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Identifying important behavioural change techniques to deliver in communication partner training for people with cognitive-communication disorder following acquired brain injury: A national e-Delphi of UK speech and language therapists

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All relevant data are within the manuscript and its supporting information files

Ethical approval and informed consent statements

Ethical approval was granted by City St George's, University of London's Language and Communication Science Proportionate Review Ethics Committee (ETH2324-2572).

ABSTRACT

OBJECTIVE: To establish consensus regarding the behaviour change techniques considered most important when delivering communication partner training to people with acquired brain injury and their communication partners.

DESIGN: Three-round e-Delphi. Participants rated 86 behaviour change techniques linked to 16 mechanisms-of-action using a 9-point Likert scale. Consensus for techniques was defined as >70% agreement. Data were analysed using descriptive statistics, latent content and sentiment analysis.

SETTING: UK clinical practice in acquired brain injury rehabilitation

PARTICIPANTS: Speech and language therapists working with people with acquired brain injury.

RESULTS: A total of 118 speech and language therapists participated in round 1, 90 participated in each of rounds 2 and 3, and 81 completed all three rounds. Consensus was reached on 80 behaviour change technique-to-mechanism of action links, representing 47 distinct techniques. Ratings did not differ by years' experience or clinical setting. Most agreement (>90%) linked to setting goals, practising skills and goal feedback. Qualitative

comments were largely positive (67%), especially for goal setting and skills practice.

Therapist reservations focused on material and monetary rewards, while therapist comments on feedback techniques, underlined a need for individualised and tailored training.

CONCLUSIONS: This is the first UK e-Delphi of speech and language therapists in acquired brain injury. Behaviour change theory provided a framework to identify key techniques, highlighting the complexity of training. Analysis revealed diverse attitudes and areas for further consideration. Consensus on the importance of communication partner training techniques offers an opportunity to develop a clinically relevant programme with potential for uptake in clinical practice.

Keywords (up to 5 relevant keywords):

cognitive-communication; communication partner training; brain injury; e-Delphi; behaviour change

Clinical messages:

- Behaviour change theory was useful for describing a complex behavioural intervention, communication partner training, which involves 47 different behaviour change techniques and 16 mechanisms of action.
- Communication partner training should be individualised to the dyad, including goal setting, practise of skills and feedback, and reflect the needs and values of the dyad.
- Speech and language therapists consistently endorsed goal setting, skills practice and feedback techniques across all three rounds.

- Speech and language therapists consistently expressed reservations about material and monetary rewards, including on ethical grounds, with clinical disagreement around self-comparison, and positive self-talk, in ways that were themselves informative.

INTRODUCTION

Cognitive-communication disorder is a common, persistent, and disabling consequence of acquired brain injury.^{1,2} Arising from impairments in attention, memory, and executive functioning,^{3,4} cognitive communication disorder disrupts communication across everyday contexts and can have significant negative psychosocial outcomes.⁵⁻⁹ Reported rates for the presence of cognitive-communication disorder range from around 30% to over 80%.¹⁰⁻¹⁴ These figures vary with injury type, severity, assessment method, and how cognitive communication disorder is defined.

Communicative success is shaped by the behaviour of communication partners including family members and friends.⁴ Communication partners can either facilitate or hinder interactions through the strategies they use.¹⁵⁻¹⁷ Despite this, in one study of 102 family members of people with traumatic brain injury, more than 60% reported dissatisfaction with the training, information, and support they receive for managing communication difficulties, with unmet needs persisting from the early months to many years post-injury.¹⁸

Communication partner training aims to improve communication outcomes by equipping communication partners with the knowledge, skills, and strategies needed to support effective interaction with individuals with acquired brain injury.^{4, 19, 20} Systematic reviews and meta-analyses demonstrate that communication partner training can improve communicative competence for both people with acquired brain injury and their

communication partners,^{19, 20} leading to its adoption in clinical guidelines.^{4, 21, 22} However, there is wide variability in the content, dosage, duration, and delivery methods of communication partner training programmes.^{19, 20, 23} Additionally, speech and language therapists face barriers such as limited time, staffing, resources and workplace support, which reduce their ability to provide communication partner training at the recommended intensity.²⁴

Communication partner training is a complex intervention, involving multiple interacting components, as it seeks to modify the communicative behaviours of communication partners to improve the interactions of people with cognitive communication disorder following a brain injury. Behaviour change theories seek to explain how and why behaviour changes, specifying the processes and conditions that influence whether a given behaviour is adopted or maintained. Applied to intervention, they offer a structured way to understand the active components of complex interventions, which may be described in terms of the *behaviour change techniques* (the observable and replicable component) used to influence behaviour²⁵ and the *mechanisms of action* through which these techniques influence change in behaviour.²⁶ This approach has been applied across a range of health-behaviour fields²⁷⁻²⁹ and, more recently, to communication partner training programmes for people with cognitive communication disorder.³⁰ Importantly, these programmes were developed by research teams and expert panels, with limited input from the wider clinical workforce responsible for delivering them.

Therefore, the aim of the present study was to establish consensus among speech and language therapists regarding the behaviour change techniques considered most important when delivering communication partner training to people with cognitive communication disorders following acquired brain injury and their communication partners.

METHODS

Study design

This study comprised a consensus exercise using a Delphi approach, which is a method used to gauge consensus around topics in health sciences.³¹⁻³³ Delphi studies capture opinions and experiences from expert participants iteratively across several rounds using consensus building processes, where the content presented in subsequent rounds is informed by a summary of the group responses in the previous round.³⁴

For this study, a three-round electronic Delphi process (e-Delphi) was used to identify and prioritise behaviour change techniques perceived as important, between September 2024 and January 2025. We used a modified Delphi approach. Unlike a classical Delphi, the first round did not ask open questions.³² Content was instead pre-determined from preliminary work.^{30, 35} This design was informed by previous e-Delphi studies that used behaviour change theory to identify and prioritise behaviour change techniques.^{29, 36} Procedures for rounds and consensus were also informed by e-Delphi studies in speech and language therapy and related fields.^{37, 38} Questionnaires were available online for asynchronous completion within a predetermined timeframe. This process enabled the research team to expand their geographical reach and allowed for practising professionals to be flexible in when and how they completed the questionnaires.³⁷ Expert participants were invited to participate in each round via a Qualtrics link. Ethical approval was granted by City St George's, University of London's Language and Communication Science Proportionate Review Ethics Committee (ETH2324-2572). Study methods and results are reported following the Recommendations for Conducting and Reporting of Delphi Studies (CREDES)³⁴ and ACcurate CONsensus Reporting Document (ACCORD).³⁹

Design, process and planning – Preparatory planning

The overall e-Delphi process is illustrated in Figure 1. Preliminary work had coded three communication partner training programmes in acquired brain injury (i.e., *TBI Express*, *TBI Express-Adapted* and *TBIconneCT*) and identified 27 unique behaviour change techniques across 16 mechanisms of action.³⁰ As existing programmes may not incorporate all techniques capable of targeting these mechanisms, the theory and techniques tool^{26, 35} was used to identify any further techniques with conclusive links to the 16 mechanisms of action. This tool is a matrix, derived from literature synthesis and expert consensus, that classifies the links between behaviour change techniques and mechanisms of action as either conclusive, inconclusive, non-links or no evidence.³⁵ This was completed by two authors (NB and CM) and reviewed by a further two authors (IK and MC), all of whom have expertise in behaviour change theory and the theory and techniques tool. This led to the addition of 21 behaviour change techniques that, while absent from the three programmes, could be important for communication partner training. For the purposes of the e-Delphi we only considered relevant behaviour change techniques with conclusive links to a mechanism of action for inclusion. No other mechanisms of action were considered beyond those identified previously. A complete list of the behaviour change techniques, mechanisms of action, and how each was included is provided in Supplementary Material 1.

To ensure the mechanisms of action and behaviour change techniques were accessible to all participants, the labels, definitions and illustrative examples were adapted for speech and language therapists.³⁶ This was completed by the first two authors (NB and CM) with reference to existing training programmes and then reviewed by two further authors (IK and MC). Second, five professionals with experience in communication partner training and acquired brain injury (three speech and language therapists, one speech and language therapist with extensive experience in behaviour change theory, and one research academic)

provided feedback on the labels, definitions and examples of each mechanism of action and behaviour change technique. Minor changes were made to the labels and definitions, with detail added to the examples to make them more clinically relevant (see Supplementary Material 1). These professionals, if eligible, were able to take part in the e-Delphi. Core members of the research team (NB, CM, MC) reviewed the Qualtrics link and made minor changes to improve the layout, presentation, accessibility and user experience of the survey, guidance notes and instructions, including the insertion of a talking head video to provide background to the survey. No members of the research team completed the e-Delphi.

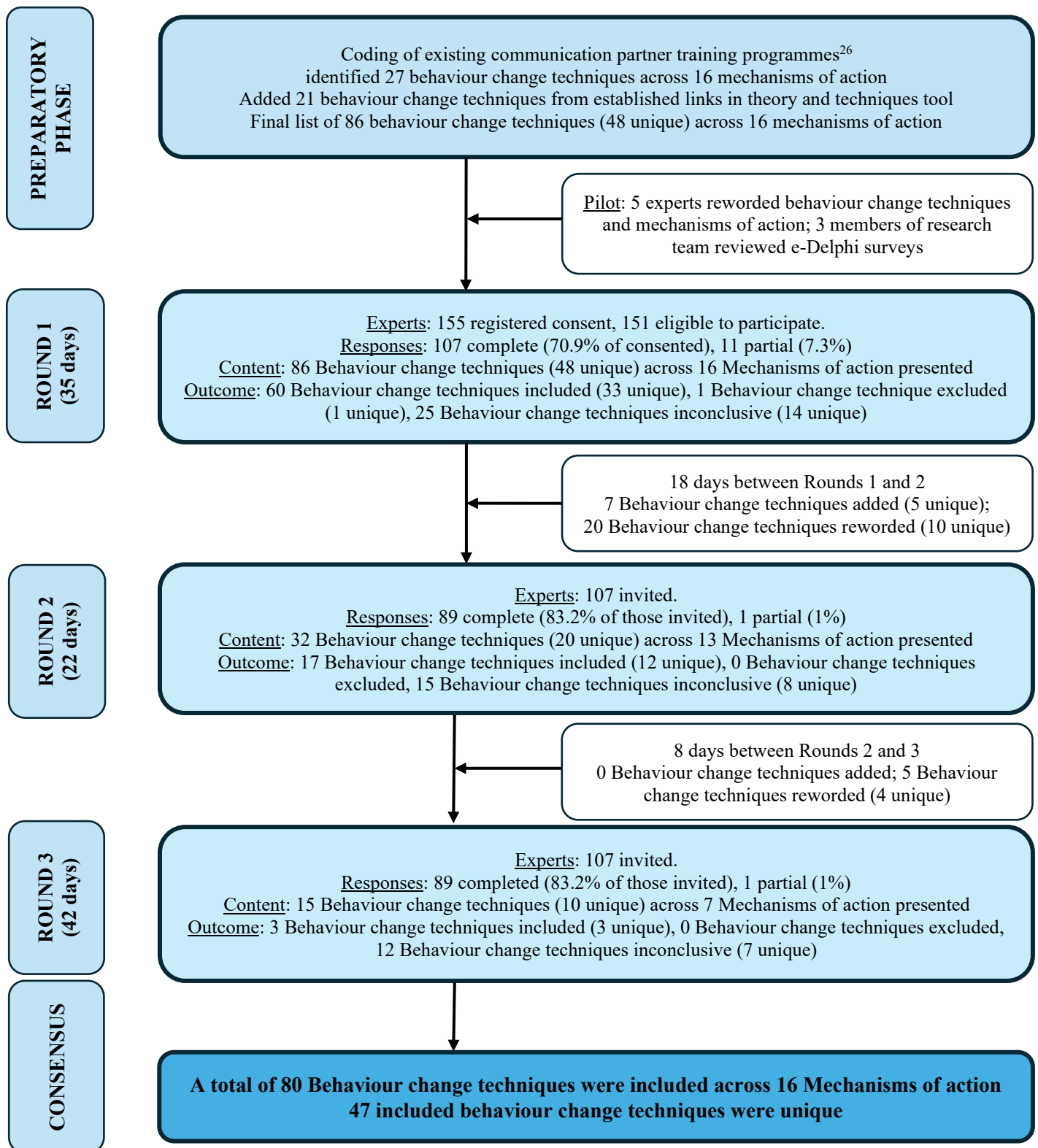


Figure 1. e-Delphi survey flowchart.

Selection of experts

Experts for this study were selected if they were a qualified speech and language therapist in the UK with at least two years' experience working in the national health service and in working with adults with acquired brain injury. They were required to self-report experience of delivering communication partner training with familiar communication partners within the past two years. Familiarity with the behaviour change technique taxonomy (v1) or behaviour change theory was not required. There is no agreed sample size for Delphi studies and panel size is not based on statistical power.^{32, 40} No formal target was therefore set a priori. Recruitment sought to maximise participation from eligible UK speech and language therapists across the three rounds.

An invitation email that included a short talking head video that described the e-Delphi process was sent to UK professional networks, clinical excellence groups. Administrators of these groups were then asked to forward the email to their mailing lists, using a snowballing method of distribution.⁴¹ Participants were also recruited through social media platforms, the study website and through conference mailing lists.

Procedure

To take part in the e-Delphi, participants were asked to click on a registration Qualtrics link embedded in the invitation email. This link contained the information sheet which described the purpose and procedure of the study and a link to the consent form. Participants could register from 11th September 2024 to 11th October 2024. Retention of participants through the rounds can be difficult⁴² so participants were offered the following as incentives to complete all three rounds: opportunity to attend an exclusive online webinar by experts in the field, be entered into a prize draw to win a £50 shopping voucher, receive a

certificate of participation, and opt in to have their contribution formally and publicly recognised on the study website.

155 consented and 151 were eligible to take part. The participant's identity was fully anonymised to each other³³ to protect against social influence and conforming to a dominant view.³⁴ The participant's identity was known only to the first and second author to monitor the progress of participants across the three rounds. This is a common practice in e-Delphi studies^{32, 38} and helps to send tailored reminders and communications to participate in rounds.^{38, 43}

Consented participants were sent an individualised Qualtrics link to complete the first round of the e-Delphi. Round 1 was open from 13th September 2024 to 11th October 2024 and extended to 17th October 2024 (35 days). The second round was open from 4th November 2024 to 21st November and extended to 25th November 2024 (22 days). The final and third round was open from 3rd December 2024 to 23rd December 2024 and extended to 13th January 2025 (42 days). Each participant was given no more than three email reminders via Qualtrics to complete each round. Those who did not complete the first round were not invited to complete the second and third round. However, if they completed the first but not the second round, they were still invited to complete the third round.

For each e-Delphi round, participants rated the importance of each behaviour change technique to bring about a change in each mechanism of action. Each mechanism of action was presented separately on an individual page, and participants were able to go “back” and change their responses if desired. To reduce bias, the order of mechanisms of action presented and behaviour change techniques within each mechanism of action was randomised. Ratings of behaviour change techniques were completed on a 9-point Likert scale [as per the RAND/UCLA method;³⁴] ranging from 1 (not important) to 9 (extremely important), see Supplementary Material 2 for an example. Open-text response boxes were

included to add any comments such as justification of their decision(s) or to suggest additional behaviour change techniques considered to be effective for the mechanism of action presented.

Definition and attainment of consensus

A predefined definition for consensus was provided to participants. Consensus was adapted from COMET recommendations⁴⁰ and defined as behaviour change techniques that were rated as highly important (i.e. score of 7-9) or of limited importance (i.e. score of 1-3) by >70% of participants.

Round 1

In Round 1 of the e-Delphi, participants were asked to rate the importance of 86 behaviour change techniques (linked to 16 mechanisms of action). These comprised 48 unique behaviour change techniques with 29 behaviour change techniques duplicated across several mechanisms of action. Those behaviour change techniques rated as important (i.e., score of 7-9) by >70% of participants were included and not rated in subsequent rounds. Behaviour change techniques rated as not important (i.e., score of 1-3) by >70% of participants were excluded. All other behaviour change techniques which did not reach consensus were rated again in Round 2. The open-text responses from participants were reviewed to make modifications to the wording of inconclusive behaviour change techniques and to identify additional behaviour change techniques not initially considered to be effective within any given mechanism of action. See Supplementary Material 3 for a complete list of behaviour change techniques and mechanisms of action rated in Round 1 and behaviour change techniques added following this round.

Round 2

As well as a URL for Round 2, participants were emailed with a summary of the results for Round 1, including which behaviour change techniques reached consensus for inclusion or exclusion, and which remained inconclusive. For the inconclusive behaviour change techniques, participants were shown what most of the group had selected (either 1-3, 4-6 or 7-9), along with the median and interquartile range. The summary also presented the number of new behaviour change techniques that were added and those whose wording had been modified. Participants were then asked to rate the importance of the inconclusive and new behaviour change techniques. Participants always had the opportunity to comment on each mechanism, even if there were no more behaviour change techniques to rate for that mechanism in Rounds 2 or 3.

Round 3

Participants were again presented with the results for the previous round that summarised which behaviour change techniques reached consensus, and which remained inconclusive. They were then asked to rate the importance of the behaviour change techniques that did not reach consensus and add any comments.

Data analysis

Percentage agreement, median and interquartile ranges (IQR) were presented to participants³⁸ following each round in addition to the number of complete and partial responses. In any round, partial responses were only included if every behaviour change technique within a single mechanism of action had been completed. Numbers of respondents per mechanism of action were reported. Behaviour change techniques were endorsed if >70% of the group rated the behaviour change technique highly (score of 7-9) or not (rated 6 or less) were compared for less vs more experienced speech and language therapists (<10 years

vs. ≥ 10 years) and for those working in inpatient (e.g., acute care, subacute care, or inpatient rehabilitation) vs community settings, using a two-sided Fisher's exact,⁴⁴ with a Benjamini–Hochberg correction⁴⁵ for multiple comparisons.

To first interpret open-text responses, the second author (CM) used latent content analysis⁴⁶ between rounds to infer how participants' responses aligned with existing behaviour change techniques and mechanisms of action. These interpretations were discussed with the first author (NB) to agree which behaviour change techniques should be added or modified for the subsequent round. The first author had over 15 years' research experience in qualitative data analysis and second author had six years' experience in qualitative data analysis. Following all three rounds, two speech and language therapy masters' students, with no previous experience in qualitative data analysis, analysed open-text responses for each mechanism of action using manifest sentiment analysis⁴⁷ where each comment was read at surface level and the emotional tone examined. Both students were trained by the first and second author and the second author met the students weekly over a five-week period to complete the analysis. Each comment was then coded into three sentiment categories of: positive (i.e., expressions of importance, support, previous success, or perceived value), neutral or mixed (i.e., expressions of uncertainty, questions, balanced pros and cons, partial effectiveness, or value accompanied by concerns) or negative (i.e., expressions indicating something is unimportant, unsupported, disliked, previously ineffective, or lacking perceived value). All data was independently coded by two students and the second author (CM) independently reviewed 4 (of 16) mechanisms of action (25%) to verify accuracy. All coding queries or disagreements were discussed and agreed by consensus.

RESULTS

Participants

Table 1 presents the participant characteristics. Of the 151 participants who were eligible to participate, there were 118 participants in round 1 and 90 participants in rounds two and three. There were 81 participants (76%) who completed all three rounds. Participants were mainly working in England, female (96%) and from White ethnic backgrounds (93%). Around two-third of speech and language therapists reported over 10 years of clinical practice working as a speech and language therapist (66%) and with around half having more than 10 years' experience working with people with cognitive communication disorder (48%). The most common format for delivering communication partner training was with both the person with cognitive communication disorder and their familiar communication partner (66%). The main work settings included inpatient (35%) and community services (28%), and with most speech and language therapists managing caseloads with more than 50% of people with cognitive communication disorder (54%). Most participants worked in the public healthcare sector (55%) followed by private or mixed settings (45%).

Table 1 - Participant demographics

	Round 1		Round 2		Round 3	
	n=118 a	%	n=90 ^a	%	n=90 ^a	%
Professional background						
<i>Years of clinical experience</i>						
2-5 years	18	15%	11	12%	14	16%
6-10 years	22	19%	18	20%	16	18%
11-15 years	23	19%	16	18%	18	20%
16-20 years	13	11%	12	13%	10	11%
>20 years	42	36%	33	37%	32	36%
<i>Years of experience working with cognitive communication disorder</i>						
2-5 years	29	25%	19	21%	22	24%
6-10 years	32	27%	24	27%	24	27%
11-15 years	16	14%	16	18%	14	16%
16-20 years	18	15%	16	18%	14	16%
>20 years	23	19%	15	17%	16	18%
<i>Formats used in previous communication partner training delivery</i>						

With person with cognitive communication disorder only	1	1%	0	0%	1	1%
With familiar communication partner only	1	1%	1	1%	0	0%
With both together	78	66%	57	63%	60	67%
Multiple formats used	38	32%	32	36%	29	32%
<i>Healthcare sector</i>						
Public	65	55%	48	53%	52	58%
Private	33	28%	26	29%	24	27%
Both public and private	20	17%	16	18%	14	16%
<i>Main work setting</i>						
Inpatient rehabilitation	41	35%	29	32%	31	34%
Community	33	28%	28	31%	27	30%
Private practice	17	14%	14	16%	14	16%
Acute/subacute	9	8%	5	6%	4	4%
Outpatient rehabilitation	6	5%	5	6%	6	7%
Early Supported Discharge	6	5%	5	6%	6	7%
Other	3	3%	2	2%	1	1%
Not-for-profit organisation	3	3%	2	2%	1	1%
<i>Estimated % of caseload with cognitive communication disorder</i>						
5% or less	4	3%	2	2%	3	3%
6 - 10%	7	6%	7	8%	7	8%
11 - 30%	21	18%	13	14%	13	14%
31 - 50%	22	19%	15	17%	17	19%
51 - 75%	37	31%	31	34%	29	32%
76 - 100%	27	23%	22	24%	21	23%
Personal characteristics						
<i>Country where based</i>						
England	107	91%	80	89%	81	90%
Wales	6	5%	6	7%	5	6%
Scotland	3	3%	2	2%	2	2%
Northern Ireland	2	2%	2	2%	2	2%
<i>Age</i>						
29 years old or younger	16	14%	12	13%	12	13%
30 - 39 years old	34	29%	24	27%	25	28%
40 - 49 years old	41	35%	32	36%	30	33%
50 - 59 years old	25	21%	21	23%	22	24%
60 years or older	1	1%	1	1%	1	1%
Prefer not to say	1	1%	0	0%	0	0%
<i>Gender</i>						
Female	113	96%	85	94%	85	94%
Male	4	3%	4	4%	4	4%
Prefer not to say	1	1%	1	1%	1	1%
<i>Ethnic background</i>						
Asian or Asian British	3	3%	3	3%	3	3%
Black, Black British, Caribbean or African	2	2%	2	2%	2	2%
Mixed or multiple ethnic groups	2	2%	2	2%	2	2%
Other ethnic group	1	1%	1	1%	1	1%
White	110	93%	82	91%	82	91%

^a Includes those who provided complete or partial responses. Percentages may not total 100% due to rounding.

Round 1

Table 2 presents the Round 1 results. A total of 107 participants completed Round 1, with 11 partial responses. Of the 86 behaviour change techniques presented, 60 reached

consensus for inclusion across 15 mechanisms of action, and 25 remained inconclusive and were carried forward to Round 2; one behaviour change technique (*10.1 Material incentive (behaviour)*) reached consensus for exclusion. Nineteen of the included techniques were rated important by more than 90% of participants. These techniques related to selecting, reviewing, and receiving feedback on targets and outcomes; developing action plans; practising skills; substituting one behaviour for another; problem solving; building habits; applying skills in new contexts; increasing the difficulty of tasks gradually; and receiving support from others. Analysis of participants' comments led to seven techniques being added and 20 reworded, to improve the clarity of their definitions and illustrative examples. Additional techniques included analysing behaviour, providing information about behaviours approved by others, removing negative stimuli, and asking others to monitor targets and outcomes without providing feedback.

Table 2 – Techniques (n=60) achieving consensus in Round 1 to be included in (rated '7', '8' or '9' by >70%) or excluded (italicised) from (i.e. rated '1', '2' or '3' by >70%) communication partner training.

Mechanism of action	Behaviour change technique^a	Complete responses	Consensus % agreed	Median (IQR)
Knowledge	2.2 Feedback on behaviour	108	88%	8 (7-9)
	4.2 Information about antecedents		82%	8 (7-8)
	5.3 Information about social and environmental consequences		78%	8 (7-8)
Skill	8.6 Generalisation of target behaviour	110	96%	9 (8-9)
	8.7 Graded tasks		93%	8 (8-9)
	8.1 Behavioural practice/rehearsal		90%	9 (8-9)
	6.1 Demonstration of the behaviour		73%	8 (6-8)
Beliefs about capabilities	8.1 Behavioural practice/rehearsal	109	95%	8 (8-9)
	8.7 Graded tasks		89%	8 (7-9)
	1.2 Problem solving		88%	8 (7-9)
	15.3 Focus on past success		87%	8 (7-9)
	6.1 Demonstration of the behaviour		77%	7 (7-8)
Beliefs about consequences	15.1 Verbal persuasion about capability	109	71%	7 (6-8)
	5.4 Monitoring of emotional consequences		78%	8 (7-8)
	5.2 Salience of consequences		76%	7 (7-8)
	9.2 Pros and cons		74%	7 (6-8)
	<i>10.1 Material incentive (behaviour)</i>		72%	2 (1-4)
Reinforcement	5.3 Information about social and environmental consequences	111	71%	7 (6-8)
	10.4 Social reward		82%	8 (7-9)
	1.3 Goal setting (outcome)		98%	8 (8-9)
	1.1 Goal setting (behaviour)		97%	8 (8-9)
	2.2 Feedback on behaviour		95%	8 (8-9)
Motivation	13.4 Valued self-identity	108	86%	8 (7-9)

	9.2 Pros and cons		80%	7 (7-8)
Goals	1.3 Goal setting (outcome)	110	97%	8 (8-9)
	1.1 Goal setting (behaviour)		95%	9 (8-9)
	1.5 Review behaviour goal(s)		95%	8 (8-9)
	1.7 Review outcome goal(s)		95%	8 (8-9)
	1.8 Behavioural contract		76%	7 (7-8)
Memory, attention and decision processes	8.3 Habit formation	108	92%	8 (8-9)
	11.3 Conserving mental resources		82%	8 (7-9)
	7.1 Prompts/ cues		81%	7 (7-8)
Environmental context and resources	12.1 Restructuring the physical environment	110	89%	8 (7-9)
	7.1 Prompts/ cues		86%	7 (7-8)
	12.2 Restructuring the social environment		80%	8 (7-8)
	3.2 Social support (practical)		78%	8 (7-9)
Social influences	3.1 Social support (unspecified)	109	92%	8 (8-9)
	3.2 Social support (practical)		87%	8 (7-9)
	10.4 Social reward		83%	8 (7-8)
Behavioural regulation	8.3 Habit formation	110	95%	8 (8-9)
	8.2 Behaviour substitution		92%	8 (7-9)
	1.2 Problem solving		91%	8 (7-9)
	2.4 Self-monitoring of outcome(s) of behaviour		85%	8 (7-9)
	11.3 Conserving mental resources		83%	8 (7-9)
	11.2 Reduce negative emotions		79%	7 (7-8)
	4.2 Information about antecedents		79%	8 (7-9)
	2.3 Self-monitoring of behaviour		77%	8 (7-9)
	1.8 Behavioural contract		72%	7 (6-8)
Attitude towards the behaviour	13.4 Valued self-identity	109	88%	8 (7-9)
	5.4 Monitoring of emotional consequences		79%	8 (7-8)
	5.3 Information about social and environmental consequences		76%	7 (7-8)
	9.2 Pros and cons		74%	7 (6-8)
Feedback processes	2.7 Feedback on outcome(s) of behaviour	109	92%	8 (8-9)
	2.2 Feedback on behaviour		89%	8 (7-9)
	2.3 Self-monitoring of behaviour		85%	8 (7-9)
Social learning/imitation	6.1 Demonstration of the behaviour	109	77%	7 (7-8)
Behavioural cueing	8.3 Habit formation	109	95%	8 (8-9)
	1.4 Action planning		91%	8 (7-9)
	8.2 Behaviour substitution		89%	8 (7-9)
	12.1 Restructuring the physical environment		83%	8 (7-9)
	7.1 Prompts/ cues		77%	7 (7-8)

^aNumeric codes refer to the behaviour change technique taxonomy version 1 (BCTTv1; Michie et al., 2013)²⁵

IQR – Interquartile range.

Round 2

Table 3 presents the Round 2 results. Eighty-nine participants completed Round 2, with one partial response. Of the 32 techniques presented, 17 reached consensus for inclusion (10 of them reworded) and 15 remained inconclusive and were carried forward to Round 3; none reached consensus for exclusion. Two of the included techniques were rated important by more than 90% of participants. The largest increase in agreement from Round 1 was for technique *4.1 Instruction on how to perform the behaviour* under the mechanism of *Skill*,

which increased from 47% to 81%. No new techniques were added, and five were reworded four of which had been reworded after Round 1.

Table 3 – Techniques (n=17) achieving consensus in Round 2 (R2)

Mechanism of action	Behaviour change technique	Complete responses in R2	R2 rating	R2 Median (IQR)	Complete responses in R1	R1 rating	R1 Median (IQR)	↑ ↓
Knowledge	4.3 Re-attribution ²	90	92%	8 (7-8)	108	N/A	N/A	N/A
	4.1 Instruction on how to perform the behaviour ¹		78%	7 (7-8)		61%	7 (6-8)	↑ 17%
Skill	4.1 Instruction on how to perform the behaviour ¹	89	81%	7 (7-8)	110	47%	6 (6-7)	↑ 34%
Beliefs about capabilities	15.4 Self-talk ¹	89	73%	7 (6-8)	109	68%	7 (6-8)	↑ 5%
Beliefs about consequences	5.6 Information about emotional consequences ¹	89	87%	7 (7-8)	109	68%	7 (6-8)	↑ 19%
	9.3 Comparative imaginings of future outcomes		83%	7 (7-8)		64%	7 (6-8)	↑ 19%
Intention and motivation	6.3 Information about others' approval ²	89	79%	7 (7-8)	108	N/A	N/A	N/A
Environmental context and resources	12.5 Adding objects to the environment ¹	90	86%	7 (7-8)	110	64%	7 (6-8)	↑ 22%
Social influences	2.5 Monitoring of outcome(s) of behaviour without feedback ²	89	83%	8 (7-8)	109	N/A	N/A	N/A
	2.1 Monitoring of behaviour by others without feedback ²		82%	8 (7-8)		N/A	N/A	N/A
	6.3 Information about others' approval ²		73%	7 (6-8)		N/A	N/A	N/A
Behavioural regulation	4.3 Re-attribution ²	89	94%	8 (7-8)	110	N/A	N/A	N/A
Attitude towards the behaviour	13.2 Framing/reframing ¹	90	74%	7 (6-8)	109	63%	7 (6-8)	↑ 11%
	9.1 Credible source ¹		73%	7 (6-8)		63%	7 (6-8)	↑ 10%
Self-image	13.1 Identification of self as role model ¹	89	81%	7 (7-8)	108	68%	7 (6-8)	↑ 13%
	13.2 Framing/reframing ¹		76%	7 (7-8)		66%	7 (6-8)	↑ 10%
Behavioural cueing	12.5 Adding objects to the environment ¹	89	87%	8 (7-8)	109	64%	7 (6-8)	↑ 23%

¹Modified wording for definition and/or example after Round 1. ²Added after Round 1.

Round 3

Table 4 presents Round 3 results. Of the 15 techniques rated, three reached consensus for inclusion (none with more than 90% endorsement) and 12 remained inconclusive; none reached consensus for exclusion. The largest increase in agreement from Round 1 to Round 3 was for *4.1 Instruction on how to perform the behaviour* under the mechanism of *Beliefs about capabilities*, which increased from 50% to 84%.

Table 5 presents the techniques that remained inconclusive after Round 3. Two were short of a threshold: *Offer material reward* (linked to *Reinforcement*) narrowly missed exclusion, with 69.7% rating it 1–3, and *Positive self-talk* (linked to *Intention and Motivation*) narrowly missed inclusion, with 69.7% rating it 7–9. *Compare to others* (linked to *Feedback*) rose by 21% from Round 1 to 3 (48% to 69%), also short of inclusion. The remaining inconclusive techniques all related to rewards, with interquartile ranges of 4 or 5, indicating a split vote.

Table 4 - Techniques (n=3) achieving consensus in Round 3.

Mechanism of action	Behaviour change technique	Complete responses in R3	R3 rating	R3 Median (IQR)	Complete responses in R2	R2 rating	R2 Median (IQR)	Complete responses in R1	R1 rating	R1 Median (IQR)	↑ ↓
Beliefs about capabilities	4.1 Instruction on how to perform the behaviour ¹	89	84%	7 (7-8)	89	60%	7 (6-8)	109	50%	6 (5-7)	↑ 34%
Environmental context and resources	7.5 Remove aversive stimulus ²	89	74%	7 (7-8)	90	66%	7 (6-8)	110	64%	7 (6-8)	↑ 10%
Social influences	6.2 Social comparison ¹	89	74%	7 (6-8)	89	52%	7 (5-7)	109	50%	6 (4-7)	↑ 24%

¹Modified wording for definition and/or example after Round 1 and further modified wording after Round 2. ²Added after Round 1 and then modified wording for definition and/or example after Round 2.

Table 5 – Techniques (n=12) which remained inconclusive after Round 3 (R3).

Mechanism of action	Behaviour change technique	Complete responses in R3	R3 rating	R3 Median (IQR)	Complete responses in R2	R2 rating	R2 Median (IQR)	Complete responses in R1	R1 rating	R1 Median (IQR)	↑ ↓
Beliefs about consequences	10.8 Incentive (outcome) ¹	89	55%	3 (2-6)	89	49%	4 (2-6)	109	58%	3 (2-6)	↓ 3%
	10.10 Reward (outcome) ¹		44%	5 (2-7)		40%	5 (2-6)		47%	4 (2-6)	↓ 3%
Reinforcement	10.1 Material incentive (behaviour)	89	69.7% ³	2 (1-4)	90	68%	2 (1-4)	111	67%	2 (1-5)	↑ 2.7%
	10.2 Material reward (behaviour)		66%	2 (1-4)		66%	2 (1-5)		64%	2 (1-5)	↑ 2%
	10.3 Non-specific reward		39%	5 (2-7)		41%	5 (2-6)		42%	5 (2-7)	↓ 3%
	10.6 Non-specific incentive		55%	3 (2-6)		52%	3 (2-6)		48%	4 (2-6)	↑ 7%
	10.8 Incentive (outcome) ¹		49%	4 (2-6)		56%	3 (2-6)		50%	4 (2-6)	↓ 1%
	10.10 Reward (outcome) ¹		35%	5 (3-7)		41%	5 (2-7)		41%	5 (2-7)	↓ 6%
Intention and motivation	10.8 Incentive (outcome) ¹	89	52%	3 (2-6)	89	47%	4 (2-6)	108	47%	4 (2-6)	↑ 5%

	10.10 Reward (outcome) ¹		39%	5 (3-7)		39%	5 (2-7)		37%	5 (2-7)	↑ 2%
	15.4 Self-talk ²		69.7% ³	7 (6-8)		64%	7 (6-8)		67%	7 (6-8)	↑ 2.7%
Feedback processes	6.2 Social comparison ²	89	69%	7 (6-8)	89	49%	6 (5-7)	109	48%	5 (4-7)	↑ 21%

¹Modified wording for definition and/or example after Round 1. ²Modified wording for definition and/or example after Round 1 and then further modified after Round 2.

³Reported to one decimal place to show that the value fell below the predefined >70% consensus threshold.

Across the three e-Delphi rounds, a total of 133 behaviour change technique-to-mechanism of action links were presented. Of these, 80 (86%) reached consensus for inclusion, one (1%) reached consensus for exclusion, and 12 (13%) were inconclusive. Of the seven additional behaviour change techniques that were introduced following comments in Round 1, all seven reached consensus by Round 3. There were 30 behaviour change techniques with modified wording of their definition and/or illustrative example, of which 12 reached consensus for inclusion in Rounds 2 or 3. Overall, across all three rounds, 47 unique behaviour change techniques were identified, with most (33 behaviour change techniques) being rated as important in Round 1.

Comparisons by years of experience (<10 years vs. ≥10 years) and clinical setting (inpatient vs. community) were based on sample sizes of between 35-67 participants. After adjustment, analyses revealed no statistically significant differences between any of the groups in ratings of importance of behaviour change techniques.

Sentiment analysis

Open-text responses were provided by 78% of participants in Round 1 (83/107), 65% in Round 2 (58/89), and 42% in Round 3 (37/89). The sentiment analysis showed that around two-thirds of comments reflected positive sentiment (n=801, 67%), almost one quarter coded as neutral or mixed (n=277, 23%), with 10% of comments expressing negative sentiment (n=120, 10%). Half of all comments were submitted in the first round (n=623, 52%).

Positive sentiment: Strategies to support goal setting were viewed positively, including written agreements, tracking progress, and regular reviews to monitor relevance and achievement. Goal hierarchies and breaking goals into smaller steps were also valued, alongside support to monitor confidence, anticipate challenges, and identify where additional help might be needed: “...bringing in family, friends, or carers to help identify goals and

support [the person] [to achieve] them... Having frequent check-ups / being accountable with someone else... (Community SLT)”. Rewards were seen to increase motivation when intrinsically linked to real-life, meaningful tasks (e.g. booking cinema tickets or a restaurant meal) or tied to an individual's identity and values, “harness[ing] the person's sense of who they are and who they admire, and how they want the world to perceive them, and using that to guide changes in behaviour (Inpatient SLT)”. For developing communication skills, participants highlighted modelling, practising skills across different contexts, and using video or audio recording to support self-reflection: “facilitating dialogue between the [person with] ABI and the CP so that they can talk about the strengths/ weaknesses they experience...and collaborate to decide on solutions (Community SLT)”. Some favoured approaches that let individuals build skills for themselves through observation, audio-visual feedback, or feedback from peers.

Negative sentiment: Most negative comments related to the use of material or monetary rewards. Participants reported reservations that externally driven rewards could improve intrinsic motivation and self-accountability. Ethical concerns were also raised regarding coercion and power dynamics, “*offering/giving rewards is, to all intents, bribery ... it raises concerns...of the message we give to potentially vulnerable people – ‘do what I ask/say and you'll get a reward’ (Community SLT)”. Participants also described practical challenges associated with implementing reward-based approaches, including cost, sustainability, and the difficulty of operationalising rewards for complex and variable behaviours: “Reward for social communication seems difficult to quantify and reinforce... social communication is less tangible... it could lead to conflict or de-incentivisation – it could be inconsistent (Community SLT)”. Despite these reservations, participants reported that rewards in the form of verbal encouragement and meaningful outcomes linked to targets*

(e.g., more balanced conversations or strengthened relationships) were more acceptable and often emerged naturally within therapeutic interactions.

Neutral and mixed sentiment: Views were mixed on techniques designed to explain and emphasise consequences, which were seen to require careful timing, adaptation, and framing particularly for people with acquired brain injury who may struggle with abstract thinking or have limited insight. Insight, cognitive ability, readiness to engage, and personal preference were all raised as factors in choosing how to give feedback or build confidence, and some favoured approaches that fostered autonomy and reflection, *“Before instructing the person (both CP and person with CCD) on 'how to' it might be helpful to see if they can generate any techniques first. This could be scaffolded and could be empowering for the person (Community SLT)”*. Collaboration with the dyad was seen as important when giving instruction or agreeing how feedback should be delivered, *“I find feedback needs to be carefully set up and thought about. It needs to "land" in the right way to feel authentic to the person. Setting up an agreement for how to track progress and gather feedback can be helpful but again this is only helpful if the person with TBI is onboard with this and it's not railroaded through by the therapist (Community SLT)”*. Social comparison divided opinion, described by some as harming mood or self-perception and by others as a powerful motivator, *“although I think we almost always discourage a person from comparing themselves with others, giving them the opportunity to see that behaviour change is possible can be really powerful (Inpatient SLT)”*. Comparisons to an individual's pre-injury self, or to a more abstract figure such as a famous person or fictional character, were felt to be less confrontational. Positive self-talk (e.g. mantras) and reflecting on past success were seen as potentially helpful depending on personality and context. Asking others to monitor behaviour without giving feedback (e.g. through diaries or checklists) was thought beneficial for supporting insight, though requiring careful negotiation to avoid causing distress.

Practical and relational challenges were also noted: family members may lack the time or capacity for monitoring roles, and clear boundaries are needed to prevent reflection or monitoring from feeling critical or punitive.

DISCUSSION

This is the first e-Delphi study where a panel of practising clinicians closely examined an intervention for people with cognitive communication disorder and their familiar communication partners. The sample of participants from across the UK were broadly representative of the UK speech and language therapist workforce based on age, gender and ethnicity.⁴⁸ Across the three rounds, UK speech and language therapists agreed on 80 behaviour change technique-to-mechanism of action links, corresponding to 47 distinct behaviour change technique labels (with 76% retention across rounds). These findings are an important step to understanding communication partner training, its complexity and what is important to clinicians in delivering communication partner training.

The survey content was pre-determined as in other e-Delphi studies using behaviour change theory.^{29, 36} Of the 47 behaviour change techniques that reached consensus, 27 behaviour change techniques previously identified in the original programmes were included,³⁰ with an additional 20 behaviour change techniques based on conclusive links between mechanisms and techniques.³⁵ Many of the original communication partner training programmes were not comprehensively described using behaviour change theory. SLTs endorsed many techniques absent from these programmes. This finding may reflect techniques that were used but not described. It may also reflect how therapists adapt communication partner training in practice. The total number of techniques is greater than for people with post-stroke aphasia⁴⁹ though not dissimilar from other complex behavioural interventions for physical activity²⁸ or smoking cessation.²⁷

A communication partner training programme is unlikely to use all techniques and this process does not determine which behaviour change techniques are *most effective*. No single programme would be expected to incorporate every technique; rather, clinicians are likely to draw on a subset suited to the individual, their communication partner, and the clinical context. Factors such as fatigue and awareness for the individual with cognitive communication disorder,⁵ and the nature of the relationship with the familiar communication partner may all influence which techniques are most relevant. Involvement of *both* individuals with cognitive communication disorder and their family members may help to prioritise these further. While participants' years of experience or clinical setting did not differentiate the behaviour change techniques identified as important, this does not rule out clinically meaningful variation between the groups given the per-group sample sizes.

At least one technique reached consensus for each mechanism of action. There was particularly high consensus for behaviour change techniques linked with goal setting, practice of skills and providing feedback. These behaviour change techniques are often described in published training programmes³⁰ and considered important.^{4, 50} A communication partner training intervention needs to be individualised and tailored to the values and needs of the person with cognitive communication disorder *and* their familiar communication partner. Understanding the mechanism of action may help select and sequence the most appropriate behaviour change techniques across an intervention. For example, a change in the mechanism *Knowledge* may be a prerequisite for others such as *Skills* and *Beliefs about capabilities*.^{29, 51} Moreover, a behaviour change technique's influence on one mechanism may lessen over time or be less effective when targeting another.^{52, 53} This provides a framework for understanding the complexity of communication partner training.

A proportion of behaviour change techniques were inconclusive highlighting genuine disagreement amongst speech and language therapists. Many related to offering and/or giving

incentives or rewards, which participants expressed ethical and practical reservations about. As the techniques were presented with clinician-adapted definitions and examples but without information on their effectiveness, these reservations reflect considered ethical and practical concerns. Whether those techniques can be effective in communication partner training is a different question and would need direct evaluation, as financial incentives or rewards have been shown to be effective for other behaviour interventions.⁵⁴ Other inconclusive behaviour change techniques related to self-regulation such as *self-talk* and *social comparison*, also narrowly missed the consensus threshold for inclusion. Participants described that these techniques may be helpful for some individuals but not others, depending on an individual's personality and context.

This study highlights the value of a theory-driven approach to underpin the development of an intervention.⁵⁵ As participants did not have expertise in behaviour change theory, the labels, definitions and examples from the behaviour change technique taxonomy (v1) were adapted to be made accessible to participants. While this adaptation provides a common language through which to understand communication partner training, participants did not rate the original behaviour change technique taxonomy (v1) items. This should be considered when interpreting how findings map onto the broader theoretical framework. These findings will inform the development of a programme theory and a theoretically informed communication partner training intervention that will be refined through co-design.

Several limitations should be considered when interpreting these findings. This study only considered behaviour change techniques with conclusive links with mechanisms of action, which means behaviour change techniques with less conclusive links may have been relevant for communication partner training but were not introduced to participants. The e-Delphi only considered the identified 16 mechanisms of action from the three coded programmes.³⁰ Reminders and incentives were used to support engagement, however

additional means of contacting participants (e.g., via text message) may be helpful as some participants reported overlooking emails in busy inboxes; and greater incentives (e.g., individual monetary rewards) may all help to improve retention. Participation was limited to UK speech and language therapists which may limit generalisability to speech and language therapists in other countries. We were also unable to guarantee that participants reviewed the previous round's results. Anonymity between participants, and the option to reach consensus for either inclusion or exclusion, were intended to reduce the risk that controlled feedback led participants to revise their ratings towards the group view. Finally, qualitative comments were not summarised between rounds which may limit deeper reflection, although reading lengthy summaries between rounds may have reduced response rates and increased participant burden.⁵⁶

This first UK e-Delphi with speech and language therapists working in cognitive communication disorder identified the behaviour change techniques and mechanisms of action considered important for delivering communication partner training. Behaviour change theory provided a useful framework for examining the complexity of communication partner training while highlighting areas of strong consensus and valuable insights into how communication partner training could be delivered in practice. These findings provide an important foundation for the development of a theoretically informed communication partner training intervention.

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