with aphasia; home environment, acute ward, nursing home or hospital	Descriptive design	Video observations, photographs	Coding framework Whether Talking Mats can help identify topics about quality of life	The mean score for all indicators on the coding framework was 4 and above, out of 6, for each topic (11 of 12 participants). They "usually" or "always": understood the task, expressed views confidently, confirmed placement symbols, indicated satisfaction end result. Cognitive mapping mats: illustrations of the Talking Mats.
Murphy and Cameron, 2008, UK [62]	Evaluate the effectiveness of Talking Mats to enable people with intellectual disability to express their views on life planning	$n = 48$ ; people with intellectual disability	Mixed method, qualitative and quantitative	Video observations Two conditions: discussion with Talking Mats, and discussion using main communication methods (MCM)	Effectiveness coding framework (ECF), duration interview, number of topics discussed, on/off task behaviour	Effectiveness: mean score significantly different between Talking Mats (15.8) and MCM (9.8) (plotted with standard error bars, $F(1.40) = 43.6, p < 0.001$ ). Duration interview: participants interacted significantly longer using Talking Mats (median time 6.45 min.) than MCM (2.39 min) (Wilcoxon test, $z = 4.57, p < 0.0001$ ). Number of topics: Talking Mats resulted in significantly more topics than MCM ( $F(1.21) = 227, p < 0.001$ ). On task behaviour: time series analysis occurrence of target behaviours at 10-second intervals: 94.5% Talking Mats, 74.9% MCM.
Murphy et al., 2010, UK [7]	Evaluate the effectiveness of Talking Mats for people with different stages of dementia	$n = 31$ ; people with dementia; living at home, sheltered housing, residential care home.	Quantitative Crossover design	Video observations Three conditions: Talking Mats, unstructured conversation (USC), structured conversation (SC)	EFFC, perseveration, on task behaviour, duration conversation	Effectiveness: Median score Talking Mats significantly higher than SC ( $z = 4.47, p < 0.001$ ) and USC ( $z = 4.23, p < 0.001$ ) in dementia. On task behaviour: for moderate and late stage dementia significant more on task behaviour with Talking Mats than SC and USC (not significant Talking Mats vs. USC in moderate stage dementia). Perseveration: Talking Mats resulted in significantly less perseveration than SC (Wilcoxon signed rank test $z = 3.54, p < 0.001$ ), and USC ( $z = 3.12, p < 0.01$ ) (not significant early stage dementia). Duration conversation: Talking Mats lasted significantly longer than USC (Paired samples t-test, $t(30) = 20.03, p < 0.001$ ).

Table 2, continued

Author, year, country	Aim of the study	Participants and setting	Method	Data collection	Outcome measures	Results related to Talking Mats
Murphy and Oliver, 2013, UK [22]	To explore whether using Talking Mats helps people with dementia and family carers feel more involved in decisions about managing daily living	$n = 18$ ; people with dementia and $n = 18$ family carers; living at home	Quantitative and qualitative	Video observations, photographs, participant questionnaire, discussion with Talking Mats and discussion usual communication methods (UCM)	Quantitative: participant involvement questionnaire Qualitative: cognitive mapping	Quantitative: people with dementia felt significantly more involved using Talking Mats compared to UCM (Wilcoxon signed-ranked test, $z = -3.83$ , $p < 0.01$ , $r = -0.45$ ). Feeling of involvement was significantly higher for the carers (Mann-Whitney U test, $z = -2.12$ , $p < 0.05$ , $r = 0.35$ ). All participants felt significantly more satisfied with discussion using Talking Mats (Wilcoxon signed-ranked test, $z = -3.46$ , $p < 0.01$ , $r = -0.41$ ). Qualitative data: people with dementia: positive experiences related to remembering, expressing, awareness, and focusing on abilities rather than disabilities. Experiences of carers: positive experiences related to understanding and listening.
Murphy et al., 2005, UK [70]	Obtain the views of frail older people with communication impairments using Talking Mats	$n = 10$ ; frail older people with a communication difficulty; care homes	Qualitative	Video observations, photographs, field notes	Topics: activities, environment, people, self	Researcher observations: participants able to express some views about likes and dislikes. Number of participants who respond to topics: activities: 10; environment: 6; people: 5; self: 4. Observations (mostly related to single participants): positive experiences related to: focusing, understanding and expressing. Cognitive mapping mats: percentages of topics discussed.
Nilsson et al., 2012, SE [41]	Test the reliability and validity of the modified short state-trait anxiety inventory using Talking Mats in children undergoing surgery	$n = 42$ ; children undergoing surgery (3–9 years old) and $n = 42$ parents; day surgeries	Quantitative (pilot study) two conditions: before and after surgery	Questionnaires	Talking Mats self-report scale (modified (STAI)) for children, compared with parent assessment short STAI	Concurrent Validity: only significant correlation between children's score using Talking Mats and parent's score on the STAI in age group 3–4 years (Spearman's correlation analysis, $r = 0.50$ , $p < 0.5$ ). Construct validity: only significant decrease in children's score using Talking Mats and parents score on the STAI in age group 7–9 years (before and after, Wilcoxon signed rank test). Internal consistency: Cronbach's alpha: 3–4 years 0.25, 5–6 years 0.59, 7–9 years 0.68. Pearson correlation coefficient: correlation between items in 7–9 years ( $r = 0.36$ – $-0.56$ ) and 5–6 years ( $r = 0.26$ – $0.55$ ), no correlation in 3–4 years ( $r = -0.01$ – $0.30$ ).

Table 2, continued

Author, year, country	Aim of the study	Participants and setting	Method	Data collection	Outcome measures	Results related to Talking Mats
Reitz and Dalemans, 2016, the Netherlands [36]	Observe the effect of Talking Mats on shared decisions in communication with AD; assess if Talking Mats affects the use of language by people with AD in conversation; get insight in the usability of the Dutch version of Talking Mats for persons with AD and their relatives	$n = 6$ couples of persons with AD and their family member; nursing home and dementia self-help group	Cross-over design, quantitative and qualitative	OPTION Scale, communication difficulties scale, interviews	Shared decisions, language used, usability	Shared decisions: shared decisions significantly increased. Significant difference between baseline measurement/measurement one and second measurement with Talking Mats, group 1: ( $t(2) = -4.618$ $p < 0.044$ ); group 2: ( $t(2) = -40.159$ $p < 0.001$ ). Group 3 with dropout resulted in no significant difference between the measurement with and without Talking Mats ( $F(1) = 6.925$ $p < 0.91$ ). Use of language: there was no significant difference between the conversations with and without Talking Mats on use of language. No overall improvement was observed, only individual differences. Qualitative data: positive experiences related to: easy to use, pictograms have positive effect, know more about the thought of each other, making decisions. Two participants were not sure about the effect of Talking Mats.

The studies are presented in alphabetical order. The information is presented as found in the articles. AD: Alzheimer's Disease; SD: standard deviation;  $p$ : probability;  $F$ : degrees of freedom; n.s.: not significant; EFFC: effectiveness framework of functional communication, HD: Huntington disease; ICF: International Classification of Functioning Disability and Health (WHO, 2012); SLP: speech and language pathology; STAI: Short State-Trait Anxiety Inventory; MCM: main communication methods. UK: United Kingdom; SE: Sweden; SA: South Africa.

Table 3  
A review of quality elements included in the qualitative studies

Article →	Cameron and Murphy, 2002	Germain, 2004	Hallberg et al., 2013	Murphy and Oliver, 2013	Murphy et al., 2005	Ferm et al., 2010	Reitz and Dalemans, 2016
Quality elements ↓							
Clear statement of the aims of the research	x	X	x	x	x	x	x
Qualitative methodology appropriate	x	x	x	x	x	x	x
Research design appropriate to address the aims of the research	-	-	x	-	-	x	x
Appropriate recruitment strategy to the aims of the research	x	x	x	x	x	?	x
Data collected in a way that addressed the research issue	-	-	x	-	-	x	x
Relationship between researcher and participants considered	-	-	-	-	-	x	x
Consideration of ethical issues	x	x	x	x	-	x	x
Data analysis clearly described	-	-	-	-	-	-	x
Clear statement of findings	x	x	x	x	x	x	x

The CASP tool for qualitative studies has been used to appraise the qualitative or mixed-methods studies. The Hallberg (2013) study used mixed methods, so this study has been appraised in this table and in Table 4. The symbol "x" indicates that this aspect is described in the publication, the symbol "-" indicates that this aspect is not described or not included in the study.

Table 4  
A review of quality elements included in the quantitative studies

Article → Quality elements↓	Ferm et al., 2010	Murphy, 2000	Murphy and Cameron, 2008	Murphy et al., 2010	Murphy and Oliver, 2013	Hallberg et al., 2013	Harty et al., 2011	Nilsson et al., 2012	Reitz and Dalemans, 2016
<b>Design features</b>									
Hypothesis/study aim made explicit	x	x	x	x	x	x	x	x	x
Type of study made clear	x	-	-	-	-	-	x	x	x
In/exclusion criteria made explicit	x	x	x	x	x	x	x	x	x
Specifies population	x	x	x	x	x	x	x	x	x
Outcomes and other variables described	x	x	x	x	x	x	x	x	x
Sample size justified	-	-	-	-	-	-	-	x	x
<b>Study conduct</b>									
Response rate (completers described)	x	x	x	x	x	x	x	x	x
Participants representative of population (no convenience sampling)	-	-	-	-	-	-	-	-	-
Statistical analysis described	x	x	x	x	x	x	x	x	x
<b>Results</b>									
Participants characteristics described	x	x	x	-	x	x	x	x	x
Numerical description of outcomes given	x	x	x	x	x	x	x	x	x

The CASP tool for RCT's has been used to appraise the quantitative studies which included a trial. The symbol "x" indicates that this aspect is described in the publication, the symbol "-" indicates that this aspect is not described or not included in the study.

### 3.2.1. *Facilitating communication*

Ten publications reported on facilitating communication. They all reported results in favour of using Talking Mats. Six of these studies used quantitative variables (based on observations) clustered in coding frameworks [1,2,5,7,10,11]. These six studies used three slightly different coding frameworks (see Box 1). Some of the elements of the coding frameworks were: participants' understanding of the topic of discussion, participants' engagement with each other, participants' confidence, and researcher's understanding of persons' views [7]. The results show that the scores on these coding frameworks were higher when using Talking Mats (compared to usual conversation, structured conversation, or unstructured conversation) for young people with a learning disability, [2,5] people with aphasia, [1,7] and people with Huntington's disease [10,11].

**Box 1. Details about the coding frameworks**

The first coding framework that Cameron and Murphy used in their 2000 and 2002 studies included the following concepts: participants' understanding of topics, participants' confidence in manipulating symbols, confirmation of the researchers' interpretation, and satisfaction about each completed mat [1,2].

The results of the 2000 study showed that the scores on the coding framework were higher when using Talking Mats compared to usual communication methods for people with aphasia [1]. The study by Cameron and colleagues reported the use of the coding framework, but reported no quantitative results on this framework [2].

In Murphy and Cameron's 2008 study, they adjusted the coding framework by adding the concept of engagement, and changed "confirmation of the researchers' interpretation" to "interviewer's understanding of participant's views". This study, with people with a learning disability, found higher scores on the coding framework when using Talking Mats compared to using usual communication methods [5].

These coding frameworks were further developed into a third coding framework, the effectiveness framework of functional communication. This framework contained the following concepts: participants' understanding of the topic of discussion; participants' engagement with each other; participants' confidence; and researcher's understanding of the person's views. In studies of people with dementia, [7] and people with Huntington's disease [10,11] the researchers reported that the scores on the effectiveness framework were higher when using Talking Mats than those for usual communication.

Within the objective of facilitating communication, the use of Talking Mats was also studied with regard to more technical aspects of communication, based on researcher observations [5,7,10,36]. Three studies focussing on these technical aspects reported positive results when using Talking Mats on the duration of the conversation, the number of topics, task behaviour, and perseveration. These results were identified for people with learning disabilities, dementia, and Huntington's disease. One study focussing on the use of language by people with dementia did not find a difference when using Talking Mats. The details of the results are as follows:

- Duration of conversation: In studies of people with dementia, Huntington's disease and learning disabilities, the conversation lasted longer when using Talking Mats compared to an unstructured or usual conversation [5,7,10]. For example, in the study of people with Huntington's disease, the conversations with Talking Mats had a mean duration of 28.31 min, compared to 3.67 min for an unstructured conversation, and 15.19 min for a structured conversation [10].
- Number of topics: Significantly more topics were discussed in conversations with Talking Mats than in usual communication, as was observed in a study of persons with a learning disability [5].
- On-task behaviour (engagement of the participant with the conversation): A study of people with a learning disability reported more on-task behaviour when using Talking Mats than with usual communication [5]. In a study of people with dementia, significantly more on-task behaviour was observed by people with moderate and late-stage dementia, compared to a structured conversation. By contrast, the on-task behaviour was not significantly greater among people with moderate dementia, when compared to an unstructured conversation [7].
- Perseveration: In a study of people with dementia, less perseveration of the persons with dementia was observed when using Talking Mats compared to structured and unstructured conversations [7].
- Use of language: In conversations between people with Alzheimer's disease and their family members, the use of language did not differ significantly between conversations with and without Talking Mats. The use of language was studied by observing seven typical language aspects of persons with Alzheimer's disease [36].

The study by Hallberg and colleagues was a mixed-methods study, and reported some qualitative results when using Talking Mats in a discussion group. The people with Huntington's disease described favourable experiences with regard to ease of use, remembering, talking, and controlling the discussion. Two participants had difficulty handling the photos. The discussion leader described that Talking Mats had helped to stay on topic. However, the Talking Mats discussion was experienced as less spontaneous, more time-consuming, and needing more preparation than the discussion without Talking Mats. The discussion without Talking Mats was experienced as more self-sustaining, more natural, and less controlled [11].

### 3.2.2. *Facilitating involvement*

Two studies reported results about the objective of facilitating involvement. These studies on involvement showed positive results of using Talking Mats for people with dementia. In the study by Murphy and Oliver [22] the “participant involvement questionnaire” was used to explore the influence of using Talking Mats. The results showed that persons with dementia and their communication partners reported more feelings of involvement when using Talking Mats compared to usual communication. Communication partners also felt significantly more satisfied with the discussion using Talking Mats [22]. The study by Reitz and Dalemans focussed on shared decisions between people with Alzheimer’s disease and their family members. They reported that the scores on the OPTION scale were significantly higher when using Talking Mats, compared to conversations without Talking Mats [36]. This study also reported positive experiences related to ease of use, finding out more about the conversation partners’ thoughts, and making decisions. Two of the six participants were not sure about the effect of Talking Mats [36].

### 3.2.3. *Functional use of Talking Mats*

Three studies reported results about functional objectives. These studies focussed on activity choices, goal setting and diagnostic processes, and reported descriptive results on the use of Talking Mats. One publication studied the influence of repeatedly using Talking Mats on making activity choices. In this study of young people with learning disabilities, Talking Mats was used twice to elicit views about photographed activities, and 92% of the photographs were placed on the same Talking Mats symbol on the second occasion [38]. Regarding the objective of goal setting, a study used Talking Mats to investigate both clients’ and their assigned rehabilitation professionals’ perceptions of the importance of ICF activities and participation domains for inclusion in their rehabilitation programme. The results showed that there were no statistically significant differences in ratings of the importance of ICF domains between patients and professionals when using Talking Mats [37]. One study focussed on using Talking Mats in a diagnostic process [41], and included an initial validation with Talking Mats as part of the measurement instrument. The results showed that children older than seven years were able to use a modified anxiety instrument (to measure anxiety before surgery) with the help of Talking Mats [41].

To conclude, almost all studies using quantitative measurements reported positive outcomes when using Talking Mats, compared to conversations without Talking Mats, though the Dalemans study reported no difference in language use. No studies reported negative outcomes when using Talking Mats. Several functional objectives identified in Part 1 have not been studied in scientific research, namely supporting the participation of people in research and projects, improving social processes, and resolving conflicts and differences of opinions. Furthermore, none of the studies in Part 2 examined the skills required to use Talking Mats as reported in Part 1.

## 4. Discussion

This scoping review included 73 publications about Talking Mats in Part 1, and 12 publications describing the empirical scientific knowledge about Talking Mats in Part 2. The results reported in Part 1 highlight the use of Talking Mats for a variety of objectives in different settings and for people with different communication difficulties, such as learning disabilities, dementia and Huntington's disease, older people who are frail, and children with and without communication impairments. The studies discussed in Part 2, mainly descriptive, cross-over and case studies, highlight important empirical findings with regard to the use of Talking Mats. These empirical studies reported that Talking Mats could have a positive influence on technical communication aspects, facilitating communication, and involvement in communication and decision making. However, the included studies were small-scale, mainly descriptive studies with a limited amount of research per target group.

### 4.1. Using Talking Mats for specific target groups

Part 1 of this review reveals that the strength of Talking Mats is its flexibility and use for different target groups. The use of AAC tools is often limited to a specific target group, with specific physical or cognitive capabilities and/or limitations, requiring person-centred consultation from speech-language pathologists or occupational therapists. The literature does not show whether advice from such specialists is needed for Talking Mats. The question is whether Talking Mats could be used as a standard framework for visualising conversations by communication vulnerable people in healthcare. Although most of the research findings were positive, Bunning et al. [48] warn that the value of Talking Mats can depend on the individual participants' communicative ability. There is a lack of empirical evidence about the requirements or skills that people should have in order to use Talking Mats. Available information about these requirements seems to come from researchers' insights and experiences (Part 1), rather than from scientific research (Part 2). Research into these requirements could help professionals determine for which people they can use Talking Mats.

### 4.2. Objectives of Talking Mats

The objectives identified in Part 1 were only partly evaluated in the empirical studies in Part 2. For example, the outcome measures in Part 2 focussed mainly on technical aspects and not on expression and thinking and understanding. The only element of the effectiveness framework which links to this was "participants' understanding of the topic of discussion". However, this element was only observed, and the persons who were communication vulnerable were not asked about this. The second objective, *facilitating involvement*, has been used as an outcome measure in only two studies in Part 2 [22,36]. With regard to the functional use of Talking Mats, only one study in Part 2 reported on the validity of using Talking Mats (with another questionnaire) in a diagnostic process [41]. None of the studies in Part 2 measured the outcomes of using Talking Mats in research or projects, or for the purpose of improving social processes and discussing conflicts & differences of opinions. More research is needed with regard to the objectives of Talking Mats, specifically focussing on user experiences.

#### 4.3. *Partner-assisted AAC*

Several publications in Part 1 emphasised that Talking Mats is a partner-assisted communication framework. The person who is communication vulnerable may not have enough influence on the options (subtopics) that are discussed. Also, some persons might be confused about what the available symbols are supposed to represent. These issues may interfere with the reliability and trustworthiness of Talking Mats, and are important issues for professionals to be aware of. To enhance the reliability and trustworthiness, the same communication partner could repeat the interview, or other persons could be asked to validate the information [49]. When communicating with persons with severe cognitive disabilities, the communication partner should, in addition to using Talking Mats, use other communication strategies, such as adjusting the pace of the conversation, paraphrasing, and reading non-verbal behaviour. Professionals and other communication partners should be aware of their own communication skills and how these impact on the use of Talking Mats. Talking Mats Limited organisation recommends attending a training course in the use of Talking Mats. The literature does not describe in detail how people have been taught to use Talking Mats. In some articles the communication partner received formal training or instructions [11,36,50], while in others, the communication partners were researchers with experience using Talking Mats [10]. The research in Part 2 did not consider the influence of the partners when using AAC. Future studies should incorporate this in their research about Talking Mats.

#### 4.4. *Empirical evidence of Talking Mats*

Part 2 of this scoping review reveals that most of the evidence about Talking Mats points to positive results. Except for the Hallberg study [11], these studies report no limitations of Talking Mats. In the Hallberg study, the discussion group leader thought that discussions without Talking Mats were more self-sustaining, felt more natural and less controlled, and that Talking Mats was time-consuming in use and in preparation [11]. The results of Part 2 confirm that people with an intellectual disability, dementia, or Huntington's disease did take longer to express themselves when using Talking Mats in a conversation than they did in unstructured conversations [5,7,10]. According to Ferm and colleagues [10], visually supported communication may take longer because communication partners use fewer words, focus on important information, and speak more slowly. This slower pace could be seen as a disadvantage, since time in healthcare is expensive and limited. However, it can also be viewed as a benefit, as it enabled people who have difficulties communicating to interact with others for significantly longer periods of time [5]. Moreover, persons who are communication vulnerable often benefit from slower communication [10]. This scoping review does not provide insights into the elements of Talking Mats that account for the positive findings. Talking Mats could be compared with other AAC tools aiming at visualisation, such as graphic topic setters, communication boards, pictographic books or picture pointing boards [51]. Both quantitative research using validated observation lists and qualitative research focussing on the experiences of communication vulnerable people would provide valuable information on the effective elements of Talking Mats. Information is also needed about effective implementation strategies for using Talking Mats in daily life/practice for communication vulnerable people.

Part 2 of this review included disparate studies about Talking Mats. The qualitative studies often lacked an in-depth analysis of the experiences of persons using Talking Mats. The included quantitative publications were descriptive or pilot studies, using different outcome measures. Some empirical studies in this review reported to have investigated the effects of Talking Mats using the “effectiveness framework of functional communication” [7,10]. However, no data about the content or construct validity of this framework were provided, which makes it difficult for professionals and researchers to assess the validity of this framework.

Talking Mats was developed in the UK, and we saw that almost all research about Talking Mats has also been done in the UK. Much of this research has been supported by Talking Mats Limited and has been published by the same authors. There is a need for research done by other research groups and in other countries.

#### *4.5. Strengths and limitations*

Strengths of this review include the use of the well-established Arksey and O’Malley framework [23] to systematically conduct the scoping review, and the use of both scientific databases and an open search in Google. However, despite the rigorous search process, relevant publications could have been missed, particularly in the grey literature. Furthermore, the overview of the countries in which Talking Mats was used might not be complete, since some data sources did not specifically report where the study was performed. Describing the methodological quality of studies in this scoping review was a challenge, since all types of study design were included. We used two rather generic lists to get some idea of the quality, but we did not perform a thorough quality assessment using design-specific criteria lists. However, our global assessment was enough to get an overview of the empirical scientific knowledge, which was the aim of this study.

#### *4.6. Conclusion*

Talking Mats can be used to support communication and involvement and for functional objectives during the healthcare process. The empirical studies showed that Talking Mats had a positive influence on several communication aspects and involvement in conversations for people with aphasia, learning disabilities, dementia and Huntington’s disease. This supports the use of Talking Mats in conversations between communication vulnerable people and professionals or caregivers. However, the body of scientific knowledge about Talking Mats is limited, due to the designs of the studies and the limited number of studies per target group. Establishing evidence-based recommendations for using Talking Mats in daily practice requires more scientific knowledge. The focus for future research should be on rigorous research involving in-depth qualitative user-reported research, feasibility of Talking Mats, criteria for using Talking Mats, and effectiveness of Talking Mats.

### **Acknowledgments**

This study was supported in part by grants from Zuyd University of Applied Sciences, Heerlen, the Netherlands.

### **Conflict of interest**

The authors report no conflicts of interest.

## References

- [1] Murphy J. Enabling people with aphasia to discuss quality of life. *BJTR*. 2000; 7(11): 454-7.
- [2] Cameron L, Murphy J. Enabling young people with a learning disability to make choices at a time of transition. *Br J Learn Disabil*. 2002; 30: 105-12.
- [3] Wynia MK. Making it easier to do the right thing: a modern communication QI agenda. *Patient Educ Couns*. 2012; 88(3): 364-6.
- [4] Jesus TS, Silva IL. Toward an evidence-based patient-provider communication in rehabilitation: Linking communication elements to better rehabilitation outcomes. *Clin Rehabil*. 2015.
- [5] Murphy J, Cameron L. The effectiveness of Talking Mats for people with intellectual disability. *Br J Learn Disabil*. 2008; 36: 232-41.
- [6] Watson J, Cameron L, Murphy J. Don't just make the font bigger. *Learning Disability Practice*. 2003; 6(7): 20-3.
- [7] Murphy J, Gray CM, Cox S, van Achterberg T, Wyke S. The effectiveness of the Talking Mats Framework in helping people with dementia to express their views on well-being. *Dementia*. 2010; 9(4): 454-72.
- [8] Blackstone S. Augmentative communication news. *Augmentative Communication*. 2009; 21(2): 1-5.
- [9] Costello JM, Patak L, Pritchard J. Communication vulnerable patients in the pediatric ICU: Enhancing care through augmentative and alternative communication. *J Pediatr Rehabil Med*. 2010; 3(4): 289-301.
- [10] Ferm U, Sahlin A, Sundin L, Hartelius L. Using Talking Mats to support communication in persons with Huntington's Disease. *Int J Lang Commun Disord*. 2010; 45(5): 523-36.
- [11] Hallberg L, Mellgren E, Harelus L, Ferm U. Talking Mats in a discussion group for people with huntington's disease. *Disabil Rehabil Assist Technol*. 2013; 8(1): 67-76.
- [12] Stans SE, Dalemans R, de Witte L, Beurskens A. Challenges in the communication between 'communication vulnerable' people and their social environment: An exploratory qualitative study. *Patient Educ Couns*. 2013; 92(3): 302-12.
- [13] Clarke M, Bloch S. AAC practices in everyday interaction. *Augment Altern Commun*. 2013; 29(1): 1-2.
- [14] Bell D, Cameron L. From Dare I say. . .? to I dare say: a case example illustrating the extension of the use of Talking Mats to people with learning disabilities who are able to speak but unwilling to do so. *Br J Learn Disabil*. 2007; 36: 122-7.
- [15] Cox S, Murphy J, Gray CM. Communication and dementia: how effective is the Talking Mats approach? *Journal of Dementia Care*. 2008; May/June: 35-8.
- [16] Murphy J, Boa S. Using the WHO-ICF with Talking Mats as a goal setting tool. *Augment Altern Commun*. 2012; 28(1): 52-60.
- [17] Macer J, Fox P. Using a communication tool to help clients express their health concerns. *Learning Disability Practice*. 2010; 9(1).
- [18] Murphy J, Gray CM, Cox S. Communication and Dementia: Talking Mats – Helping People with Dementia to Express their Views. Full Report Joseph Rowntree Foundation 2007.
- [19] Brewster SJ. Putting words into their mouths? Interviewing people with learning disabilities and little/no speech. *Br J Learn Disabil*. 2004; 32(4): 166-9.
- [20] Whitehurst T. Liberating silent voices-perspectives of children with profound & complex learning needs on inclusion. *Br J Learn Disabil*. 2006; (35): 55-61.
- [21] Ferm U, Eckerholm W, Gelfgren E, Hartelius L. Communication between Huntington's disease patients, their support persons and the dental hygienist using talking mats. *Huntington disease-Core Concept and Current Advances Intech*. 2012.

- [22] Murphy J, Oliver T. The use of Talking Mats to support people with dementia and their carers to make decisions together. *Health Social Care Community*. 2013; 21(2): 171-80.
- [23] Arksey H, O'Malley L. Scoping studies: Towards a Methodological Framework. *Int J Social Research Methodology*. 2005; 8(1): 19-32.
- [24] Levac D, Colquhoun H, O'Brien KK. Scoping studies: advancing the methodology. *Implement Sci*. 2010; 5: 69.
- [25] TalkingMats. Talking Mats 2016 Available from: <http://www.talkingmats.com/index.php/our-publications>.
- [26] Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. *Qual Health Res*. 2005; 15(9): 1277-88.
- [27] Bastawrous M, Gignac MA, Kapral MK, Cameron JI. Factors that contribute to adult children caregivers' well-being: a scoping review. *Health Soc Care Community*. 2015; 23(5): 449-66.
- [28] CASP checklists: CASP; 2013. Available from: <http://www.casp-uk.net/#!/casp-tools-checklists/c18f8>.
- [29] Murphy J. Talking Mats: speech and language research in practice. *Speech & Language Therapy in Practice*. 1998; 11-4.
- [30] Murphy J, Gray CM, Cox S. Using talking mats to help people with dementia to communicate. Report Joseph Rowntree Foundation; 2007.
- [31] Wright K. Researching the views of pupils with multiple and complex needs. Is it worth doing and whose interests are served by it? *Support for Learning*. 2008; 23(1): 32-40.
- [32] Murphy J, Cameron L. Talking Mats: A Resource to Enhance Communication. Stirling. PUo, editor2005.
- [33] Bornman J, Murphy J. Using the ICF in goal setting: clinical application using Talking Mats. *Disabil Rehabil Assist Technol*. 2006; 1(3): 145-54.
- [34] Murphy J, Oliver T, Cox S. Talking mats help involve people with dementia and their carers in decision making, Findings. Joseph Rowntree Foundation; 2010.
- [35] Murphy J. Perceptions of communication between people with communication disability and general practice staff. *Health Expectations*. 2006; (9); 1-12.
- [36] Reitz C, Ruth D. The use of 'Talking Mats' by persons with alzheimer in the Netherlands: increasing shared decision-making by using a low tech communication aid. *Journal of Social Inclusion*. 2016; 7(2): 36-47.
- [37] Harty M, Griesel M, van der Merwe A. The ICF as a common language for rehabilitation goal-setting: comparing client and professional priorities. *Health and Quality of Life Outcomes*. 2011; 9(87).
- [38] Germain R. An exploratory study using cameras and talking mats to access the views of young people with disabilities on their out-of-school activities. *Br J Learn Disabil*. 2004; 32: 170-4.
- [39] Bunning K, Steel G. Self-concept in young adults with a learning disability from the Jewish community. *Br J Learn Disabil*. 2007; 35(1): 43-9.
- [40] Murphy J, Cameron L. The acute hospital experience for adults with complex communication needs. *Communication Matters*. 2006; 20(2): 7-11.
- [41] Nilsson S, Buchholz M, Thunberg G. Assessing children's anxiety using the modified short state-trait anxiety inventory and talking mats: a pilot study. *Nurs Res Pract*. 2012.
- [42] Cameron L, Murphy J. Views of young adults at the time of transition. *Communication Matters*. 2001; 15(1): 31-2.
- [43] Murphy J, McCallan S, Aitken J. Helping People make decisions about PEG feeding. *RCSLT Bulletin*. 2003; (618); 10-1.
- [44] Sclera pictograms Available from: [www.sclera.be](http://www.sclera.be).
- [45] Boa S, MacFadyen L. Goal Setting for People with Communication Difficulties. *Communication Matters*. 2003; 17(3): 31- 3.

- [46] World Health Organization, ICF [home page on the internet]. Available from: <http://www.who.int/classifications/icf/en/>.
- [47] Murphy J. Talking Mats: A study of communication difficulties and the feasibility and effectiveness of a low-tech communication framework (PhD Thesis) Discussion: University of Stirling; 2009.
- [48] Bunning K, Heath B, Minnion A. Communication and Empowerment: A Place for Rich and Multiple Media? *J Appl Res Intellect Disabil*. 2009; 22(4): 370-9.
- [49] Murphy J. Talking Mats: A study of communication difficulties and the feasibility and effectiveness of a low-tech communication framework (PhD Thesis) Introduction: University of Stirling; 2009.
- [50] Murphy J, Strachan Y. Talking mats: extending the reach into goal setting practices for health and social care staff in Edinburgh. 2011. Available from: <https://www.talkingmats.com/wp-content/uploads/2013/09/TM-and-goal-setting-in-Edinburgh-final-report-2011.pdf>.
- [51] Stans SE, Dalemans RJ, de Witte LP, Smeets HW, Beurskens AJ. The role of the physical environment in conversations between people who are communication vulnerable and healthcare professionals: a scoping review. *Disabil Rehabil*. 2016; 1-12.
- [52] Beringer A, Tönsing K, Bornman J. The self-determined and partner-predicted topic preferences of adults with aphasia. *Aphasiology*. 2013; 27(2): 227-51.
- [53] Buchholz M, Ferm U, Holmgren K. Including persons with complex communication needs in research – a structured methodology based on Talking Mats. Isaac Conference Toronto, 2016.
- [54] Dinwoody D, Macer J. Talking Mats for literacy target setting. *LITERACY Today*. 2010; March: 15-6.
- [55] Gillespie A, Murphy J, Place M. Divergences of Perspective Between People With Aphasia and their Family Caregivers. *Aphasiology*. 2010; 24(12): 1559-75.
- [56] Murphy J. Helping people with severe communication difficulties to express their views: a low tech tool. *Communication Matters Journal*. 1998; 12(2): 9-11.
- [57] Murphy J. A focus on social issues: a response to Baladin. *Advances in speech-language pathology*. 2002; 4(2): 123-7.
- [58] Murphy J, Place M, Gillespie A. Using Talking Mats to see each other's point of view. *Speech and Language Therapy Bulletin*. 2012 June; 20-1.
- [59] Pettit LK, Tonsing KM, Dada S. The perspectives of adults with aphasia and their team members regarding the importance of nine life areas for rehabilitation: a pilot investigation. *Top Stroke Rehabil*. 2017; 24(2): 99-106.
- [60] Bell D, Cameron L. The assessment of the sexual knowledge of a severe learning disability and a severe communication disorder. *Br J Learn Disabil*. 2003; 31: 123-9.
- [61] Bell D, Turnbull A, Bruce K. Differential diagnosis of dementia in the field of learning disabilities: a case study. *Br J Learn Disabil*. 2009; 37(1): 56-65.
- [62] Brown L, Dendy M, Murphy J. Respite Review: Obtaining the Views of the Users. *Communication Matters Journal*. 2000; 14(2): 25-6.
- [63] Bunning K, Alder R, Proudman L, Wyborn H. Co-production and pilot of a structured interview using Talking Mats R to survey the television viewing habits and preferences of adults and young people with learning disabilities. *Br J Learn Disabil*. 2017; 45(1): 1-11.
- [64] Cameron L, Boa S. Advocating partnership. *Speech and Language Therapy in Practice* 2009; Spring: 8-10.
- [65] Cameron L, Murphy J. Obtaining consent to participate in research: the issues involved in including people with a range of learning and communication disabilities. *Br J Learn Disabil*. 2006; 35: 113-20.
- [66] Cameron L, Watson J, Murphy J. Talking Mats: A focus group tool for people with learning disability. *Communication Matters*. 2004; 18(1): 33-5.

- [67] Mitchell W. 'I know how I feel': Listening to Young people with life-limiting conditions who have learning and communication impairments. *Qual Soc Work*. 2010; 9(2): 185-203.
- [68] Small N, Raghavan R, Pawson N. An ecological approach to seeking and utilising the views of young people with intellectual disabilities in transition planning. *J Intellect Disabil*. 2013; 17(4): 283-300.
- [69] Hubbard G, Downs M, Tester S. Including older people with dementia in research: challenges and strategies. *Aging and Mental Health*. 2003; 7(5): 351-62.
- [70] Macer J, Murphy J. Training care home staff to use talking mats with people who have dementia. 2009. Available from: <http://ebookbrowsecom/jrfresearchtraining-in-use-of-talking-mats-summary-pdf-d174918238>.
- [71] Macer J. Talking Mats: training for care home staff. *Journal of Dementia Care*. 2011; 19(1): 37-9.
- [72] Murphy J. Talking Mats and Families Living with Dementia. *Communication Matters*. 2014; 28(3): 23-5.
- [73] Murphy J, Oliver T, Cox S. Talking Mats and involvement in decision making for people with dementia and family carers. 2012.
- [74] Murphy J, Tester S, Hubbard G, Downs M, McDonald C. Enabling Frail Older People with a Communication Difficulty to Express their Views: the use of Talking Mats™ as an interview tool. *Health and Social Care in the Community*. 2005; 13(2): 95-107.
- [75] Tester S, Hubbard G, Downs M, MacDonald C, Murphy J. Exploring perceptions of quality of life of frail older people during and after their transition to institutional care. *Research Findings* 24; 2003.
- [76] Borg S, Agius M, Agius L. A user and their family's perspective of the use of a low-tech vs a high-tech AAC system. *Stud Health Technol Inform*. 2015; 217: 811-8.
- [77] Hooton J, Westaway A. The voice of the child with Down syndrome. *Down Syndrome Research and Practice*. 2008; 12(3): 25-9.
- [78] Midtlin HS, Naess KA, Taxt T, Karlsen AV. What communication strategies do AAC users want their communication partners to use? A preliminary study. *Disabil Rehabil*. 2015; 37(14): 1260-7.
- [79] Turner L. Case study: empowering vulnerable children and their parents using Talking Mats.
- [80] Material training course Talking Mats. Talking Mats Ltd; 2012.
- [81] Boa S. You will know when it feels right' *Speech and Language Therapy in Practice*. 2005; Autumn: 27-8.
- [82] Barrie K, Miller E. Talking Points-A personal outcomes approach: using talking mats. Joint improvement team. 2010; Available from: <http://www.jitscotland.org.uk/action-areas/talking-points-user-and-carer-involvement/communication-skills/>.
- [83] Boardman L, Crichton C, Butterworth S. When you can't talk about it. *Probation Journal*. 2016; 63(1): 72-9.
- [84] Glendinning C, Mitchell W, Brooks J. Ambiguity in practice? Carers' roles in personalised social care in England. *Health Soc Care Community*. 2015; 23(1): 23-32.
- [85] Gridley K, Brooks J, Glendinning C. Good practice in social care: the views of people with severe and complex needs and those who support them. *Health Soc Care Community*. 2014; 22(6): 588-97.
- [86] Ferm U, Bloch S, Saldert C. Negotiating disagreement in picture symbol supported decision making. *Journal of Interactional Research in Communication Disorders*. 2015; 6(2): 131-56.
- [87] Murphy J. Enabling People with Motor Neurone Disease to Discuss their Quality of Life. *Communication Matters Journal*. 1999; 13(2): 2-6.

- [88] Murphy J, Boa S. Presentation: using the WHO ICF with talking mats as a goal setting tool. Talking Mats Limited, Scotland; 2012.
- [89] Murphy J, Cameron L. Communication disability and crime. Talking Mats research and development centre.
- [90] Murphy J, Mackay M. Will anyone listen to us? What matters to young people with complex and exceptional health needs and their families during health transitions; 2015.