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Comments

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INCOG 2.0 Guidelines for Cognitive Rehabilitation Following Traumatic Brain Injury, Part IV: Cognitive-Communication and Social Cognition Disorders

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Introduction: Moderate to severe traumatic brain injury causes significant cognitive impairments, including impairments in social cognition, the ability to recognize others' emotions, and infer others' thoughts. These cognitive impairments can have profound negative effects on communication functions, resulting in a *cognitive-communication disorder*. Cognitive-communication disorders can significantly limit a person's ability to socialize, work, and study, and thus are critical targets for intervention. This article presents the updated INCOG 2.0 recommendations for management of cognitive-communication disorders. As social cognition is central to cognitive-communication disorders, this update includes interventions for social cognition. **Methods:** An expert panel of clinicians/researchers reviewed evidence published since 2014 and developed updated recommendations for interventions for cognitive-communication and social cognition disorders, a decision-making algorithm tool, and an audit tool for review of clinical practice. **Results:** Since INCOG 2014, there has been significant growth in

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On behalf of the INCOG Expert Panel.

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The authors declare no conflicts of interest.

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cognitive-communication interventions and emergence of social cognition rehabilitation research. INCOG 2.0 has 9 recommendations, including 5 updated INCOG 2014 recommendations, and 4 new recommendations addressing cultural competence training, group interventions, telerehabilitation, and management of social cognition disorders. Cognitive-communication disorders should be individualized, goal- and outcome-oriented, and appropriate to the context in which the person lives and incorporate social communication and communication partner training. Group therapy and telerehabilitation are recommended to improve social communication. Augmentative and alternative communication (AAC) should be offered to the person with severe communication disability and their communication partners should also be trained to interact using AAC. Social cognition should be assessed and treated, with a focus on personally relevant contexts and outcomes. **Conclusions:** The INCOG 2.0 recommendations reflect new evidence for treatment of cognitive-communication disorders, particularly social interactions, communication partner training, group treatments to improve social communication, and telehealth delivery. Evidence is emerging for the rehabilitation of social cognition; however, the impact on participation outcomes needs further research. **Key words:** *cognitive-communication, cognitive rehabilitation, guidelines, rehabilitation, social cognition, social communication, therapeutic approaches, traumatic brain injury*

THE ABILITY TO COMMUNICATE successfully underpins one's capacity to develop and maintain social relationships, find new friends and romantic partners, and take part in academic, vocational, and leisure activities.^{1,2} This ability can be significantly affected by traumatic brain injury (TBI), which often causes cognitive impairments that affect communication functions. Communication dysfunction that results from underlying cognitive impairments is referred to as a *cognitive-communication disorder*.³ Cognitive-communication disorders are common after severe TBI, with over 70% of people experiencing some level of communication disability as a result of their injury.⁴ The multifocal nature of TBI can result in a complex interplay of cognitive, physical, behavioral, emotional, linguistic, and psychosocial sequelae that may contribute to the communication difficulties experienced by the individual.⁵ Signs and symptoms of communication difficulties can range from impoverished communication (flat affect, word-finding difficulty, and inability to generate or maintain topics in conversation), to excessive talkativeness, tangential topic production, domination of talking time in conversations, and repetitiveness.⁴ As a result, communicating with a person with TBI can be taxing⁶ to the point where friends, carers, and family may begin avoiding the person, therefore limiting preinjury relationships. Cognitive-communication disorders can have significant negative effects on psychosocial outcomes, including effects on employment, friendships, school, and community life.⁷ Overall, loss of communicative competence is a major obstacle to reintegration into the community.

A critical cognitive underpinning of communication competence is social cognition. Social cognition has been conceptualized as both cognitive and affective; ie, it includes both understanding another's thoughts and beliefs, also known as theory of mind (ToM), as well as emotion perception and emotional empathy.⁸ The importance of social cognition is evident in the types of communication problems reported by people

with TBI and their communication partners. People with TBI have been described as egocentric in their communication, unresponsive to social cues, missing implied meanings, being overly familiar with acquaintances, and violating social conventions like norms for interpersonal space. As a result of these impairments, people with TBI can misjudge social situations, which can interfere with their ability to establish and maintain new relationships.⁹ Impairments in the ability to "read" social situations and communication cues also may make individuals with TBI vulnerable to exploitation, abuse, and in some cases, violence, or crime.¹⁰

Since INCOG 2014, research on social cognition in TBI has expanded, advancing our understanding of the nature of social cognition and its role in social behavior,¹¹ clinical assessment of social cognition,¹² greater consensus regarding social cognition outcome measures,¹³ and reviews of social cognition treatments.^{14,15} The term "social communication"^{16,17} has also been adopted by TBI researchers since INCOG 2014, to describe the specific impact of communication disorders on a person's capacity to achieve personally relevant social goals across contexts. Thus, we expanded our scope from the original INCOG 2014 review to include social cognition interventions.

Given the importance of communication in our everyday lives, and the difficulties that arise when communication is affected by TBI, it is imperative that cognitive-communication disorders and social cognition be addressed in rehabilitation. The purpose of this article is to update the INCOG 2014 guidelines for the management of cognitive-communication disorders. Since INCOG 2014, there have been advances in the development of models of cognitive-communication,⁴ social cognition,¹⁴ and increased use of telehealth approaches,^{18,19} particularly following COVID-19.²⁰ Changes to communication ability become evident as soon as the person emerges from coma, during the period of posttraumatic amnesia (PTA). During this time, a speech-language pathologist should identify and

facilitate the optimal means of communication. INCOG 2.0 refers to cognitive-communication recommendations after the person has emerged from PTA. For further information regarding management during PTA, please refer to Ponsford et al²¹ in this issue (INCOG 2.0, Part I: posttraumatic amnesia).

The recommendations are organized according to the model of cognitive-communication competence by MacDonald,⁴ which comprises 7 domains, 7 competencies, and 47 factors related to communication functioning and intervention. The model was designed to improve consistency with referrals, guide assessment and treatment, and plan service needs. The 7 domains are the individual, the contextual domain, the environmental domain, the cognitive domain, the communication domain, the physical/sensory domain, and the emotional/psychosocial domain.⁴ The model illustrates the complexity of cognitive-communication disorders in people with TBI and shows the importance of the context in which communication takes place, including not only the cognitive, behavioral, and sensorimotor abilities of the person, but also the central role of communication partners, and the necessary integration of all these factors to enable social competence. These concepts underpin the INCOG 2.0 cognitive-communication guidelines.

METHODS

Updated INCOG guidelines

The reader is referred to the methods paper of this series for a complete review of the strategies used for the updated literature review (from 2014) and development of the recommendations and other tools (see INCOG 2.0 Methods, Overview, and Principles).²² The target population of this guideline is adults 18 years and older with moderate to severe TBI. In brief, the updated INCOG (with INCOG being an acronym standing for “International Cognitive”) guideline follows a thorough search, review, and critical evaluation of currently published clinical practice guidelines (from 2014) for each domain including principles of assessment, PTA, attention, memory, executive functions, and cognitive-communication. An international expert panel comprising of TBI cognitive rehabilitation researchers and clinicians, most from the first version of INCOG, formed the authors. In preparation, a detailed Internet and Medline search was conducted to identify new published TBI and cognitive rehabilitation evidence-based guidelines (from 2014). A systematic search (2014 to July 2021) of multiple databases (Medline, Embase, Cochrane, CINAHL, and PsycINFO) was also conducted to identify TBI articles and reviews. Research articles meeting inclusion but published after

TABLE 1 *INCOG level of evidence grading system*

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|---|
| <p>A: Recommendation supported by at least one meta-analysis, systematic review, or randomized controlled trial of appropriate size with relevant control group.</p> <p>B: Recommendation supported by cohort studies that at minimum have a comparison group (includes small randomized controlled trials) and well-designed single-case experimental designs.</p> <p>C: Recommendation supported primarily by expert opinion based on their experience, though uncontrolled case studies or series may also be included here.</p> |
|---|

July 2021 were added based on the discretion of the expert panel. Two authors independently aligned the research articles within the existing INCOG guidelines and flagged areas where new guidelines may be warranted based on the research evidence. The evidence for this topic area was distributed to the cognitive-communication working group. During the series of videoconference meetings, the working group examined the recommendations matrix and updated some recommendations based on new evidence, articulated novel recommendations based on the evidence available, and considered the clinical applicability of recommendations to enhance outcomes for individuals with TBI. For each recommendation, the cumulative evidence (studies used in the original guidelines and new articles) was evaluated by the panel in terms of study design and study quality, to determine the level of evidence grading (see Table 1).

All relevant references after 2014 were consolidated into a reference library that was made available to the author teams, as they drafted the manuscript and finalized the recommendations. Consensus of the working group was reached when members unanimously agreed to the wording and evidence grading assignment of all the recommendations. By the end, 26 new references related to cognitive-communication disorders (from 2014 forward) and 12 references for the new recommendation for social cognition (from 2000 forward) were included in the recommendations of this article. The clinical algorithm was updated accordingly in the management areas of cognitive-communication and social cognition.

LIMITATIONS OF USE AND DISCLAIMER

These recommendations are informed by evidence for TBI cognitive rehabilitation interventions that was current at the time of publication. Relevant evidence published after the INCOG guideline could influence the recommendations contained herein. Clinicians must also consider their own clinical judgment, patient

preferences, and contextual factors such as resource availability in their decision-making processes about implementation of these recommendations.

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RESULTS

Recommendations and literature review

The full details of the recommendations, level of evidence (grade), and supporting references categorized into systematic reviews or meta-analyses, randomized controlled trials (RCTs), and non-RCTs are tabulated in Table 2. The INCOG guidelines include 8 recommendations regarding best practice for the assessment and management of cognitive-communication disorders following TBI and 1 recommendation regarding social cognition management (see Table 2). For cognitive-communication, 3 recommendations represent principles of practice, which are embodied in current international practice standards for the speech-language pathology profession, determined by consensus expert opinion, and, therefore, represent level C evidence; 2 recommendations are based on level B evidence and 4 recommendations are based on level A evidence. For social cognition, there is 1 recommendation based on level A evidence.

Cognitive-communication #1: Rehabilitation staff should recognize that levels of communication competence and communication characteristics may vary as a function of their communication partners, environment, communication demands, communication priorities, fatigue, physical and sensory issues (eg, vision, hearing), psychosocial variables, behavioral dyscontrol, emotional variables, and other personal factors (updated from INCOG 2014,²³ Cognitive-communication 1, p. 356).

Level B evidence.

This recommendation is similar to INCOG 2014, except for the addition of physical, sensory, and psychosocial variables. These were added in recognition of the frequently reported physical co-occurring or comorbid factors. Dysarthria is a persistent motor speech disorder arising after TBI,²⁴ with estimated prevalence varying from 6% to 60%²⁵ (see Togher et al²⁶ for overview). Dysarthria should be considered when designing cognitive-communication interventions, with inclusion of modifications and augmentative and alternative communication, where indicated (AAC) to facilitate rehabilitation (see Cognitive-communication #6 regarding AAC). Other comorbid physical sequelae such as balance disorders, dizziness or vestibular

issues, visual disturbances, hearing deficits, sleep-wake disorders, and pain can impede participation in conversation and should be addressed by the multidisciplinary team. Hearing and vision screening should be routinely conducted to ensure these sensory issues are not confounding communication outcomes.²⁷ It is imperative that accommodations are made for sensory loss or disturbance, including availability of eyeglasses and hearing aids to ensure accurate assessment and interventions.

Psychosocial, behavioral dyscontrol and emotional variables can also impact cognitive-communication competence. Anxiety,²⁸ depression, and posttraumatic stress disorders may be associated with cognitive impairments in attention, working memory, information processing, executive functions, and processing speed.²⁹ These factors should be considered when devising management plans for cognitive-communication disorders. There were no additional references to add from 2014 for Cognitive-communication #1. The reader is referred to INCOG 2014 for the original references supporting this recommendation.²³

Cognitive-communication #2: A cognitive-communication evaluation and rehabilitation program for individuals with TBI should be culturally responsive and take into account the person's premorbid physical and psychosocial variables, including gender identity; native, first, and preferred languages; literacy and language proficiency; cognitive abilities; communication style considering expectations in the person's cultural linguistic background and tradition; and gender identity (updated from INCOG 2014,²³ Cognitive-communication 3, p. 356).

Level C evidence.

Since 2014, there has been increased recognition of the importance of diversity, equity, and inclusion (DEI) in the field of TBI rehabilitation with recommendations for cultural competence training.³⁰ For those from a range of DEI backgrounds, the impact of cognitive-communication disorders may be compounded due to a lack of access to rehabilitation. For example, medical staff often have difficulty distinguishing communication disorders associated with TBI from cultural linguistic factors.³¹ Combined with a lack of culturally appropriate communication resources to assist healthcare interactions and poor access to formal communication or cultural training, this can lead to inaccurate diagnoses and inappropriate interventions.³¹

Cognitive-communication #3: Staff should receive cultural competence training (INCOG 2.0).

Level C evidence.

People from culturally and linguistically diverse backgrounds who sustain a TBI experience disparities in the quality and quantity of interventions, and functional outcomes post-TBI.³² Healthcare providers should be able to communicate effectively with patients with a

TABLE 2 *INCOG 2.0 guideline recommendations for cognitive-communication and social cognition and new supporting evidence^a*

	Guideline recommendations to improve cognitive-communication and social cognition	Grade	Reviews	RCTs	Other
Cognitive-communication #1	<p>Rehabilitation staff should recognize that levels of communication competence and communication characteristics may vary as a function of:</p> <ul style="list-style-type: none"> • Communication partners: individuals with traumatic brain injury may communicate at a higher level with family and friends who know them well than with healthcare professionals • Environment • Communication demands (eg, time pressure, need to follow multiple speakers) • Communication priorities • Fatigue • Physical variables • Sensory issues (eg, vision, hearing) • Psychosocial variables • Behavioral dyscontrol • Emotional variables • Other personal factors <p>(Updated from INCOG 2014,²³ Cognitive-communication 1, p. 356)</p>	B			
Cognitive-communication #2	<p>A cognitive-communication evaluation and rehabilitation program for individuals with TBI should be culturally responsive and take into account:</p> <ul style="list-style-type: none"> • The person's premorbid physical and psychosocial variables, including gender identity • Native, first, and preferred languages • Literacy and language proficiency • Cognitive abilities • Communication style considering expectations in the person's cultural/linguistic background and tradition • Gender identity <p>(Updated from INCOG 2014,²³ Cognitive-communication 3, p. 356)</p>	C	MacDonald ⁴		
Cognitive-communication #3	<p>Staff should receive cultural competence training (INCOG 2.0).</p>	C			American Speech Language Hearing Association cultural competence check-ins Warren and Garcia ³² (continues)

TABLE 2 *INCOG 2.0 guideline recommendations for cognitive-communication and social cognition and new supporting evidence^a (Continued)*

	Guideline recommendations to improve cognitive-communication and social cognition	Grade	Reviews	RCTs	Other
Cognitive-communication #4	A person with TBI who has a cognitive-communication disorder should be provided with interventions and intervention materials that are both grounded in the principles of cognitive-communication rehabilitation and individualized, taking the person's context into account to maximize communication competence (updated from INCOG 2014, ²³ Cognitive-communication 2, p. 356). Recommended cognitive-communication interventions can be direct or indirect at any level of impairment and include: a. Communication partner training (level A), b. Communication strategy and metacognitive awareness training (level A), c. Reintegration to daily functions, productive activities, participation and competence, modification of the communication environment, assistance with adjustment to impairments, d. Communication coping treatment (level C), e. Focus on confidence, self-esteem, and identity formation (level C), and f. Provision of education and information regarding the nature of acquired cognitive-communication disorders to both the patient and close other and communication partners (level C) (adapted from INESSS-ONF 2020).	A-C	Lé et al ⁴⁰ MacDonald ⁴ Meulenbroek et al ⁸²		American Speech Language Hearing Association ⁸⁹ College of Audiologists and Speech-Language Pathologists of Ontario ³
Cognitive-communication #4a	Communication partner training	A	Behn et al ³⁵ Wiseman-Hakes et al ³⁴ Lé et al ⁴⁰ MacDonald ⁴ Meulenbroek et al ⁸²	Rietdijk et al ¹⁹ Rietdijk et al ³⁷ Togher et al ⁹⁰	Copley et al ⁶⁴ Finch et al ⁶³
Cognitive-communication #4b	Communication strategy and metacognitive awareness training	A			

(continues)

TABLE 2 *INCOG 2.0 guideline recommendations for cognitive-communication and social cognition and new supporting evidence^a (Continued)*

	Guideline recommendation and social cognition	Grade	Reviews	RCTs	Other
Cognitive-communication #4c	Reintegration to daily functions, productive activities, participation and competence, modification of the communication environment, assistance with adjustment to impairments	C	Lé et al ⁴⁰ MacDonald ⁴ Meulenbroek et al ⁸²		Behn et al ³⁹ Behn et al ³⁸ Meulenbroek and Cherney ⁴² Douglas et al ⁴⁵
Cognitive-Communication #4d	Communication-coping treatment	C			
Cognitive-communication #4e	Focus on confidence, self-esteem, and identity formation	C			
Cognitive-communication #4f	Provision of education and information regarding the nature of acquired cognitive-communication disorders to both the patient and close other and communication partners	C	MacDonald ⁴		Togher et al ⁴⁷
Cognitive-communication #5	A cognitive-communication rehabilitation program for individuals with TBI should provide the opportunity for practicing and using communication skills in situations appropriate to the context in which the person will live, work, study, and socialize. Goal attainment scaling is recommended as a method to measure person-centered intervention outcomes (INCOG 2014, ²³ Cognitive-communication 4, p. 357).	A	MacDonald ⁴		Behn et al ³⁸ Keegan et al ⁵⁴ Meulenbroek and Cherney ⁴²
Cognitive-communication #6	Individuals with severe communication disability following TBI should be provided with proper assessment to determine the appropriate augmentative and alternative communication (AAC) intervention by trained clinicians. The individual and close communication partners should be provided with training to effectively use AAC aids. This training should be ongoing as needs change and technology evolves. (Updated from INCOG 2014, ²³ Cognitive-communication 6, p. 357)	C			

(continues)

TABLE 2 *INCOG 2.0 guideline recommendations for cognitive-communication and social cognition and new supporting evidence^a (Continued)*

Guideline recommendations to improve cognitive-communication and social cognition		Grade	Reviews	RCTs	Other
Cognitive communication #7	Clinicians should consider group therapy as an appropriate means of remediation of cognitive-communication training when social communication impairments exist post-TBI. Where aligned with their communication goals, clinicians should consider group therapy (updated from INCOG 2014, ²³ cognitive-communication 7, p. 361).	A	Lé et al ⁴⁰	Harrison-Felix et al ⁶⁵	Behn et al ³⁹ Behn et al ³⁸ Bosco et al ⁶⁷ Copley et al ⁶⁴ Douglas et al ⁴⁵ Finch et al ⁶³ Gabbatore et al ⁶⁶ Keegan et al ⁵⁴ Parola et al ⁶⁸ Whitworth et al ⁶² Rietdijk et al ¹⁸
Cognitive-communication #8	Telerehabilitation is as efficacious, feasible, and acceptable for communication partner training compared with in-person intervention (INCOG 2.0).	B		Rietdijk et al ¹⁹ Rietdijk et al ³⁷	
Social cognition #1	Clinicians should consider evaluating aspects of social cognition ability, including emotion perception, theory of mind (ToM), and emotional empathy. Interventions that aim at improving emotion perception, perspective taking, ToM, and social behavior are recommended. Computerized social cognition treatments are not recommended given lack of evidence of generalization to real life-activities (INCOG 2.0).	A	Cassel et al ¹⁴ Henry et al ¹² McDonald ⁸¹ Turkstra et al ⁹² Vallat-Azouvi et al ¹⁵	Bornhofen and McDonald ⁵⁸ McDonald et al ⁷⁵ Neumann et al ⁸⁰ Westerhof-Evers et al ⁷³	Cassel et al ⁷² Gabbatore et al ⁶⁶ Ownsworth et al ⁷⁸ Rodríguez-Rajo et al ⁷⁹

Abbreviations: RCT, randomized controlled trial; TBI, traumatic brain injury.

^aRefer to Togher et al²³ for evidence contributing to the recommendations prior to 2014.

diverse social and cultural heritage, and undergo cultural competence training, which can include learning cultural humility and developing culturally responsive services (eg, American Speech-Language Hearing Association cultural competence check-ins; <https://www.asha.org/practice/multicultural/self/>).

Cognitive-communication #4: A person with TBI who has a cognitive-communication disorder should be provided with interventions and intervention materials that are both grounded in the principles of cognitive-communication rehabilitation and individualized, taking the person's context into account to maximize communication competence (updated from INCOG 2014,²³ Cognitive-communication 2, p. 356).

Recommended cognitive-communication interventions can be direct or indirect at any level of impairment and include:

- a. Communication partner training (level A),
- b. Communication strategy and metacognitive awareness training (level A),
- c. Reintegration to daily functions, productive activities, participation and competence, modification of the communication environment, and assistance with adjustment to impairments (level C),
- d. Communication coping treatment (level C),
- e. Focus on confidence, self-esteem, and identity formation (level C), and
- f. Provision of education and information regarding the nature of acquired cognitive-communication disorders to both the patient and close other and communication partners (level C) (adapted from INESSS-ONF 2016³³).

Level A-C evidence.

Since INCOG 2014, there has been progress regarding the development of evidence-based interventions to modify the communication environment, including providing communication training for partners of people with TBI. Two systematic reviews describe increased reports of positive outcomes from partner training intervention research with recommendations that further larger scale trials are needed.^{34,35} Trained communication partners are taught to provide support and structure to facilitate interactions, including the use of positive question-asking strategies (such as asking the person questions about their feelings and opinions), provision of new communication opportunities to give the person with TBI the floor, using scaffolding strategies such as jointly produced narratives,³⁶ providing background information to a given topic to help the person with TBI engage more easily in a conversation (ie, cognitive supports), and approaching conversations with a positive, interested attitude (ie, emotional supports). There is new evidence of the efficacy of communication partner training using telehealth from an RCT³⁷ (see Cognitive-communication #8).

Intervention should focus on improving and restoring cognitive and social communication functions, with gradual reintegration to daily functions and

productive activities, which are dependent on cognitive-communication skills.^{4,38-43} The person with TBI should be provided with interventions, which help them adjust to their cognitive-communication impairments including compensatory strategy training,⁴⁴ develop coping strategies,⁴⁵ confidence and self-esteem with a focus on identity,⁴⁶ and provision of education and information regarding the nature of acquired communication disorders.^{4,23,33} One recent education program is interact-ABI-lity (<https://abi-communication-lab.sydney.edu.au/courses/interact-abi-lity/>), which is a free online resource about communication disorders following brain injury, with the target audience including people with brain injury and all those who communicate with them.⁴⁷

Cognitive-communication #5: A cognitive-communication rehabilitation program for individuals with TBI should provide the opportunity for practicing and using communication skills in situations appropriate to the context in which the person will live, work, study, and socialize. Goal attainment scaling is recommended as a method to measure person-centered intervention outcomes (updated from INCOG 2014,²³ Cognitive-communication 4, p. 357).

Level A evidence.

This recommendation remains unchanged from INCOG 2014 based on level A evidence.²³ People with TBI often have difficulties with transfer and generalization of skills from one environment or context to another. Training communication skills within natural contexts ensures that these skills will have social and ecological validity (ie, will contribute to the individual's social, vocational, educational, and independent living success) and thus are more likely to generalize into real-life situations.⁴⁸ Anecdotally, young adults with TBI within educational settings can benefit from context-specific coaching, self-regulation learning strategies, attention to the student's literacy, use of goal setting processes to facilitate educational and social achievements, and environmental and cognitive supports.⁴⁹

Treatment should focus on improving meaningful participation in daily activities using approaches that are individualized, functional, goal- and outcome-oriented, person-centered, and grounded in the context of real communication and cognitive demands. One new vocational communication program is the Work-Related Communication (WORC) program, which is a computer-based social communication training for workplace interactions comprising didactic training, role-play, and feedback.⁴² Participants ($n = 8$) demonstrated an increase in politeness and communication partners reported a significant increase in social communication skills as reported on the La Trobe Communication Questionnaire^{50,51} in a pre-/poststudy. Decontextualized drill practice, worksheets, and brain

training programs are not recommended, as there is insufficient evidence to support or refute generalization of treatment effects to real-life activities.⁵²

A validated and clinically feasible measure to promote personally relevant goal setting and to monitor progress with cognitive-communication treatment is goal attainment scaling (GAS).^{38,53-55} The aim is to build on success and target areas where the person can achieve positive outcomes. Goal attainment, as measured by GAS, is most effective when the person with TBI is actively engaged in the goal setting process and can learn to self-monitor communication behaviors. GAS can be used within a range of cognitive-communication goals, such as topic management, awareness of personal space and inappropriate touching, and monitoring intelligibility during group conversations.⁵⁴ Social communication skills training should encompass the use of goal setting, feedback, and self-regulation with an emphasis on communication skills relevant to daily life.

Cognitive-communication #6: Individuals with severe communication disability following TBI should be provided with proper assessment to determine the appropriate augmentative and alternative communication (AAC) intervention by trained clinicians. The individual and close communication partners should be provided with training to effectively use AAC aids. This training should be ongoing as needs change and technology evolves (updated from INCOG 2014,²³ Cognitive-communication 6, p. 357).

Level C evidence.

There are no new RCTs investigating the effectiveness of AAC since INCOG 2014, which may be due to a range of issues including obtaining consent, difficulty with measuring outcomes, heterogeneity, lack of funding, or insufficient participant numbers to randomize.⁵⁶ Nonetheless, for those individuals with severe communication disability necessitating communication support, AAC should be routinely offered, as per the INCOG 2014 recommendations. AAC can be low tech, such as an alphabet board or communication book, or high tech, utilizing digital health technologies, apps, and specialized communication devices including voice output communication aids. To provide appropriate AAC support, the clinician needs to conduct a thorough evaluation of the person's potential for speech production, prognosis, communication needs and barriers, levels of literacy, best physical response to enable device use, seating/positioning/mobility requirements, and visuoperceptual and visual acuity skills. Assessment should be conducted within the context of the person's communication environment(s), and in collaboration with their everyday communication partners (as per Cognitive-communication recommendations #1-3).

Cognitive-communication #7: Clinicians should consider group therapy as an appropriate means of remediation of cognitive-communication training when social communication

impairments exist post-TBI. Where aligned with their communication goals, clinicians should consider group therapy (updated from INCOG 2014,²³ Cognitive-communication 7, p. 361).

Level A evidence.

Group interventions for people with TBI and their families offer significant positive treatment effects, and are thus recommended as a service delivery model for this population.²³ Groups have been used to treat social communication skills and emotion perception,^{57,58} social problem-solving and self-monitoring of social skills,⁵⁹⁻⁶¹ communication coping strategies in the context of communication breakdown,⁴⁵ discourse production,⁶² and metacognitive strategy instruction to improve social communication skills, with an emphasis on personalized goal setting to achieve social communication goals.^{63,64} In the one new RCT since INCOG 2014, Group Interactive Structured Treatment (GIST)⁶⁵ was compared with an alternative treatment (AT) group. GIST comprised a 13-week psychoeducational social communication curriculum in a group format, while the AT group received 12 weeks of classroom-style PowerPoint and audio presentations. Post-treatment, participants in both treatment conditions met or exceeded their self-selected functional social competence goals.⁶⁵ A 2017 pilot study of Intervention for Metacognition and Social Participation (IMPACT) training found 6 of the 8 participants achieved or exceeded their social communication goals.⁶³ Cognitive-pragmatic treatment⁶⁶⁻⁶⁸ is a group-based training program designed to improve pragmatic abilities, with pre-/poststudies supporting improvements on standardized tests and discourse measures of narrative performance; however, there have been no controlled studies and no data regarding generalization to everyday communication activities.

Cognitive-communication skills have been addressed in 2 new pilot group interventions, which aim to build competencies during authentic, natural interactions in community settings. For example, *INSIGHT* is a social group intervention, which has been trialed in a pilot study, where the person with TBI engages in everyday activities of their choice, such as going to a coffee shop, while working on individual personalized communication goals.⁵⁴ In this study, the Rehabilitation Treatment Specification System (RTSS)⁶⁹ was used as a framework to present the aims, targets, and ingredients of the group treatment, as well as the mechanisms of action that were implemented to help clients meet their goals. For example, if the *aim* was to establish and maintain friendships, the *targets* were to participate in group conversations, and use appropriate turn taking and volume control. Another example is *project-based* group treatment whereby participants determine a project they want to complete together, such as making a YouTube video, and then build their chosen project together, while

working on their individual communication goals.^{38,39} Project-based treatment has been evaluated in an exploratory controlled trial with alternate allocation to treatment arms (waitlist vs control) ($n = 21$) with moderate to large effect sizes on conversation, perceived communication ability, and quality-of-life outcome measures.³⁹

Cognitive-communication #8: Telerehabilitation is as efficacious, feasible, and acceptable for communication partner training compared to in-person intervention (INCOG 2.0).

Level B evidence.

Since INCOG 2014, telehealth has become a common service delivery model for the assessment and treatment of cognitive-communication and social cognition disorders following moderate to severe TBI. There are 2 studies, which report a rigorous RCT comparing equivalence of telehealth to an in-person communication partner training program, with the finding that participants made similar positive gains in their conversational proficiency regardless of mode of service delivery.^{19,37} Social communication skills training was administered to the person with TBI and their everyday communication partner, either in the home or via videoconferencing, with therapeutic elements including clinician modeling, video feedback, role-play, and rehearsal. The in-person group had greater improvement in purposeful conversations (talking about a given topic), and both groups improved on the Adapted Measure of Support in Conversations and Adapted Measure of Participation in Conversation⁷⁰ compared with controls. Comparisons between telehealth and in-person groups found medium to large effect sizes, favoring the telehealth group on self-reported measures of communication.³⁷ Telehealth was acceptable to participants with TBI and their family members on measures of home practice completion, session attendance, and therapeutic alliance.¹⁸

Social cognition #1: Clinicians should consider evaluating aspects of social cognition ability, including emotion perception, theory of mind (ToM), and emotional empathy. Interventions, which aim at improving emotion perception, perspective taking, ToM, and social behavior, are recommended. Computerized social cognition treatments are not recommended given lack of evidence of generalization to real-life activities (INCOG 2.0).

Level A evidence.

Social cognition can be impacted in 4 ways following a severe TBI, including impaired ToM, reduced emotional empathy, poor social perception, and abnormal social behavior.¹² Since INCOG 2014, social cognition treatments have emerged with descriptions in narrative and scoping reviews and commentaries^{14,15,71} and proof of concept studies.⁷² As a result, this is a new recommendation. There has been one rigorous RCT since INCOG 2014 of a multifaceted treatment of

social cognition and emotion regulation (T-ScEmo) ($n = 60$), a 20-hour program of individual sessions, which aimed to improve social cognition, regulation of social behavior, and participation in everyday life.⁷³ The program was divided into 3 modules, including emotion perception, perspective taking and ToM, and social behavior, with the primary aim focusing on improving social relationships. Treatment ingredients included facial feature processing, mimicry, personal emotional experiences, asking others about their thoughts and feelings, attending to the feelings of others, and social skills training. A range of outcome measures were used including the Role Resumption List (RRL),^{73,74} which assesses amount and quality of activities compared with premorbid levels. Of critical importance, the T-ScEmo group resumed previous life roles to a greater extent than the control group as measured on the RRL.

One RCT ($n = 20$) reported a brief intervention addressing recognition of emotional prosody.⁷⁵ The treatment was brief (6 hours) with structured game activities focusing on establishing a common vocabulary of emotional words and categories, and distinguishing prosodic patterns associated with emotions. While there were no significant effects for group on the primary outcome measure, which was the Awareness of Social Inference Test (TASIT),⁷⁶ 6 of the 10 treated participants individually improved on primary outcome measures, with none of the control participants improving on any measure. Small sample size was a limitation of this study.

Social cognition rehabilitation has also been investigated in a pre-/post-follow up study ($n = 15$) where cognitive pragmatic treatment included education provision about using inference in daily communication, with practice of self-monitoring and interpreting nonliteral and nonverbal communication via role-play and video feedback.⁶⁶ Improvements were noted on all modalities of the Assessment Battery for Communication (ABaCo)⁷⁷ including linguistic, extralinguistic, paralinguistic, and social appropriateness abilities. Finally, Ownsworth and colleagues⁷⁸ conducted a pre-/poststudy ($n = 21$) where participants attended a 16-week social skills group program with a focus on self-regulation skills. Improvements were noted on the Self-Regulation Skills Interview (SRSI) measure, indicating improved self-awareness, self-regulation skills, and psychosocial functioning.⁷⁸

Computerized social cognition treatments, which focus on training one aspect, such as emotion recognition training^{79,80} and social cognition training of cognitive biases, emotional processing, and ToM through the use of photographs and videos,⁷⁹ report improvements on decontextualized outcome measures; however, these studies do not report generalization of improved skills to everyday activities. Computer-based decontextualized

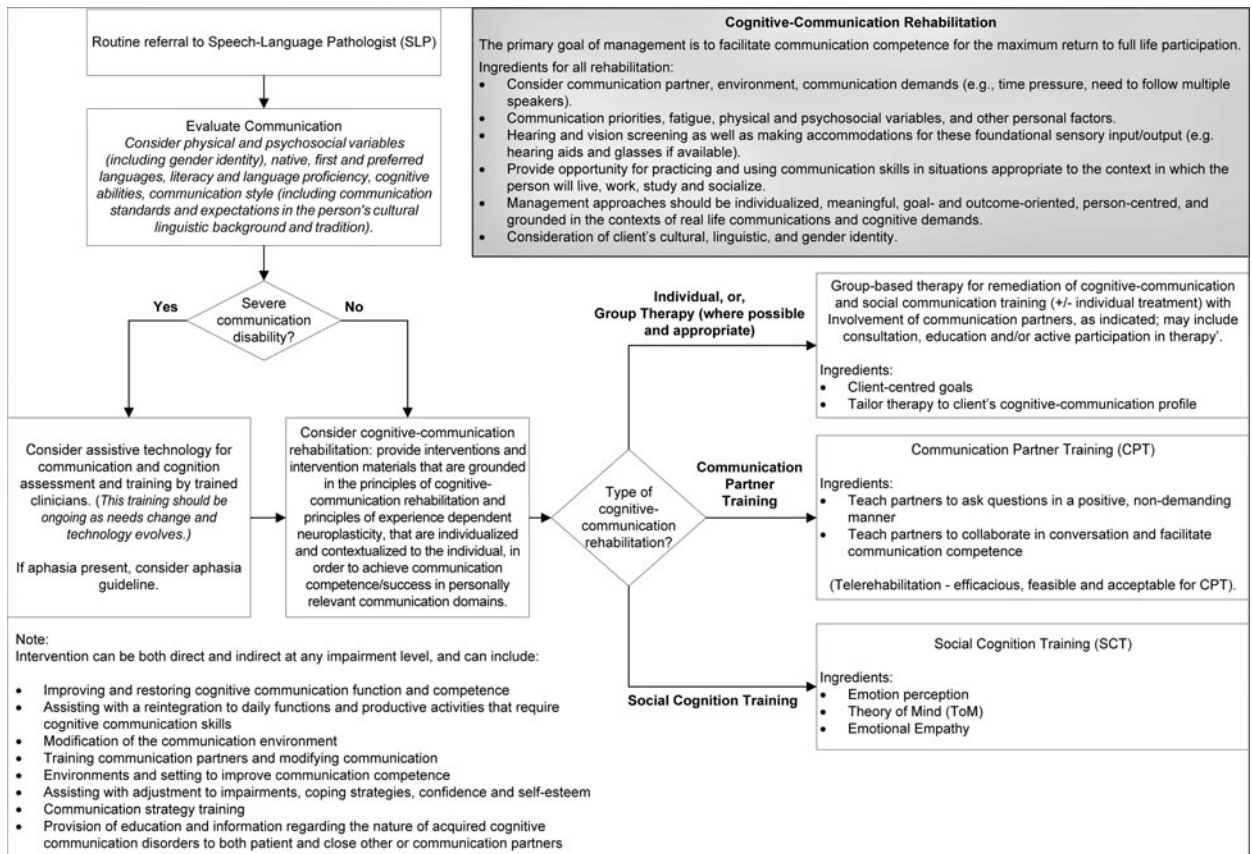


Figure 1. INCOG 2.0 Cognitive Communication and Social Cognition algorithm.

social cognition skills training is not recommended, given lack of evidence of generalization to real-life activities.

Algorithm

Clinicians are encouraged to follow the decision algorithm in Figure 1 that highlights how to navigate this series of the guidelines.

Audit tool

As indicated by the AGREE II instrument, audit criteria can include process or behavioral elements and/or clinical and health outcomes. The INCOG team has agreed upon the following 3 items from the guideline deemed most significant to clinical practice, and auditable: (i) evidence that cognitive-communication treatment and education has been provided; (ii) evidence that individuals with severe communication impairments receive assessment for and training in the use of augmentative and/or alternative communication; and (iii) communication participation in everyday social life should be measured. Table 3 outlines the items that could be audited from the chart. Clinicians and organizational leaders are encouraged to use these tools in review or audit of individual patient charts to de-

termine degree of adherence to the recommendations. This is most successful in changing practice when these audit results are fed back to the team for discussion of opportunities for improvement.

DISCUSSION

Rehabilitation of cognitive-communication disorders is an emerging field, with most new evidence comprised of pre-/poststudies with small sample sizes. Nonetheless, there have been significant theoretical advances in understanding the nature of cognitive-communication disorders, along with advances in the study of social cognition in TBI and application of findings to rehabilitation. The critical mass of social communication interventions, group treatments, and communication partner training studies has enabled narrative, scoping, and systematic reviews of the field. For example, reviews of social communication assessment and treatment approaches in TBI by the Academy of Neurological Communication Sciences and Disorders^{81,82} reflect the maturation of our understanding of how and why treatments work for cognitive-communication disorders. Informed by the Rehabilitation Treatment Specification System,⁸³ it is now possible to identify not only effective treatments, but the components that contribute

TABLE 3 Audit guidelines for priority recommendations: Cognitive-communication

Intervention (guideline recommendation)	Specific activities, devices, or tools	Assessment of need and effectiveness	Patient characteristics	Discipline
<p><i>Cognitive-communication treatment and education and training of communication partners</i></p> <p>A person with TBI who has a cognitive-communication disorder should be provided with interventions and intervention materials that are grounded in the principles of patient- and client-centered rehabilitation and that are individualized and contextualized to the individual, to support the individual in achieving communication competence/success in personally relevant communication domains (eg, medical/rehabilitation communication, family communications, community communications, social communication, workplace communication, academic communication, information management and problem-solving communication and overall literacy). Cognitive communication treatment should be provided by a speech-language pathologist (updated from INCOG 2014,²³ Cognitive-communication 2, p. 356).</p> <p><i>Note:</i> The primary goal of management is to facilitate success communication competence for the maximum return to full life participation. Evidence to date favors management approaches that are individualized, meaningful, goal- and outcome-oriented, patient-centered, and grounded in the contexts of real-life communications and cognitive demands. Intervention should take place in a variety of environments and should provide opportunities for rehearsal of communication skills (Togher et al²³). Intervention can be both direct and indirect at any impairment level, and can include:</p> <ul style="list-style-type: none"> • Improving cognitive-communication function and communication competence • Assisting with reintegration into everyday activities and roles that require cognitive-communication skills • Modification of the communication environment • Training communication partners and modifying communication contexts to support effective communication • Assisting with adjustment to impairments, and development of coping strategies, confidence, and self-esteem • Communication strategy training 	<ul style="list-style-type: none"> • Speech-language pathology treatment program documented • Assessment for need conducted • Training provided 	<ul style="list-style-type: none"> • Cognitive-communication impairment • Social cognition impairment 	<ul style="list-style-type: none"> • SLP • OT • PT • MD • Neuro • Other 	

(continues)

TABLE 3 *Audit guidelines for priority recommendations: Cognitive-communication (Continued)*

Intervention (guideline recommendation)	Specific activities, devices, or tools	Assessment of need and effectiveness	Patient characteristics	Discipline
<p>Providing education and information regarding the nature of acquired cognitive-communication disorders to both patient and close other or communication partners</p>				
<p><i>Prescription of augmentative and alternative communication devices</i> Individuals with severe communication disability following traumatic brain injury should be assessed by trained clinicians to determine appropriate augmentative and alternative communication intervention. The individual and close communication partners should be provided with training to effectively use augmentative and alternative communication aids. This training should be ongoing as needs change and technology evolves.</p>		<ul style="list-style-type: none"> • Assessment for need conducted • Low-tech or high tech AAC systems are in place or have been trialed • Training provided 	<ul style="list-style-type: none"> • Severe communication impairment (e, unintelligible speech or lack of production of speech) • Unable to meet communication needs as per baseline 	<ul style="list-style-type: none"> • SLP • OT • PT • MD • Neuro • Other
<p><i>Communication participation in everyday social life should be measured</i> Clinicians should consider group therapy as an appropriate means of intervention for communication and social skills when the individual has social communication impairments and group therapy aligns with the individual's communication goals.</p>		<ul style="list-style-type: none"> • Results of assessment of participation in social life reported • Patient-identified goals measured and reported group training • Individual training 	<ul style="list-style-type: none"> • Cognitive-communication impairment • Social cognition impairments 	<ul style="list-style-type: none"> • SLP • OT • PT • MD • Neuro • Other

Abbreviations: AAC, augmentative and alternative communication; TBI, traumatic brain injury.

to improved cognitive-communication outcomes. For example, behavioral shaping, feedback, modeling, use of multiple exemplars to promote generalization, and opportunities for high-dose practice are important ingredients in social communication interventions that aim to improve skills or establish new communication strategies,⁸¹ and most social communication treatment studies include these ingredients. Reinforcement is a commonly used ingredient, such as the use of verbal praise⁸⁴ through to primary reinforcers such as chocolate.⁸⁵ Role-play is a common instructional activity as well as clinician feedback and to a lesser extent, peer feedback. Self-monitoring and self-regulation of social communication behaviors were reported in 67% of 21 treatment studies reported by Meulenbroek et al,⁸² with an emphasis on the acquisition and generalization of social communication problem-solving strategies, behavior regulation, and emotion regulation skills. Cognitive behavioral treatment and awareness training was reported in 20% of studies. Most treatment programs (20 of the 21 studies reported) featured both behavioral and cognitive elements that comprised a treatment “package” including clinician modeling of the target behavior and feedback to facilitate acquisition of a new skill, followed by cognitive elements such as self-monitoring of behavior and use of the newly acquired communication behavior in new contexts.⁸²

Meulenbroek et al⁸² suggested the following 3 considerations when designing communication interventions: (1) all social communication interventions require voluntary participation from the treatment participant,²³ thus, the intervention should be based on client ability and need and client awareness, motivation, and engagement should be addressed; (2) it is important to promote and measure accuracy, efficiency, and stability of performance during cognitive-communication treatment; and (3) generalization needs to be planned for, and will be facilitated by using context-sensitive treatment approaches.⁸⁶ The ingredients to support this process include home practice, regular daily practice within everyday contexts, group therapy, family involvement in treatment, and a focus on the positive changes that can occur within the person’s life when their communication skills improve.

Finally, recent advances in technology and Internet access have led to increased access and uptake of online and virtual treatments. Increasing reliance on telehealth will lead to the development of new cognitive and social communication treatment domains, such as facilitating interaction by the person with TBI in the digital world, and learning how to engage safely and effectively with social media platforms.⁸⁷ These new advances are already necessitating that clinicians develop new competencies to work within the digital and virtual health space, leading to the development of knowledge and performance competencies in this field.⁸⁸

Current state of practice

Since INCOG 2014, the evidence base supporting cognitive-communication treatments has continued to expand. The development of new models of cognitive-communication competence⁴ and social cognition¹⁴ has shaped efforts to develop multifaceted, contextualized group treatments such as the T-ScEmo,⁷³ IMPACT,⁶⁴ and INSIGHT.⁵⁴ The development of TBI ConneCT¹⁹ has enabled evidence-based communication partner training via telehealth. Measuring outcomes of treatment has been clarified with a consensus article on outcome measures for adults with moderate to severe TBI, which recommends 8 communication measures, and 2 social cognition measures,¹³ and the use of GAS is accepted as best practice. Finally, as stated in INCOG 2014,^{23(p365)} “we recognize that a person’s cognitive-communication ability should not be evaluated and treated as an isolated skill but should be viewed within the broader context of the person’s everyday communication needs.”

CONCLUSION

The INCOG 2.0 recommendations reflect the new evidence for rehabilitation of cognitive-communication disorders, particularly social interactions, communication partner training, both in person and via telehealth delivery, and group interventions to improve cognitive-communication disorders. Evidence is emerging for the rehabilitation of social cognition; however, the impact on participation outcomes needs further research.

REFERENCES

1. Meulenbroek P, Bowers B, Turkstra LS. Characterizing common workplace communication skills for disorders associated with traumatic brain injury: a qualitative study. *J Vocat Rehabil.* 2016;44(1): 15–31. doi:10.3233/JVR-150777
2. Shorland J, Douglas JM. Understanding the role of communication in maintaining and forming friendships following traumatic brain injury. *Brain Inj.* 2010;24(4):569–580. doi:10.3109/02699051003610441
3. College of Audiologists and Speech-Language Pathologists of Ontario. *Practice Standards and Guidelines for Acquired Cognitive Communication Disorders.* College of Audiologists and Speech-Language Pathologists of Ontario; 2015.
4. MacDonald S. Introducing the model of cognitive-communication competence: a model to guide evidence-based communication interventions after brain injury. *Brain Inj.* 2017; 31(13/14):1760–1780. doi:10.1080/02699052.2017.1379613

5. Struchen MA, Pappadis MR, Sander AM, Burrows CS, Myszka KA. Examining the contribution of social communication abilities and affective/behavioral functioning to social integration outcomes for adults with traumatic brain injury. *J Head Trauma Rehabil.* 2011;26(1):30–42. doi:10.1097/HTR.0b013e3182048f7c
6. Bond F, Godfrey HP. Conversation with traumatically brain-injured individuals: a controlled study of behavioural changes and their impact. *Brain Inj.* 1997;11(5):319–329. doi:10.1080/026990597123476
7. Elbourn E, Kenny B, Power E, Togher L. Psychosocial outcomes of severe traumatic brain injury in relation to discourse recovery: a longitudinal study up to 1 year post-injury. *Am J Speech Lang Pathol.* 2019;28(4):1463–1478. doi:10.1044/2019_AJSLP-18-0204
8. McDonald S. Impairments in social cognition following severe traumatic brain injury. *J Int Neuropsychol Soc.* 2013;19(3):231–246. doi:10.1017/S1355617712001506
9. Milders M. Relationship between social cognition and social behaviour following traumatic brain injury. *Brain Inj.* 2018;33(1):62–68. doi:10.1080/02699052.2018.1531301
10. Williams WH, Chitsabesan P, Fazel S, et al. Traumatic brain injury: a potential cause of violent crime? *Lancet Psychiatry.* 2018; 5(10):836–844. doi:10.1016/s2215-0366(18)30062-2
11. Jetswaart M, Milders M, Crawford JR, Currie D, Scott CL. Longitudinal aspects of emotion recognition in patients with traumatic brain injury. *Neuropsychologia.* 2008;46(1):148–159. doi:10.1016/j.neuropsychologia.2007.08.002
12. Henry JD, Von Hippel W, Molenberghs P, Lee T, Sachdev PS. Clinical assessment of social cognitive function in neurological disorders. *Nat Rev Neurol.* 2016;12(1):28–39. doi:10.1038/nrn.2015.229
13. Honan CA, McDonald S, Tate R, et al. Outcome instruments in moderate-to-severe adult traumatic brain injury: recommendations for use in psychosocial research. *Neuropsychol Rehabil.* 2019; 29(6):896–916. doi:10.1080/09602011.2017.1339616
14. Cassel A, McDonald S, Kelly M, Togher L. Learning from the minds of others: a review of social cognition treatments and their relevance to traumatic brain injury. *Neuropsychol Rehabil.* 2019; 29(1):22–55. doi:10.1080/09602011.2016.1257435
15. Vallat-Azouvi C, Azouvi P, Le-Bornec G, Brunet-Gouet E. Treatment of social cognition impairments in patients with traumatic brain injury: a critical review. *Brain Inj.* 2019;33(1):87–93. doi:10.1080/02699052.2018.1531309
16. Academy of Neurologic Communication Disorders Traumatic Brain Injury Writing Committee; Byom L, O'Neil-Pirozzi TM, et al. Social communication following adult traumatic brain injury: a scoping review of theoretical models. *Am J Speech Lang Pathol.* 2020;29(3):1735–1748. doi:10.1044/2020_AJSLP-19-00020
17. Wiseman-Hakes C, Kakonge L, Doherty M, Beauchamp M. A conceptual framework of social communication: clinical applications to pediatric traumatic brain injury. *Semin Speech Lang.* 2020;41(2): 143–160. doi:10.1055/s-0040-1701683
18. Rietdijk R, Power E, Attard M, Togher L. Acceptability of telehealth-delivered rehabilitation: experiences and perspectives of people with traumatic brain injury and their carers. *J Telemed Telecare.* 2022;28(2):122–134. doi:10.1177/1357633x20923824
19. Rietdijk R, Power E, Attard M, Heard R, Togher L. Improved conversation outcomes after social communication skills training for people with traumatic brain injury and their communication partners: a clinical trial investigating in-person and telehealth delivery. *J Speech Lang Hear Res.* 2020;63(2):615–632. doi:10.1044/2019_JSLHR-19-00076
20. Ramage A. Potential for cognitive communication impairment in COVID-19 survivors: a call to action for speech-language pathologists. *Am J Speech Lang Pathol.* 2020;29(4):1821–1832. doi:10.1044/2020_AJSLP-20-00147
21. Ponsford J, Trevena-Peters J, Janzen S, et al. INCOG 2.0 guidelines for cognitive rehabilitation following traumatic brain injury, part I: posttraumatic amnesia. *J Head Trauma Rehabil.* 2023;38(1):24-37. doi:10.1097/HTR.0000000000000840
22. Bayley M, Janzen S, Harnett A, et al. INCOG 2.0 guidelines for cognitive rehabilitation following traumatic brain injury: methods, overview and principles. *J Head Trauma Rehabil.* 2023;38(1):7-23. doi:10.1097/HTR.0000000000000838
23. Togher L, Wiseman-Hakes C, Douglas JD, et al. INCOG recommendations for management of cognition following traumatic brain injury, part IV: cognitive communication. *J Head Trauma Rehabil.* 2014;29(4):353–368. doi:10.1097/HTR.0000000000000071
24. Sarno MT, Buonagaro A, Levita E. Characteristics of verbal impairment in closed-head injured patients. *Arch Phys Med Rehabil.* 1986;67(6):400–405.
25. Morgan A. Dysarthria in children and adults with TBI. In: McDonald S, Togher L, Code C, eds. *Social and Communication Disorders Following Traumatic Brain Injury.* Psychology Press; 2013: 218–257.
26. Togher L, Keegan LC, Elbourn E. *Assessment and Treatment of Speech and Language Disorders Following Traumatic Brain Injury.* In: Zasler ND, Katz DI, Zafonte RD, et al., eds. Springer Publishing Company; 2022:1026–1039.
27. Maas AIR, Menon DK, Adelson PD, et al. Traumatic brain injury: integrated approaches to improve prevention, clinical care, and research. *Lancet Neurol.* 2017;16(12):987–1048. doi:10.1016/S1474-4422(17)30371-X
28. Gould KR, Ponsford JL, Spitz G. Association between cognitive impairments and anxiety disorders following traumatic brain injury. *J Clin Exp Neuropsychol.* 2014;36(1):1–14. doi:10.1080/13803395.2013.863832
29. Hammond FM, Corrigan JD, Ketchum JM, et al. Prevalence of medical and psychiatric comorbidities following traumatic brain injury. *J Head Trauma Rehabil.* 2019;34(4):E1–E10. doi:10.1097/htr.0000000000000465
30. Sander AM, Lequerica AH, Ketchum JM, et al. Race/ethnicity and retention in traumatic brain injury outcomes research: a traumatic brain injury model systems national database study. *J Head Trauma Rehabil.* 2018;33(4):219–227. doi:10.1097/htr.0000000000000395
31. Hersh D, Armstrong E, McAllister M, et al. General practitioners' perceptions of their communication with Australian Aboriginal patients with acquired neurogenic communication disorders. *Patient Educ Couns.* 2019;102(12):2310–2317. doi:10.1016/j.pec.2019.07.029
32. Warren KL, García JJ. Centering race/ethnicity: differences in traumatic brain injury inpatient rehabilitation outcomes. *PM R.* Published online November 13, 2021. doi:10.1002/pmjr.12737
33. Bayley M, Swaine B, Lamontagne M, et al. *INESSS-ONF Clinical Practice Guideline for the Rehabilitation of Adults With Moderate to Severe TBI.* Ontario Neurotrauma Foundation; 2016.
34. Wiseman-Hakes C, Ryu H, Lightfoot D, Kukreja G, Colantonio A, Matheson FI. Examining the efficacy of communication partner training for improving communication interactions and outcomes for individuals with traumatic brain injury: a systematic review. *Arch Rehabil Res Clin Transl.* 2020;2(1):100036. doi:10.1016/j.arct.2019.100036
35. Behn N, Francis J, Togher L, Hatch E, Moss B, Hilari K. Description and effectiveness of communication partner training in TBI: a systematic review. *J Head Trauma Rehabil.* 2021;36(1):56–71. doi:10.1097/htr.0000000000000580
36. Jorgensen M, Togher L. Narrative after traumatic brain injury: a comparison of monologic and jointly-produced discourse. *Brain Inj.* 2009;23(9):727–740. doi:10.1080/02699050903133954
37. Rietdijk RB, Power EP, Attard MP, Heard RP, Togher LP. A clinical trial investigating telehealth and in-person social communication

- skills training for people with traumatic brain injury: participant-reported communication outcomes. *J Head Trauma Rehabil.* 2020; 35(4):241–253. doi:10.1097/HTR.0000000000000554
38. Behn N, Marshall J, Togher L, Cruice M. Setting and achieving individualized social communication goals for people with acquired brain injury (ABI) within a group treatment. *Int J Lang Commun Disord.* 2019;54(5):828–840. doi:10.1111/1460-6984.12488
 39. Behn N, Marshall J, Togher L, Cruice M. Feasibility and initial efficacy of project-based treatment for people with ABI. *Int J Lang Commun Disord.* 2019;54(3):465–478. doi:10.1111/1460-6984.12452
 40. Lê K, Coelho C, Fiszdon J. Systematic review of discourse and social communication interventions in traumatic brain injury. *Am J Speech Lang Pathol.* 2022;31(2):991–1022. doi:10.1044/2021_ajslp-21-00088
 41. Larkins BM, Worrall LE, Hickson LM. Stakeholder opinion of functional communication activities following traumatic brain injury. *Brain Inj.* 2004;18(7):691–706. doi:10.1080/02699050310001617389
 42. Meulenbroek P, Cherney LR. Computer-based workplace communication training in persons with traumatic brain injury: the work-related communication program. *J Commun Disord.* 2021;91:106104. doi:10.1016/j.jcomdis.2021.106104
 43. Parente R, Stapleton M. Development of a cognitive strategies group for vocational training after traumatic brain injury. *NeuroRehabilitation.* 1999;13(1):13–20. doi:10.3233/NRE-1999-13103
 44. Cicerone KD, Goldin Y, Ganci K, et al. Evidence-based cognitive rehabilitation: systematic review of the literature from 2009 through 2014. *Arch Phys Med Rehabil.* 2019;100(8):1515–1533. doi:10.1016/j.apmr.2019.02.011
 45. Douglas JM, Knox L, De Maio C, Bridge H, Drummond M, Whiteoak J. Effectiveness of communication-specific coping intervention for adults with traumatic brain injury: preliminary results. *Neuropsychol Rehabil.* 2019;29(1):73–91. doi:10.1080/09602011.2016.1259114
 46. Ylvisaker M, Feeney T. Reconstruction of identity after brain injury. *Brain Impair.* 2000;1(1):12–28. doi:10.1375/brim.1.1.12
 47. Togher L, Brunner M, Power E, Avramović P, Miao M, Riedijk R. interact-ABI-lity. Published 2022. <https://abi-communication-lab.sydney.edu.au/courses/interact-abi-lity>
 48. Ylvisaker M, Turkstra LS, Coelho C. Behavioral and social interventions for individuals with traumatic brain injury: a summary of the research with clinical implications. *Semin Speech Lang.* 2005; 26(4):256–267. doi:10.1055/s-2005-922104
 49. Kennedy MRT. *Coaching College Students With Executive Function Problems.* The Guilford Press; 2017.
 50. Douglas JM, O'Flaherty CA, Snow PC. Measuring perception of communicative ability: the development and evaluation of the La Trobe Communication Questionnaire. *Aphasiology.* 2000;14(3): 251–268. doi:10.1080/026870300401469
 51. Douglas JM, Bracy CA, Snow PC. Measuring perceived communicative ability after traumatic brain injury: reliability and validity of the La Trobe Communication Questionnaire. *J Head Trauma Rehabil.* 2007;22(1):31–38. doi:10.1097/00001199-200701000-00004
 52. Politis AM, Norman RS. Computer-based cognitive rehabilitation for individuals with traumatic brain injury: a systematic review. *Perspect ASHA Spec Interest Groups.* 2016;1(2):18–46. doi:10.1044/persp1.SIG2.18
 53. Kiresuk T, Sherman R. Goal attainment scaling: a general method for evaluating comprehensive community mental health programs. *Community Ment Health J.* 1968;4(6):443–453. doi:10.1007/BF01530764
 54. Keegan L, Murdock M, Suger C, Togher L. Improving natural social interaction: group rehabilitation after traumatic brain injury. *Neuropsychol Rehabil.* 2020;30(8):1497–1522. doi:10.1080/09602011.2019.1591464
 55. Howell S, Beeke S, Pring T, Varley R. Measuring outcomes of a peer-led social communication skills intervention for adults with acquired brain injury: a pilot investigation. *Neuropsychol Rehabil.* 2021;31(7):1069–1090. doi:10.1080/09602011.2020.1760892
 56. Gandhi P, Tobin S, Vongphakdi M, Copley A, Watter K. A scoping review of interventions for adults with dysarthria following traumatic brain injury. *Brain Inj.* 2020;34(4):466–479. doi:10.1080/02699052.2020.1725844
 57. McDonald S, Tate R, Togher L, et al. Social skills treatment for people with severe, chronic acquired brain injuries: a multicenter trial. *Arch Phys Med Rehabil.* 2008;89(9):1648–1659. doi:10.1016/j.apmr.2008.02.029
 58. Bornhofen C, McDonald S. Treating deficits in emotion perception following traumatic brain injury. *Neuropsychol Rehabil.* 2008; 18(1):22–44. doi:10.1080/09602010601061213
 59. Braden C, Hawley L, Newman J, Morey C, Gerber D, Harrison-Felix C. Social communication skills group treatment: a feasibility study for persons with traumatic brain injury and comorbid conditions. *Brain Inj.* 2010;24(11):1298–1310. doi:10.3109/02699052.2010.506859
 60. Dahlberg CA, Cusick CP, Hawley LA, et al. Treatment efficacy of social communication skills training after traumatic brain injury: a randomized treatment and deferred treatment controlled trial. *Arc Phys Med Rehabil.* 2007;88(12):1561–1573. doi:10.1016/j.apmr.2007.07.033
 61. Helffenstein DA, Wechsler FS. The use of interpersonal process recall (IPR) in the remediation of interpersonal and communication skill deficits in the newly brain-injured. *Clin Neuropsych.* 1982;4(3): 139–143.
 62. Whitworth A, Ng N, Timms L, Power E. Exploring the viability of NARNIA with cognitive-communication difficulties: a pilot study. *Semin Speech Lang.* 2020;41(1):83–98. doi:10.1055/s-0039-3400512
 63. Finch E, Cornwell P, Copley A, Doig E, Fleming J. Remediation of social communication impairments following traumatic brain injury using metacognitive strategy intervention: a pilot study. *Brain Inj.* 2017;31(13/14):1830–1839. doi:10.1080/02699052.2017.1346284
 64. Copley A, Smith C, Finch E, Fleming J, Cornwell P. Does metacognitive strategy instruction improve impaired self-awareness in adults with cognitive-communication disorders following an acquired brain injury? *Speech Language Hearing.* 2022;22(2):125–137. doi:10.1080/2050571X.2020.1816403
 65. Harrison-Felix C, Newman JK, Hawley L, et al. Social Competence treatment after traumatic brain injury: a multicenter, randomized controlled trial of interactive group treatment versus noninteractive treatment. *Arch Phys Med Rehabil.* 2018;99(11):2131–2142. doi:10.1016/j.apmr.2018.05.030
 66. Gabbatore IP, Sacco KP, Angeleri RP, Zettin MPS, Bara BGMDP, Bosco FMP. Cognitive pragmatic treatment: a rehabilitative program for traumatic brain injury individuals. *J Head Trauma Rehabil.* 2015;30(5):E14–E28. doi:10.1097/HTR.0000000000000087
 67. Bosco FM, Parola A, Angeleri R, Galetto V, Zettin M, Gabbatore I. Improvement of communication skills after traumatic brain injury: the efficacy of the cognitive pragmatic treatment program using the communicative activities of daily living. *Arc Clin Neuropsychol.* 2018;33(7):875–888. doi:10.1093/arclin/acy041
 68. Parola A, Bosco FM, Gabbatore I, Galetto V, Zettin M, Marini A. The impact of the cognitive pragmatic treatment on the pragmatic and informative skills of individuals with traumatic brain injury (TBI). *J Neurolinguistics.* 2019;51:53–62. doi:10.1016/j.jneuroling.2018.12.003
 69. Turkstra LS, Norman R, Whyte J, Dijkers MP, Hart T. Knowing What We're Doing: Why Specification of Treatment Methods

- Is Critical for Evidence-Based Practice in Speech-Language Pathology. *Am J Speech Lang Pathol*. 2016;25(2):164–171. doi:10.1044/2015_ajslp-15-0060
70. Togher L, McDonald S, Tate R, Power E, Rietdijk R. Measuring the social interactions of people with TBI and their communication partners: the adapted Kagan scales. *Aphasiology*. 2010;24(6-8):914–927. doi:10.1080/02687030903422478
 71. Avramović P, Kenny B, Power E, et al. Exploring the relationship between cognition and functional verbal reasoning in adults with severe traumatic brain injury at six months postinjury. *Brain Inj*. 2017;31(4):502–516. doi:10.1080/02699052.2017.1280854
 72. Cassel A, McDonald S, Kelly M. Establishing “proof of concept” for a social cognition group treatment program (SIFT IT) after traumatic brain injury: two case studies. *Brain Inj*. 2020;34(13/14):1781–1793. doi:10.1080/02699052.2020.1831072
 73. Westerhof-Evers HJ, Visser-Keizer AC, Fasotti L, et al. Effectiveness of a Treatment for Impairments in Social Cognition and Emotion Regulation (T-ScEmo) after traumatic brain injury: a randomized controlled trial. *J Head Trauma Rehabil*. 2017;32(5):296–307. doi:10.1097/htr.0000000000000332
 74. Spikman JM, Boelen DH, Lamberts KF, Brouwer WH, Fasotti L. Effects of a multifaceted treatment program for executive dysfunction after acquired brain injury on indications of executive functioning in daily life. *J Int Neuropsychol Soc*. 2010;16(1):118–129. doi:10.1017/s1355617709991020
 75. McDonald S, Togher L, Tate R, Randall R, English T, Gowland A. A randomised controlled trial evaluating a brief intervention for deficits in recognising emotional prosody following severe ABI. *Neuropsychol Rehabil*. 2013;23(2):267–286. doi:10.1080/09602012.751340
 76. McDonald S, Flanagan S, Rollins J. *The Awareness of Social Inference Test (TASIT)*. ASSBI Resources; 2003.
 77. Angeleri R, Bosco FM, Gabbatore I, Bara BG, Sacco K. Assessment battery for communication (ABaCo): normative data. *Behav Res Methods*. 2012;44(3):845–861. doi:10.3758/s13428-011-0174-9
 78. Ownsworth TL, McFarland K, McYoung R. Self-awareness and psychosocial functioning following acquired brain injury: an evaluation of a group support programme. *Neuropsychol Rehabil*. 2000;10(5):465–484. doi:10.1080/09602010050143559
 79. Rodríguez-Rajo P, García-Rudolph A, Sánchez-Carrión R, Aparicio-López C, Enseñat-Cantallops A, García-Molina A. Computerized social cognitive training in the subacute phase after traumatic brain injury: a quasi-randomized controlled trial. *Appl Neuropsychol Adult*. Published online February 23, 2022. doi:10.1080/23279095.2022.2042693
 80. Neumann D, Babbage DR, Zupan B, Willer B. A randomized controlled trial of emotion recognition training after traumatic brain injury. *J Head Trauma Rehabil*. 2015;30(3):E12–E23. doi:10.1097/htr.0000000000000054
 81. Sohlberg MM, MacDonald S, Byom L, et al. Social communication following traumatic brain injury part I: state-of-the-art review of assessment tools. *Int J Speech Lang Pathol*. 2019;21(2):115–127. doi:10.1080/17549507.2019.1583280
 82. Meulenbroek P, Ness B, Lemoncello R, et al. Social communication following traumatic brain injury part 2: identifying effective treatment ingredients. *Int J Speech Lang Pathol*. 2019;21(2):128–142. doi:10.1080/17549507.2019.1583281
 83. Whyte J, Dijkers MP, Hart T, et al. Development of a theory-driven rehabilitation treatment taxonomy: conceptual issues. *Arch Phys Med Rehabil*. 2014;95(1, suppl):S24–S32.e2. doi:10.1016/j.apmr.2013.05.034
 84. Braunling-McMorrow D, Lloyd K, Fralish K. Teaching social skills to head injured adults. *J Rehabil*. 1986;52(1):39–44.
 85. Giles GM, Fussey I, Burgess P. The behavioural treatment of verbal interaction skills following severe head injury: a single case study. *Brain Inj*. 1988;2(1):75–79. doi:10.3109/02699058809150933
 86. Ylvisaker M, Feeney TJ, Urbanczyk B. A social-environmental approach to communication and behavior after traumatic brain injury. *Semin Speech Lang*. 1993;14(1):74–86. doi:10.1055/s-2008-1064160
 87. Brunner M, Palmer S, Togher L, Hemsley B. “I kind of figured it out”: the views and experiences of people with traumatic brain injury (TBI) in using social media—self-determination for participation and inclusion online. *Int J Lang Commun Disord*. 2019;54(2):221–233. doi:10.1111/1460-6984.12405
 88. Brunner M, McGregor D, Keep M, et al. An eHealth capabilities framework for graduates and health professionals: mixed-methods study. *J Med Internet Res*. 2018;20(5):e10229. doi:10.2196/10229
 89. American Speech Language Hearing Association. *Scope of Practice in Speech-Language Pathology [Scope of Practice]*. American Speech Language Hearing Association; 2016. www.asha.org/policy/
 90. Togher L, McDonald S, Tate R, Rietdijk R, Power E. The effectiveness of social communication partner training for adults with severe chronic TBI and their families using a measure of perceived communication ability. *NeuroRehabilitation*. 2016;38(3):243–255. doi:10.3233/NRE-151316
 91. McDonald S. What’s new in the clinical management of disorders of social cognition? *Brain Impairment*. 2017;18(1):2–10. doi:10.1017/BrImp.2017.2
 92. Turkstra LS, Mutlu B, Ryan CW, et al. Sex and gender differences in emotion recognition and theory of mind after TBI: a narrative review and directions for future research. *Front Neurol*. 2020;11:59–59. doi:10.3389/fneur.2020.00059