

**Assistive Technology Supporting Independence after Acquired Brain Injuries: A
Systematic Review**

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Abstract

Importance: Acquired brain injuries (ABI) often result in cognitive impairments that limit independence in ADL's, including meal preparation. Assistive technologies have been identified as a potential intervention to improve safety, independence, and community participation for individuals living with ABI.

Objective: To identify, evaluate, and synthesize the current literature concerning the efficacy of assistive technology use with acquired brain injury patients to support independence.

Data Sources: A literature search was conducted between May 20, 2026 and May 28, 2026. Follow up searches were conducted on May 31, 2026. Databases included CINAHL Complete, Academic Search Complete, and MEDLINE using Hawai'i Pacific University's online library databases. Search terms included (traumatic brain injury or head injury or acquired brain injury or tbi or abi) AND (occupational therapy or occupational therapist or occupational therapists or OT) AND (assistive technology or assistive devices or devices or adaptive technology), as well as combinations of these terms.

Study Selection and Data Collection: This systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Published studies on assistive technology supporting independence after acquired brain injuries and traumatic brain injuries were included in the systematic review. Systematic reviews, scoping reviews, dissertations, and conference proceedings were excluded..

Findings: A total of six studies were included in this systematic review, representing Level III and Level IV evidence according to the American Occupational Therapy Association's Levels of Evidence. The outcomes of these studies indicate that assistive technologies, such as COOK,

were associated with improved safety, increased task performance, greater independence, and enhanced confidence. This resulted in reducing caregiver burden and supported community living.

Conclusion and Relevance: Evidence suggests that some assistive technologies, specifically the Cognitive Orthosis for coOKing (COOK), can support increased independence and safety during meal preparation for individuals with traumatic brain injuries.

Key words: ABI, acquired brain injury, assistive devices, assistive technology, occupational therapy, TBI, traumatic brain injury

Assistive Technology Supporting Independence after Acquired Brain Injuries: A Systematic Review

Acquired brain injury (ABI) is a significant public health concern that encompasses both traumatic and non-traumatic brain injuries, which can impair an individual's physical, psychological, and cognitive health (Zarshenas et al., 2023). Individuals living with traumatic brain injury (TBI) may experience cognitive deficits that create lasting challenges that limit independence in everyday living (Zarshenas et al., 2022). Meal preparation is amongst the many daily activities that are impacted by these impairments (Zarshenas et al., 2022). There is a growing interest in the use of assistive technologies for cognition (ATC), which utilize specialized tools during everyday tasks, to support people with cognitive impairments (Gagnon-Roy et al., 2022). A leading example is the Cognitive Orthosis for coOKing (COOK), a context-aware technology that combines security features with a cognitive assistance technology to help individuals safely and independently navigate meal preparation (Pinard et al., 2021).

Meal Preparation is a complex and meaningful instrumental activity of daily living (IADL) that requires multiple cognitive abilities including planning, working memory, and executive functions (Gagnon-Roy et al., 2023). For individuals who have acquired an ABI or TBI, these cognitive demands become barriers to independence (Zarshenas et al., 2022). Meal preparation involves characteristics of heat and sharp objects, and many individuals with TBI are restricted from cooking due to safety risks (Gagnon-Roy et al., 2023). Loss of independence can lead to an increase in caregiver burden, due to their loved one's reliance on their support to perform many daily activities (Gagnon-Roy et al., 2023).

To address these challenges, ATC has emerged to provide a new approach to cognitive rehabilitation (Gagnon-Roy et al., 2023). Many existing technologies focus on single

impairments which results in a lack of support for context-aware solutions for demanding multi-step tasks, like cooking (Pinard et al., 2021). In response, COOK was designed to support both the cognitive operations and the safety requirements of meal preparation (Pinard et al., 2021).

Several studies have demonstrated the effectiveness of COOK as an assistive technology for supporting meal preparation. Research regarding the implementation of COOK as an assistive technology for meal preparation has been documented through several studies. Early testing showed that COOK enables individuals with ABI or TBI to resume safe and independent meal preparation (Pinard et al., 2021). These evaluations indicated the technology is both usable and well designed, though studies did identify technological issues and navigation inconsistencies that produced barriers to its use (Gagnon-Roy et al., 2022). Extensive feedback from individuals with ABI and TBI, along with their families and healthcare providers further confirmed that COOK significantly reduces caregiver burden and overcomes cognitive challenges associated with meal preparation (Gagnon-Roy et al., 2022; Zarshenas et al., 2022). However, barriers to the implementation and sustained use of COOK include limited financial support, inadequate training, and reduced user motivation (Zarshenas et al., 2022, 2023).

Recent research has focused on real world applications in private home settings and supported community residences and has determined COOK improves independence and safety compared to traditional methods if there is adequate technical support, specialized training, and environmental considerations prior to implementation (Gagnon-Roy et al., 2023, 2022; Zarshenas et al., 2021). Studies involving clinicians and caregivers have highlighted that COOK is a promising tool for increasing independence (Gagnon-Roy et al., 2023; Pinard et al., 2021; Zarshenas et al., 2021). Collectively, these studies have documented the implementation of COOK and identified its advantages and barriers, supporting its feasibility as an assistive

technology solution for individuals with acquired brain injuries (Gagnon-Roy et al., 2022, 2023; Zarshenas et al., 2021, 2022, 2023). The purpose of this systematic review was to examine and analyze the strength of the evidence regarding the effectiveness of assistive technology interventions in supporting independence among individuals with traumatic brain injury.

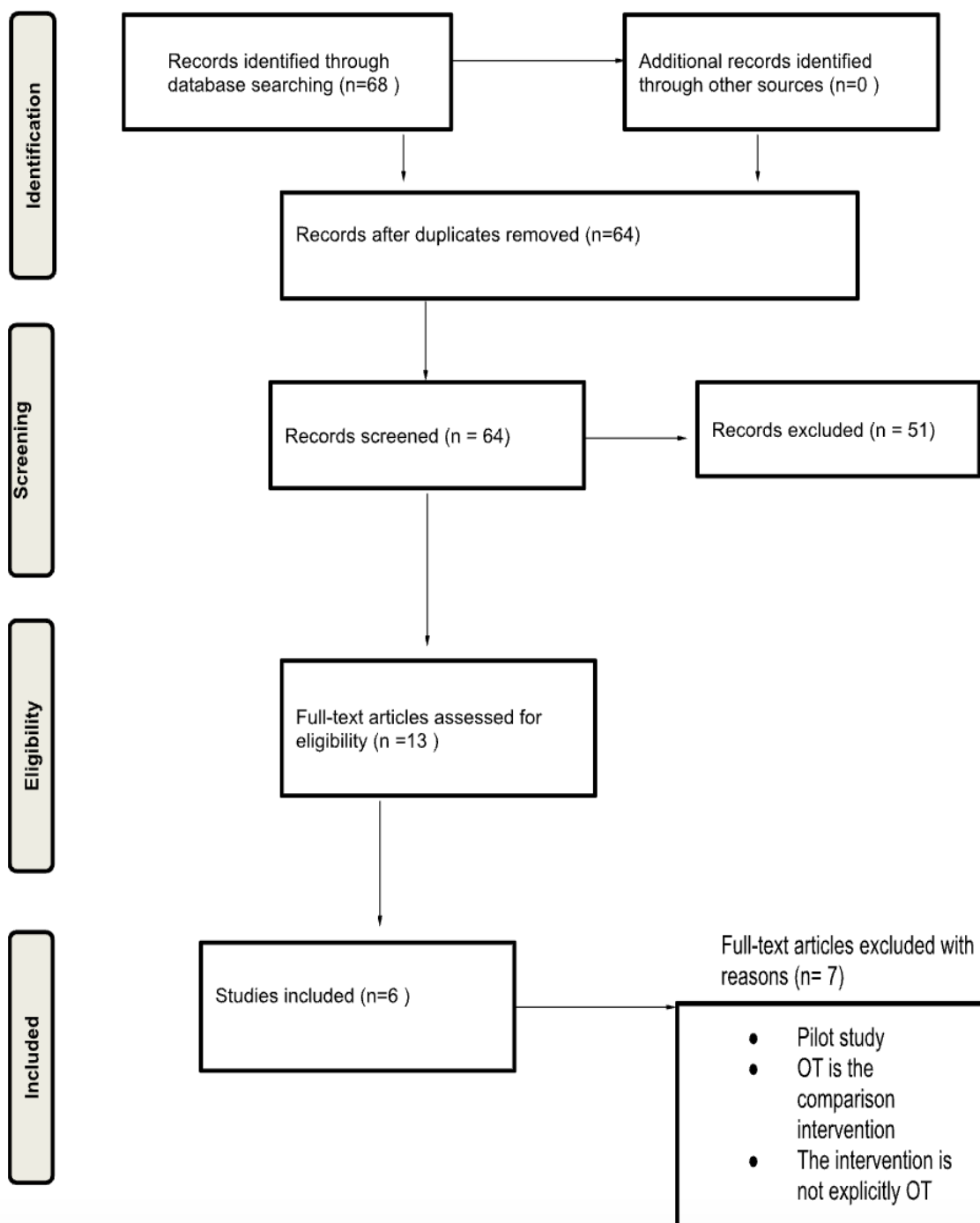
Methods

The systematic review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and incorporated recommended processes for conducting a systematic review. The guiding research question for this systematic review was: How does assistive technology support independence with meal preparation in adults with cognitive impairment after traumatic brain injury?

A broad search of the literature was conducted between May 20, 2026, and May 28, 2026. The inclusion criteria for studies in this systematic review were as follows: peer-reviewed, published in English, full-text, participants over age 18 with a cognitive impairment due to a traumatic brain injury, must specifically address occupational therapy, and dated between 2021-2026. Exclusion criteria, in addition to those studies that did not meet the inclusion criteria, included articles that were systematic reviews, scoping reviews, dissertations, and conference proceedings. A search for relevant literature was completed using electronic databases: CINAHL Complete, MEDLINE, and Google Scholar through Hawai'i Pacific University's online library database. Search terms included traumatic brain injury, occupational therapy, and assistive devices, as well as combinations of these terms with the use of Boolean operators. Appendix A provides the search terms used for this systematic review.

The initial search included 68 articles related to the research topic (Figure 1). One additional article was identified through citation tracking, making the total 69. After duplicates

were removed, 29 articles remained and were screened through review of the abstracts to assess if they met the inclusion criteria. Twenty-one articles did not meet the inclusion criteria, and thus, eight articles remained that went under full-text review, independently by each of the four researchers. In the full-text review, it was found that an additional two articles did not meet the inclusion criteria, due to not addressing the researchers' identified population of focus. Therefore, this process yielded a total of six studies that were thoroughly analyzed and synthesized by the researchers. Four independent reviewers completed the screening and selection of the studies, assessed their quality, and extracted the data. An evidence table of the six articles included in this review can be referenced in Appendix B. A risk of bias table was used to assess the study quality and levels of evidence and is provided in Appendix C.

Figure 1*Flow Diagram*

Results

Six studies met the inclusion criteria. The articles were assessed according to their risk of bias, level of evidence, and quality. This systematic review included six studies that contained relevant information regarding the use of assistive technology. An evidence table is provided in Appendix B. The Cochrane risk-of-bias guidelines were used to assess each article and are provided in Appendix C. The information from these articles was divided into two themes: Usability of COOK and Efficacy of COOK.

Usability of COOK

Three of the six studies on assistive technologies to support individuals with ABIs discussed the usability of COOK. One of these studies was a Level V study and two were Level III studies (see Appendix B). All studies provided evidence that COOK is effective and potentially beneficial.

The study by Gagnon-Roy et al. (2023) was a single-case study done on a 35-year-old male with TBI. The study gathered both qualitative and quantitative data on the usability of COOK for the participant, with data collection occurring throughout the 3-phase process. The three phases consisted of a baseline phase, a learning/installation phase, and a follow-up phase. Across the three phases, the participant and his mother provided qualitative data through interviews and journal entries, while quantitative data were collected through researcher observations using structured performance measures, including numerical ratings of task completion and safety during meal preparation activities. The participant was able to cook meals independently, and safely, with the use of COOK, whereas before COOK was implemented in his apartment, he was unable to prepare more complex meals (mac and cheese being the most complex meal he could prepare). COOK was also easy to learn and use for the participant, with

the biggest reported issue being technical issues. The participant did report more meals cooked at home as opposed to eating out following the learning and installation of COOK in his apartment. Therefore, it can be concluded that the usability of COOK for individuals with ABI is high and, with some technical bug fixes, could be beneficial for overall independence in meal preparation.

The study by Gagnon-Roy et al. (2022) was a mixed-methods study done with eighteen participants ($n=8$ experts on either cognitive impairment or human computer interaction [HCI], $n=10$ adults with moderate to severe TBI). The experts in this study found that COOK had usability scores between 79.5 (good) to 82.5 (excellent) on the System Usability Scale [SUS]. The main issues identified by the experts were navigation of the interface screen, technical bugs, the need for more feedback, need for additional information (both with recipes and after a shutdown by the safety system), and difficulties with the on-screen keyboard and voice command. The participants with TBI in this study expressed satisfaction with the usability of COOK. The participants with TBI expressed that COOK helped them feel more confident in the kitchen, made them feel safer while preparing meals, and inspired them to try and make different meals. They also stated that COOK helped them to prepare more meals than they typically would before their use of COOK. The participants with TBI also identified the same issues as the experts, with the addition of needing improved/more easily accessible technical support for users. Overall, this study found that the usability of COOK scored moderate to high on the SUS scale, with users reporting overall satisfaction with the program.

Using a mixed-methods design, Pinard et al. (2021) recruited three participants residing in a supported-living. The intervention was implemented across two settings, a laboratory and the participants' apartments. Participants received training on the use of COOK in the laboratory, followed by installation of the system in their apartments, where they used the system

independently. Two out of three participants were very satisfied with both the device and the services that came with the device (training and meal prep instructions/accessibility). The two satisfied participants found COOK to be helpful for increasing independence, making them feel safe while preparing meals, and easy to use. The unsatisfied participant was displeased with the device but approved of the services. The unsatisfied participant stated that they did not use COOK very often because they did not need it due to living close to other food options they could purchase instead. Therefore, their dissatisfaction was not due to a lack of usability, but rather a personal preference not to prepare their own meals in a kitchen. This study also found that COOK was usable, easy for individuals to use, and helpful for increasing independence and safety while preparing meals.

Efficacy of COOK

Three of the six studies on assistive technologies to support individuals with ABIs discussed the efficacy of COOK. One of these studies was a Level IV study and two were Level IIIB studies (see Appendix B). All studies provided evidence that COOK can be helpful for some individuals with TBI to regain independence and safety in the kitchen while preparing meals.

The study by Zarshenas et al. (2021) was a single-case experimental design study with a 47-year-old female participant. Data was collected through quantitative methods, such as amount of assistance required, task performance errors, and appropriate responses to safety issues, as well as descriptive qualitative methods, including three interviews with the participant and three focus groups with the participant's care team. Each quantitative component of the study had a baseline, adaptation, and follow-up phase, with a training and acquisition phase in between baseline and adaptation. With the follow-up phase of assistance needed, data showed the participant required less assistance than during the baseline phase. Data for errors made while

meal prepping showed that, by the follow-up phase, the participant made significantly less errors than during the baseline phase. Inappropriate responses to safety also significantly decreased between the baseline and follow-up phase. The conclusions of the study found that COOK was effective at helping to increase independence, made users feel safer while preparing meals, and helped users to gain inspiration for cooking a variety of meals.

The study by Zarshenas et al. (2022) was a qualitative descriptive study using individual semi-structured interviews and focus groups to explore the advantages of COOK and the barriers to its implementation. The study consisted of $n=30$ participants. Participants included $n=16$ occupational therapists, $n=3$ speech language pathologists, $n=1$ physical therapist, $n=2$ rehab/personal support workers, $n=2$ nurses, $n=2$ behavioral therapists/neuropsychologists, and $n=4$ executive directors/case managers. Data was collected through in-person focus groups that lasted for 120 minutes each. Participants were provided with videos and PowerPoints about the COOK program prior to the focus groups to ensure that all participants were informed about the topic being discussed. The study found that COOK was beneficial for individuals with TBI, as well as other ABIs (e.g., Alzheimer's, MS, Dementia, cognitive deficits, etc.). The support offered by COOK resulted in improvement in executive functioning skills and motivation for participants with TBI. Contraindicators of using the COOK program include extensive injuries, inability to follow instructions, and psychosocial impairments. The COOK program could also be beneficial for caregivers and families of individuals with TBI or other types of cognitive impairment by lessening caregiver burden and increasing confidence that the individuals with TBI or cognitive impairment are safe when preparing their own meals. Participants expressed that COOK is an assistive technology that combines the support of multiple assistive technologies into one comprehensive program. Health care provider participants, specifically,

believed that COOK had the potential to be implemented in both clinical and residential settings. The findings of this study found COOK to be a helpful technology that increased independence, safety, and variety of meals for users.

The study by Zarshenas et al. (2023) was another qualitative descriptive study that collected data through semi-structured interviews and focus groups. All participants ($n=20$) with moderate to severe ABI and caregiver participants ($n=13$) were interviewed. Participants with ABI all received a score of <13 on the Glasgow Coma Score, as well as difficulties with meal prep and related activities, lived at home or in community residential settings, and were fluent in English or French. Focus groups lasted for 120 minutes and participants were provided with videos and PowerPoints before the focus group to ensure all individuals taking part in the focus group had enough information to participate in the discussion. Individual, semi-structured interviews lasted for 90 minutes each. Data was collected on total number of verbal assists required for meal prep and total number of errors during task performance (planning, carrying out, and verifying goal attainment). Focus groups additionally collected data on the total number of times the COOK system was automatically locked due to the client's lack of appropriate response to safety issues. Limitations of the COOK program included the need for additional staff training, difficulties maintaining client motivation, gaps in technology features, and environmental constraints. Despite these barriers, the clients and care team found that COOK helped to increase independence, aided in memory and executive functioning, and enhanced safety during meal preparation. COOK helped to identify hazards in the cooking environment with warning messages and visual reminders. This study also found that the COOK program helped to reduce the burden on caregivers of individuals with ABI. The findings of this study support the idea that COOK is beneficial for independence, safety, and caregiver burden.

Discussion

The findings of this review suggest that the COOK program may be a valuable tool for helping individuals with acquired brain injury manage meal preparation more independently and safely. Across the included studies, participants demonstrated improvements in completing cooking-related tasks, which may support their ability to remain active and engaged in everyday life (Gagnon-Roy et al., 2022; Gagnon-Roy et al., 2023; Pinard et al., 2021; Zarshenas et al., 2021, 2022, 2023). These findings are important because there can be several difficulties with meal preparation after ABI which limits home independence and community involvement. Several studies also reported reductions in caregiver burden and anxiety, suggesting that the benefits of COOK may extend beyond the individual using the program (Gagnon-Roy et al., 2021; Zarshenas et al., 2022, 2023). Overall, the evidence suggests that COOK has the potential to support both functional independence and quality of life for individuals living with ABI and their families.

Common themes identified related to the barriers of the COOK program included lack of technical support (there was no 24/7 access to support), technical/program bugs, and insufficient instructions, though not all participants from all studies reported this challenge (Gagnon-Roy et al., 2023; Pinard et al., 2021; Zarshenas et al., 2022, 2023). Many of the studies in this systematic review reported that, due to lack of 24/7 technical support, they were either frequently calling the creator of COOK outside of typical office hours or just unable to use COOK until technical support was available again (Gagnon-Roy et al., 2021, 2022). The studies by Zarshenas et al. (2021, 2022, 2023) found that technical support was beneficial, available, and necessary for the use and efficacy of COOK.

Another key feature of COOK that contributes to the usability and efficacy of the program is the automatic safety system [SSS] integrated into the COOK program (Gagnon-Roy et al., 2022; Pinard et al., 2021; Zarshenas et al., 2021). Participants of these studies found that the automatic safety system increased their feelings of safety while preparing meals and was helpful for when they forgot to turn off a burner or walked away from their stovetop for too long.

Overall, the findings of this systematic review found that COOK, despite the barriers that need to be addressed, can be beneficial for individuals with ABI in increasing independence with meal prep, safety in the kitchen, motivation to cook, and expanding the variety of meals prepared (Ganon-Roy et al., 2021, 2022; Pinard et al., 2021; Zarshenas et al., 2021, 2022, 2023).

Strengths and Limitations

One strength of this systematic review was the adherence to PRISMA guidelines. This helped keep the overall article search and selection process more organized and reliable. Being able to use multiple databases was another strength throughout this systematic review.

There were several limitations in the process of the systematic review. Only six articles met the inclusion criteria, which limited the available evidence that could be included. In addition, most studies had small sample sizes and evidence, making it more difficult to generalize findings to individuals with TBI. Since the search was limited to specific databases and English-language articles, it is possible that other relevant studies were not identified. Also, due to the limited time to complete the review, the researchers chose to only include full-text articles, which could have left out additional relevant studies.

Implications for Occupational Therapy Practice

The synthesis of articles in this systematic review showed promising implications for future occupational therapy practice. The primary intervention that was evaluated in this review

was the use of the COOK method as an assistive technology to support independence in meal preparation for clients with traumatic brain injury. The research gathered from clients, caregivers, healthcare professionals, and developers indicated that this cognitive orthosis offers many benefits to enhance participation, performance, and safety in meal preparation. However, future research needs to be conducted with larger sample sizes, in different settings, and with various populations to gain more insight into the benefits, barriers, and uses for this program. Based on the present research, the main implications for current occupational therapy practice include:

- There is a need for training on how to use COOK (for healthcare professionals, caregivers, clients) and increased public awareness of the program so that it can be implemented safely and effectively.
- Future research should be conducted for the use of COOK in other populations with cognitive or physical impairments.
- Client-centered care and thorough evaluation of client goals, characteristics, and home environment should be performed by occupational therapists when determining if COOK is appropriate.
- Caregivers of individuals with traumatic brain injury and healthcare professionals agree that this technology reduces their burden because their loved one do not require constant supervision to perform meal preparation.
- While the COOK program offers multiple benefits to support independence, safety, and motivation, there are also multiple barriers that need to be addressed, including customization of recipes, kitchen space requirements, 24/7 technical support, cost of the technology, available languages, and being able to use kitchen equipment without it.

Conclusion

Studies included within this systematic review provide evidence on the effectiveness of assistive technology supporting independence after traumatic brain injury. The reviewed studies suggest that assistive technologies such as the Cognitive Orthosis for (COOK) can improve independence, safety, and participation in meal preparation for individuals with traumatic brain injury. Participants demonstrated reduced need for assistance, improved task performance, increased confidence, and greater ability to prepare meals independently, while caregivers and healthcare providers reported potential reductions in caregiver burden and support for community living. Although the findings are promising, more research is needed to better understand the long-term effectiveness of these technologies and how they can be successfully used with larger and more diverse TBI populations.

AI Disclosure Statement: During the preparation of this systematic review, the authors used Claude AI to improve grammar and readability. After using this tool, the authors reviewed and edited the content. The authors take full responsibility for the final content.

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Appendix A*Systematic Review Search Terms*

occupational therapy or occupational therapist or occupational therapists or ot

AND

Assistive technology or assistive devices or devices or adaptive technology

AND

TBI or traumatic brain injury or brain injury or head injury

Author/Year	Level of Evidence Study Design Risk of Bias	Participants Inclusion Criteria Study Setting	Intervention and Control Groups	Outcome Measures	Results
Gognon-Roy et al. (2023)	Level 6 Mixed-methods (usability study), single-case design. <i>Risk of Bias:</i> Moderate	<i>Participants:</i> <i>n</i> =1 35-y/o male <i>Inclusion Criteria:</i> 1. Sustained a severe TBI at least two years or more before the start of the study (medical records must indicate this diagnosis) 2. Lived in their own home (alone or with another person) 3. Reported meal preparation difficulties 4. Were interested in testing this new technology 5. Could communicate and understand instructions given to them in French <i>Study setting:</i> Research centre and participant's own apartment	<i>Intervention:</i> The intervention consisted of a baseline phase, an installation/learning phase, and a follow-up phase. <i>Baseline phase:</i> The participant prepared meals at home how he would prepare them independently. <i>Installation/Learning phase:</i> The participant's kitchen was fitted with the COOK technology and tools. The participant was also instructed through preparing several types of meals while using the COOK program. To teach the participant how to use COOK, the cognitive rehabilitation method described by Sohlberg and Mateer was used. This method includes three learning phases:	This study measured the usability of cook, which includes the efficacy and efficiency of the technology. It also measured the program's ability to decrease the amount of unnecessary actions taken while preparing a meal.	<i>Significant Findings:</i> This study found that the participant stated COOK was a useful tool that helped him feel more confident and independent. He even mentioned that he would no longer need to call his girlfriend crying when he did not know what to make, as he would always be able to make something simple with COOK. The participant's mother also stated contentment with the program and expressed that the program benefitted her son greatly. There were, however, several suggestions for improving the program. Such as implementing training for the meal planner [participant was given a meal planner, but no training on how to use it/maintain motivation to plan meals ahead], have 24/7 tech support available, have more

		acquisition, application, and adaptation. During the acquisition phase, the participant was instructed on each function of the COOK program through exercises. This phase was done once the participant could use 90% of COOK's functions independently. During the application phase, the participant completed 10 scenarios that required use of multiple functions of COOK in order to "pass." Once the participant reached a 90% success rate, this phase was considered done. In between the "application" and "adaptation" phases, the participant's apartment was fitted with the COOK technology and tools. The final phase (adaptation) consisted of the participant using COOK in their apartment kitchen. During this phase, the participant was presented with 3 scenarios. The participant prepared a simple meal		information available while preparing recipes (cook time, ingredient alternatives, potential add-ins), personalized recommendations for recipes, and the ability to listen to music while preparing meals using COOK.
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			while having technical problems with COOK, prepare a complex meal following a recipe, and prepare a complex meal for guests. <i>Follow-up phase:</i> Occurred at one-, four-, and eight-weeks post-learning phase. <i>Control Groups:</i> N/A		
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Gagnon-Roy et al. (2022)	Level 3 Mixed-methods <i>Risk of Bias:</i> Moderate	<i>Participants:</i> $n=8$ [experts] $n=10$ [adults with moderate to severe TBI] <i>Inclusion Criteria:</i> The “experts” needed to have expertise in HCI or clinical experience with clients with cognitive impairments. The “adults with TBI” needed to have moderate to severe TBI and be interested in meal prep. <i>Study setting:</i> Not specified.	<i>Intervention:</i> The intervention consisted of two parts. The first part consisted of teaching participants how to use COOK. This first part consisted of three smaller segments. First, participants provided a baseline (independently preparing a meal), then they were taught how to use COOK and taken through multiple scenarios, and finally they were asked to prepare meals with COOK independently while dealing with technical difficulties and other [potentially] real-world difficulties. The second part of the intervention consisted of two questionnaires, the SUS and the AttrakDiff Scale, and interviews. <i>Control Groups:</i> N/A	The outcomes of this study consisted of knowledge (gained via participant surveys) on how to improve the COOK program (training and functioning).	<i>Significant Findings:</i> Many participants described COOK as easy to use, accessible, and well-made. Participants also expressed how COOK could be helpful for themselves and others with various cognitive impairments (memory deficits and older adults). 90% of the adult participants with TBI expressed that they would want to have COOK in their home. Participants stated that COOK helped them to feel more independent and confident in their own safety and meal preparation abilities. Participants also mentioned that COOK helped them to be more inspired to cook and gave them more ideas on recipes instead of making the same meals repeatedly. On the other hand, participants also expressed concerns and barriers around COOK. Kitchen space was a major concern. Many participants expressed a lack of space for the technology COOK
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					required. Other participants mentioned pets being a barrier. Pets may interfere with the sensors and/or damage the equipment (peeing on or chewing through). Participants also thought of other groups of people, such as those with visual impairments or those for whom technology is difficult to understand. These participants also expressed 24/7 technical support as being integral for the program. Overall, while COOK is helpful, increases safety, and boosts confidence and feelings of independence in users, there are some areas that need to be worked on and addressed.
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Pinard et al. (2021)	Level 3 Mixed- methods(usability study) <i>Risk of Bias:</i> Moderate	<i>Participants:</i> $n=3$ <i>Inclusion Criteria:</i> 1. Have an apartment 2. Be able to resume cooking 3. Speak French 4. Be in stable condition (following their TBI) <i>Study setting:</i> Laboratory setting and users' apartments (within a supported-living residence)	<i>Intervention:</i> The three-step method specified by Sohlberg and Mateer was used to gain a baseline, introduce/train participants on using COOK, and then had participants engage in meal prep with COOK independently. <i>Control Groups:</i> N/A	The outcome being measured in this study were COOK's usability, effectiveness, and user satisfaction.	<i>Significant Findings:</i> COOK helped to increase the number of meals participants were preparing each week. One participant went from preparing 7 simple meals per week to preparing 13 meals per week. Approximately 1/3 participants did not continue to use COOK up until the 6-month follow-up, but this was determined to be a budgeting issue, not an issue between the user and COOK. The other two participants showed increased independent meal prep, confidence, and feelings of independence at the 6-month follow-up.
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Zarshenas et al. (2021)	Level 4 Mixed-methods(single experimental case design and descriptive qualitative study) <i>Risk of Bias:</i> Moderate	<i>Participants:</i> N=1 (47-year-old female) <i>Inclusion Criteria:</i> Sustained a moderate to severe ABI at time of injury, medically stable and discharged from inpatient/outpatient rehab, lived at researchers' partner supportive community setting for at least 1 year, had perceived difficulties with performing meal preparation and related activities, had general knowledge of how to use smart technology, fluent in English, had identifiable goal of wanting to improve meal preparation skills in COPM and were willing to participate in the study <i>Study Setting:</i> Supportive community residence for adults with ABI	<i>Intervention 1:</i> implementation of the COOK method (n=1) 2 days a week for 1 meal facilitated by occupational therapist trained in using the COOK method. Consisted of 3 phases: • Acquisition: safety training, introduction to features, identify staff/client needs (7 2-hr sessions over 2 wks) • Application: prepare hot meals using COOK with predefined scenarios under researcher supervision (using error-less training method/review of previously learned skills/progressive increase of recipe complexity, in person training with care team, meet with care team to make adjustments (7 2-hr sessions over 2 wks) • Adaptation: COOK method implemented by client and care team	<i>Independence (for intervention 1 & 2)</i> • Total number of verbal assists • Total number of errors in task performance (planning, carrying out, verify goal attainment) <i>Safety (for Intervention 1 only)</i> • Total number of times COOK system was automatically locked due to client's lack of appropriate response to safety issue <i>Psychosocial</i> • Beck Depression Inventory v.2 • Beck Anxiety Inventory • Overt Behavioural Scale • Fatigue Severity Scale	<i>Significant Findings</i> The client and the care team noted that the COOK method was helpful for supporting independence with meal preparation by aiding memory and executive function issues. The automatic safety system of the COOK program significantly enhanced safety in meal preparation by identifying hazards through warning messages and visual reminders. The care team recognized that the use of COOK reduced the amount of full-time care the client needed. Barriers to implementation of the COOK system include staff training, maintaining client motivation, gaps in technology features, and environmental limitations. <i>Nonsignificant Findings:</i> None
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			with remote supervision by researcher, meet with care team for adjustments (8 2-hr sessions over 2 wks and 10 follow-up sessions) <i>Intervention 2:</i> Control task of making a budget for the meal (not expected to change because of COOK) <i>Control task:</i> making a budget	• Self-Awareness Deficits Interview and Scoring • Quality of Life after Brain Injury-subscales • Community Integration Questionnaire	
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Zarshenas et al. (2022)	Level 3B Qualitative descriptive study using individual semi-structured interviews and focus groups <i>Risk of Bias:</i> Moderate	<i>Participants:</i> N = 30 (16 occupational therapists, 3 speech language pathologists, 1 physical therapist, 2 rehab/personal support workers, 2 nurses, 2 behavioral therapists/neuropsychologists, 4 executive directors/case manager, 93.3% female) <i>Inclusion Criteria:</i> Have at least 2 years experience working with patients with TBIs in inpatient/outpatient setting, community or private sectors, research institutes, or associations in Ontario with access to broad perspectives from professionals in different settings, fluent in English, interested in participating in study <i>Study Setting:</i> Phone interviews and in-person focus groups at the research laboratory	<i>Intervention 1:</i> Mono-disciplinary in person focus groups lasting 120 minutes. Participants were provided with videos and PowerPoints about the COOK method prior to the intervention. <i>Intervention 2:</i> Semi-structured individual interview via phone or in person lasting 90 minutes No control group	<i>Benefits</i> • Possibility of using COOK to support various cognitive deficits • Caregiver support • Increased client independence • Possibility of implementing COOK in various settings <i>Barriers</i> • Severe sequelae following TBI • Absence of supportive caregivers • Gaps in features • Living in a remote area • Lack of financial support <i>Facilitators</i> • Having trained rehab professionals available • Raising awareness of COOK • Program training availability • Availability of technical support • Making improvements to COOK	<i>Significant Findings</i> The COOK program was useful for TBI and non-TBI patients (Alzheimer's, Multiple Sclerosis, elderly) patients with mild to moderate cognitive impairments but not for those with severe and extensive motor, cognitive, or psychosocial dysfunction. Healthcare professionals reported that caregivers found the COOK program reduced the amount of supervision their loved one needed to perform meal preparation. The smart technology that COOK offers has shown to be more beneficial than other assistive devices, with participants highly regarding the automatic safety system. The cognitive assistance offered by COOK supports patients' executive function and motivation. Providing technical support was found to be essential for continued use. The COOK method can be used in various settings to address different treatment plan goals, though an identified barrier was access to
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				• Providing financial support	care for those living in remote areas. A lack of financial support to purchase COOK is a significant barrier for client, caregiver, and healthcare professional implementation.
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Zarshenas et al. (2023)	Level 3B Qualitative descriptive study using individual semi-structured interviews and focus groups <i>Risk of Bias:</i> Moderate	<i>Participants:</i> TBI patients: N = 20, mean age 39.6, 50% male, 65% live alone, 90% received rehab after injury Formal/Informal Caregiver: N = 13, 61.5% informal, 23% male <i>Inclusion Criteria:</i> TBI Patients: had sustained a moderate to severe ABI at the time of injury with a Glasgow Coma Score <13, at least 6 months post injury, perceived difficulties with meal preparation and related activities, lived at home or in community residential setting, fluent in English or French Formal/Informal Caregivers: self-identified as providing support in daily activities for ABI patients with the above inclusion criteria <i>Study Setting:</i> Research center or participants' residences	<i>Intervention 1:</i> Focus groups lasting 120 minutes. Participants were given videos and PowerPoints about COOK before the intervention. <i>Intervention 2:</i> Individual semi-structured interviews lasting 90 minutes No control group	<i>Clients</i> • Difficulties in meal prep following ABI • Current compensatory strategies • Benefits • Barriers • Facilitators <i>Caregivers</i> • Difficulties with meal prep following ABI • Benefits • Facilitators <i>Technology features</i> • Benefits • Barriers • Facilitators <i>Customer service</i> • Benefits <i>Financial resources</i> • Barriers • Facilitators	<i>Significant Findings</i> Clients reported cognitive (memory, learning, attention), physical (gross/fine motor coordination), and psychosocial (aggression, confidence, self-regulation) improvements that positively impacted their ability to perform meal preparation. Compensatory strategies were assistive devices recommended by their occupational therapist, smartphone reminders, and visual/verbal cues from their caregivers. Caregivers expressed that busy schedules impacted their ability to support their loved ones in meal prep and they did not encourage them to do it independently, due to safety concerns.
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Note. ABI = acquired brain injury, COPM = Canadian Occupational Performance Measure, COOK = Cognitive Orthosis for coOKing, TBI = traumatic brain injury

Risk of Bias for Before-After (Pre-Post) Studies with No Control Group (One Group Design)												
Citation	Study question or objective clear	Eligibility or selection criteria clearly described	Participants representative of real-world patients	All eligible participants enrolled	Sample size appropriate for confidence in findings	Intervention clearly described and delivered consistently	Outcome measures pre-specified, defined, valid/reliable, and assessed consistently	Assessors blinded to participant exposure to intervention	Loss to follow-up after baseline 20% or less	Statistical methods examine changes in outcome measures from before to after intervention	Outcome measures were collected multiple times before after intervention	Overall risk of bias assessment (low, moderate, high risk)
Gagnon-Roy et al., 2024	Y	Y	N	NR	N	Y	Y	NR	Y	Y	Y	Moderate
Pinard et al., 2021	Y	Y	N	NR	N	Y	Y	NR	Y	N	Y	Moderate
Gagnon-Roy et al., 2022	Y	Y	N	NR	N	Y	Y	NR	Y	N	Y	Moderate
Zarshenas et al., 2021	Y	Y	Y	NR	N	Y	Y	NR	Y	Y	N	Moderate
Zarshenas et al., 2023	Y	Y	Y	NR	N	Y	Y	NR	NR	N	N	Moderate

