



2024

## What is Task-Oriented Training? A Scoping Review

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### Recommended Citation

Halford, E., Jakubiszak, S., Krug, K., & Umphress, A. (2024). What is Task-Oriented Training? A Scoping Review. *Student Journal of Occupational Therapy*, 4(1), 1-23. <https://doi.org/10.46409/001.DPYW4980>

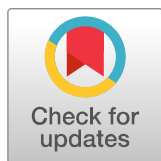
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### Cover Page Footnote

We would like to acknowledge Dr. Veronica Rowe for assistance with conceptualization and supervision of the project.



# What is Task-Oriented Training? A Scoping Review

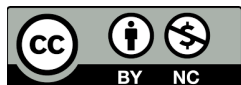
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## To cite this article:

Halford, E., Jakubiszak, S., Krug, K., Umphress, A. (2023). What is task-oriented training? A scoping review. *Student Journal of Occupational Therapy*, 4(1), 1-23. <https://doi.org/10.46409/001.DPYW4980>

**Conflict of interest statement:** The authors express that they have no conflict of interest with regard to the research conducted in this paper.



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## Abstract

*Task-Oriented Training (TOT) is a proven stroke rehabilitation intervention with significant evidence-based research that supports its effectiveness. The absence of a clear definition has led to variability in research reporting and subsequent confusion with practical implementation. A consistent definition seeks to remedy this ambiguity to facilitate knowledge translation. The objective of this study was to determine a comprehensive definition of TOT that encapsulates previous definitions and descriptions in the literature. In order to derive this definition, a two-stage scoping review process was conducted across four databases searching for articles on the use of TOT in adult stroke rehabilitation therapy.*

*The analysis of this scoping review included 172 articles. Commonly found words used to define TOT included: repetitive, functional, task practice, task specific, task oriented, intensity, and client-centered. Other salient words that aligned with the principles of neuroplasticity and key components of TOT were meaningful, progressive, graded, variable, and feedback. Based on these findings, a comprehensive proposed definition is as follows: Task-oriented training is an effective stroke rehabilitation intervention that focuses on the use of client-centered, repetitive practice of activities that are of high intensity and meaningful to the client. In conclusion, although similar principles were described in the TOT literature, there was no consistent and comprehensive definition of TOT. This scoping review identified key concepts from TOT methodology, and discussion sections in rehabilitation literature to generate a proposed comprehensive definition of TOT to guide research and practice.*

**Keywords:** Stroke, Task-Oriented Training, Rehabilitation, Scoping Review

## **Introduction**

The National Stroke Association reports that “more than 7 million people have experienced a stroke, and it is now the leading cause of long-term disability in the United States” (NSA, 2015). While death rates have declined from stroke, disability resulting from stroke has increased and the resultant need for rehabilitation in the surviving stroke population has increased (Wolf, et al., 2016). Approximately 85% of people who have a stroke experience upper extremity hemiparesis, a disability that significantly decreases overall function and independence (Hatem, et al., 2016). Task-Oriented Training (TOT) is an effective stroke rehabilitation intervention with significant evidence-based research that supports its effectiveness. (Almhdawi, et al., 2016; Bayona, et al., 2005; Hubbard, et al., 2009; Thant, et al., 2019; Wolf, et al., 2006; Winstein, et al., 2013; Winstein, et al., 2016). However, previous studies do not consistently define task-oriented training. To ensure the appropriate implementation of TOT as a rehabilitation intervention, there needs to be clearer guidelines on how TOT can be implemented to improve function. Without a definition and guidelines, there is inconsistency in treatment approaches, implementation, and outcomes.

Research has found that a majority of stroke survivors have difficulties with arm movement and function, which inhibits performance and participation in desired activities of daily living (ADLs), and that these deficits are not addressed in current rehabilitation impairment-based approaches (Camona, et al., 2018; Wolf, et al., 2016). Evidence supports TOT as “critical for enhancing motor and functional recovery and for producing neuroplastic changes post-stroke” (Hsieh, et al., 2018). These neuroplastic changes result in greater function and independence in activities of daily living for stroke survivors. Task-oriented training reinforces the repetition of meaningful activities, allows greater independence in ADLs, and thus increases quality of life.

Current evidence-based concepts and interventions related to and used in conjunction with TOT include Constraint Induced Movement Therapy (CIMT),

mirror therapy, and repetitive task practice. Constraint Induced Movement Therapy is a subcategory of TOT described as forced use of the affected upper extremity while the other extremity is constrained (Wolf et al., 2006). Mirror therapy is an intervention used in stroke rehabilitation that is defined as a therapy in which a mirror is used to reflect the movement of the less involved upper limb as if it were the more affected limb (Page et al., 2002). Mirror therapy has also been used as a primer for TOT (Bondoc et al., 2018). Lastly, repetitive task practice is an intervention used to strengthen muscles and prevent compensatory movement patterns using repetitive, active exercise (Wolf, et al., 2002). As described above, each of these methods for interventions has a clear definition to facilitate their replication and use in practice, while TOT, a method often associated with these interventions, does not.

Task-oriented training is an evidence-based practice grounded in motor learning principles and focused on the use of functional activities to enact a neuroplastic change. Frequently used subcomponents of TOT include repetitive task practice, intensity of training, active problem solving by the participant, use of tasks deemed meaningful to the patient, and guided discovery (Winstein et al., 2016). Rowe and Neville (2018) suggest that TOT should be both collaborative and interactive with the participant identifying the problem. Despite having common themes and components, there is no consistent use or implementation of TOT (Rowe and Neville, 2018). Without a consistent definition to guide researchers and therapists, knowledge translation is impeded so that stroke survivors miss the opportunity to receive the most effective, evidence-based interventions during rehabilitation.

Task-oriented training is considered a promising intervention for clients with stroke, but rehabilitation practitioners are still using therapy practices with lesser established evidence of efficacy (Wolf et al., 2016). This trend is a prime example of the gap in translating knowledge from basic science to clinical practice. In fact, it takes approximately 17 years for scientific healthcare discoveries to be implemented into practice, and

“only 14% of those discoveries [are included] into clinical practice” (Juckett, et al., 2020). Not having a clear definition of TOT can create discrepancies in how the therapy is replicated and can also weaken its validity if not administered consistently.

The basic scientific evidence continues to grow regarding the effectiveness of TOT with stroke survivors; however, the various descriptions, implementation methods, and lack of definition for TOT hinders the application of the practices in rehabilitation and limits knowledge translation from research to practice. A consistent definition will create a more efficient and accurate method of knowledge translation leading to better provision of care.

### Specific Aims and Purpose

This study constructed an evidence-based definition of TOT from the existing literature. As previously stated, multiple studies, such as Waddell, et al., (2014), Israely, et al., (2017), and Timmermans, et al., (2014), cite the importance and efficacy of TOT but do not specifically define the therapy or its methodology in enough detail to be consistently replicated in practice or research. In finding the most common components and explanations used for TOT, this scoping review identified the state of the current research and generated a definition to improve the implementation of TOT in both research and practice.

### Methods

Scoping reviews are an effective method for summarizing available evidence in order to better understand the range of literature across a field of interest. The framework used for this scoping review was proposed by Arksey and O'Malley (2005). Researchers collated, analyzed, and summarized the current evidence available on TOT to answer the following research question: What is task-oriented training and how is it defined in the current literature?

### Identifying relevant studies

A database search was performed to locate articles that included concepts related to TOT. Due to the lack of unified terminology in referring to this treatment approach, researchers searched various names associated with TOT as reported in Table 1, as well as hyphenated versions of these terms, to accrue as many studies as possible. All articles that contained these terms in either the title, abstract, or article were deemed eligible for inclusion in this review. Table 1 summarizes the databases and search terms used.

### Selecting the Studies

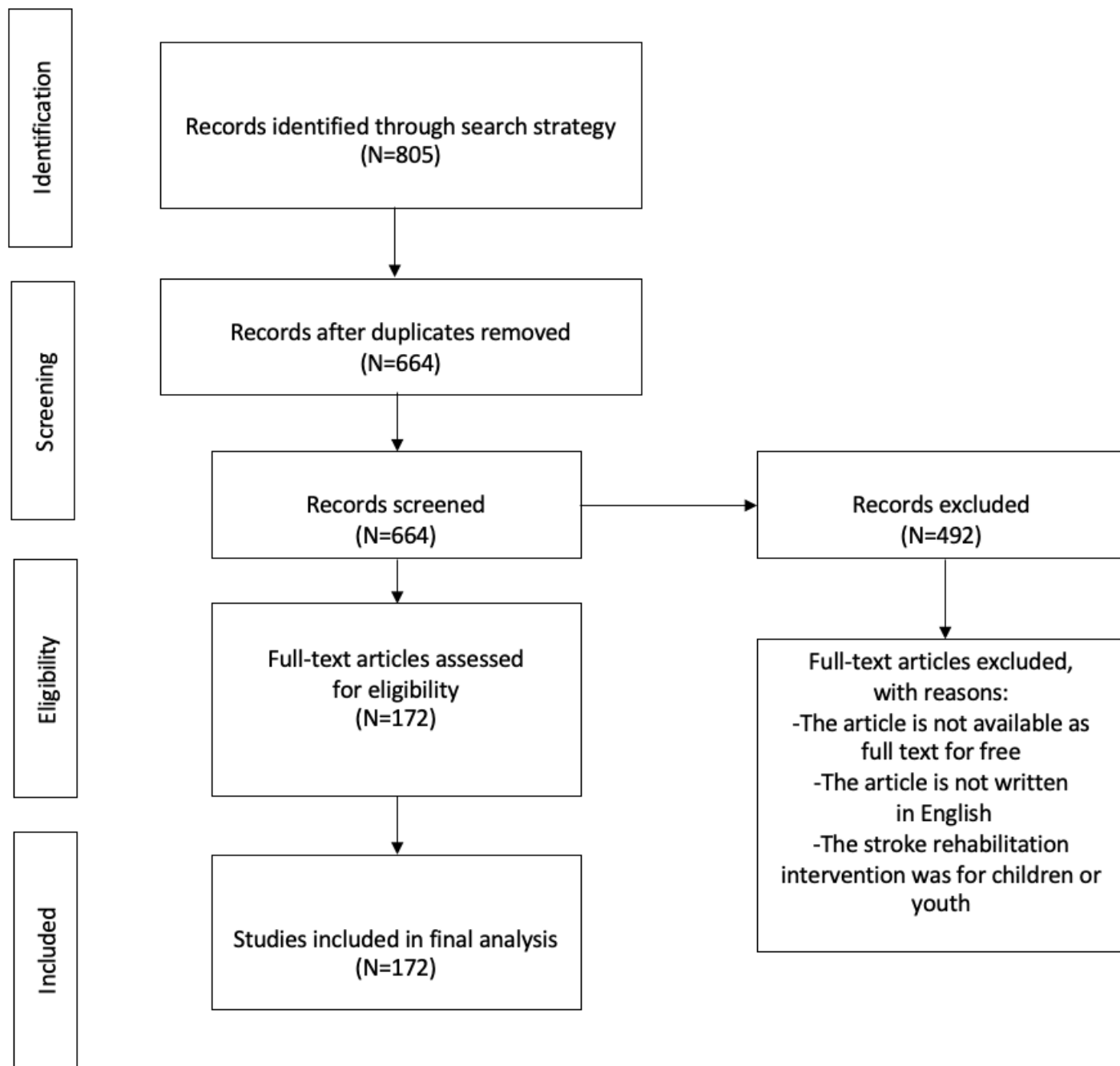
A comprehensive search of the databases using the key terms listed in Table 1 produced 664 eligible studies. All eligible articles were downloaded into an Endnote database and duplicates were removed. Articles were then entered into a Google sheet and divided into two subsets. A two-stage review process was implemented by four students who

**Table 1**  
*Databases and Key Search Terms*

Databases Searched	Key Search Terms
CINAHL Cochrane Library PubMed EBSCO	“Task oriented training”, “task specific training”, “task oriented therapy”, “task specific”, “repetitive task practice”, “task performance and analysis”, “Task-oriented approach”, “task-specific approach”, “Cerebrovascular accident”, “CVA”, “Stroke”, “rehabilitation”, “rehab”, “function”, “recovery”, “recovery of function”, “ADLs”, “Bilateral Arm Training”, “Constraint Induced Movement Therapy”, “Cognitive Orientation to Daily Occupational Performance”, “Occupational therapy”, “occupational therapy”, “Physical therapy”, “physical therapy”, “adult” “aged” “middle aged”

**Figure 1**

*Flow Chart of Article Selection*



were near completion of their master's degree in occupational therapy. During the first stage, each pair of reviewers was assigned one subset of 332 articles to independently review. Each pair of review partners applied the inclusion and exclusion criteria during this first stage of the two-stage review to refine the list of relevant articles.

The following inclusion criteria were used: 1) adult stroke, 2) interventions of TOT, task specific training (TST), repetitive task practice (RTP), CIMT, bilateral arm therapy (BAT), cognitive orientation of occupational performance (CO-OP), and 3) articles published in the last 15 years. The following exclusion criteria was used: 1) lack of access to full article 2) articles written in languages other than English.

Following independent review, partners came to a consensus on article inclusion. One hundred seventy-two articles passed the first stage of the review process. The four reviewers assessed the 172 eligible articles during the second stage. Discrepancies amongst reviewers was discussed until consensus on article eligibility was determined. Reviewer consensus maintained inter-rater reliability in this stage for final article inclusion.

### **Data extraction and charting the data**

Eligible articles were evaluated, and analysis continued only those meeting the proposed criteria in accordance with the scoping review methodology of Arksey and O'Malley (2005). Data extracted from articles included: purpose, methods, outcome measures, interventions, and all useful descriptions of TOT included in the text.

### **Collating, summarizing, and reporting the results**

A narrative synthesis to answer the research questions was constructed by analyzing the relationship within studies and between studies. The analysis included combining, categorizing, and comparing information across the collected data. The scoping review revealed themes within the

literature, which were extracted from the articles then quantified and will be discussed below.

## **Results**

Of the 664 articles identified, 172 articles met the inclusion criteria. The figures throughout specify the study designs, populations, outcome measures, interventions, and findings of task-oriented training as described in the literature. The 172 included articles were published between 1995 and 2020. All data was charted in accordance with the scoping review methodology of Arksey and O'Malley, 2005.

### **Research designs reviewed**

The majority of studies ( $n = 70$ ) were randomized control trials, followed by reviews ( $n = 13$ ), quasi-experimental ( $n = 12$ ), case series ( $n = 12$ ), and case reports ( $n = 10$ ).

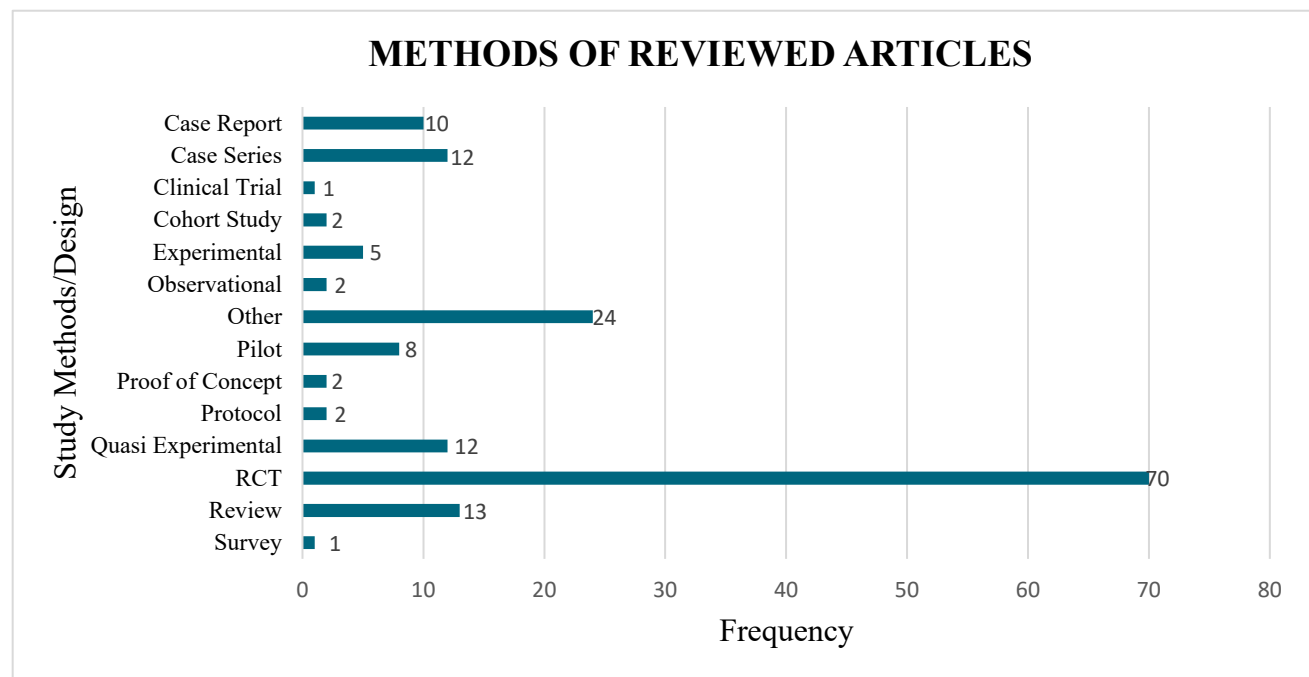
The level of description of the intervention varied across studies. In particular, the quality and completeness of the intervention descriptions varied widely.

### **Patient Characteristics**

There were 9,418 total participants across the included articles. All these participants were adult stroke survivors. Great variability was observed in months post stroke as some authors postulate the benefit of TOT more than one year after stroke while others center their research on neuroplasticity that occurs within six months. The majority of the included articles described participants as being in the acute and subacute stages of stroke with mild to moderate impairments. Among measurements used to obtain participant characteristics, the Fugl-Meyer Assessment ( $n = 70$ ) was used most often for impairment-based outcome measurement and the Wolf Motor Function Test ( $n = 32$ ) was the most common functional outcome measurement.



**Figure 2**  
*Types of Research Methodologies Reviewed*



### Discipline and Setting Characteristics

Articles across all settings and disciplines were reviewed, which allowed for identification of pertinent themes on the administration of TOT that transcended practice areas. A multidisciplinary approach was often utilized, meaning more than one health professional was involved in providing an intervention. Health professionals identified in this review are occupational therapists, physical therapists, and nurses. Task-oriented training occurred both concurrently and consecutively among disciplines. The multidisciplinary approach was prevalent with stroke survivors with hemiparesis and hemiplegia as TOT improved functional use of upper and lower extremities. These health care professionals utilized TOT in varying ways unique to their disciplines and settings. Occupational therapists focused their training on functional everyday tasks, whereas physical therapists centered on repetitions with walking, and lastly nurses supported and facilitated practice of functional tasks. Task-oriented training was implemented across the continuum of patient

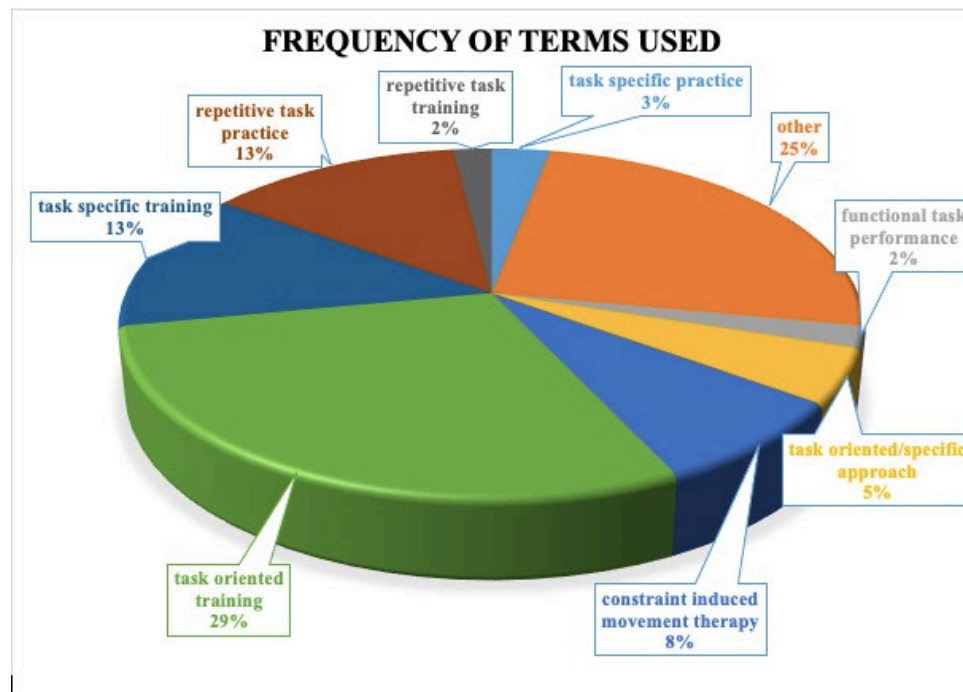
care. TOT was highly used in inpatient, skilled nursing, and home health therapy settings. In contrast, acute care was the setting in which TOT was utilized the least. Reasons cited for infrequent use included the recency of neurologic insult and subsequent medical fragility, as well as the small amount of time therapists spend with the stroke survivor in these settings.

### Intervention Characteristics

Through the analysis of 172 articles, only 21 of those articles stated a clear definition of TOT. Definitions included principles of motor learning and motor control, as well as neuroplasticity (Almhdawi, et al., 2016; Hsieh, et al., 2017; Hsieh, et al., 2018; Jong-Hoon et al., 2018). Thus, we propose a definition grounded in the principles of neuroplasticity as these components are critical for motor and functional improvement. The definition places an emphasis is placed on the mass practice of goal-oriented, functional, and challenging tasks



**Figure 3**  
Types of Research Methodologies Reviewed



that facilitate the client's active problem solving and leads to outcomes of functional improvements (Almhdawi, et al., 2016; Arya & Pandian, 2013; Askim, et al., 2013; Hsieh, et al., 2017; Hsieh, et al., 2018; Jong-Hoon et al., 2018; Rowe & Neville, 2018; Tijssen, et al., 2019; Vive, et al., 2020). The key words obtained from data extraction are outlined in detail below. Intensity was determined as the most important component followed by repetition of functional activities according to two Cochrane Reviews (French, et al., 2010; French, et al., 2016). Through data extraction, the frequency of word uses when describing, administering, and defining TOT were revealed. The words with the highest frequency were repetitive (106), functional (92), task practice (67), task specific (51), task oriented (44), intensity (39), and client-centered (35). Other important components that align with the principles of neuroplasticity were meaningful (29), progressive (27), graded (26), variable (26), and feedback (25). The various search terms used

to execute this scoping review represented the numerous titles for the intervention. We identified that the term "task-oriented training" was used most frequently across articles (29%). Other terms for this intervention had the following frequency of use: 13% used "task specific training", 13% used "repetitive task practice", and the remaining articles named their interventions by other terms.

### Culminating definition of TOT

Task-oriented training seeks to facilitate cortical reorganization, remediation and reacquisition of skills, and active problem solving of functional tasks to minimize impairments, through planned variability in the environment, feedback, and difficulty of task (Askim, et al., 2013). Review of the literature revealed that the underlying assumptions for the task-oriented approach are motor learning and control, neuroplasticity, and the system theory (Almhdawi, et al., 2016; Flinn, 1995;

Hsieh et al., 2017). These theoretical constructs, operational definitions from articles, and the frequency descriptor data ultimately led to the following definition for TOT: Task-oriented

## **Discussion**

This scoping review examined available publications to determine how TOT is being defined in the literature to build a comprehensive definition of this evidence-based practice for stroke rehabilitation. The key terms found most often in the research studies defining TOT are repetitive, functional, task practice, task specific, task oriented, intensity, and client-centered, respectively. Concepts such as ‘meaningful’, ‘progressive’, ‘graded’, and ‘feedback’ were all considered as valuable principles of neuroplasticity that also shaped TOT interventions.

With a foundation in motor learning and motor control, TOT places an emphasis on mass practice of goal-oriented, functional, and challenging tasks that facilitates the client’s active problem solving, leading to functional improvements. In defining task-oriented training, a greater understanding of TOT can be established for knowledge translation. Task-oriented training can be implemented more frequently, consistently, and according to research findings to provide the most beneficial intervention for patients with stroke. It was apparent from the review that some research protocols did not provide all the aspects of TOT that we propose should be included in the definition. For example, only 29 of the 172 included studies related that the task needed to be meaningful - a concept that logically provides increased involvement and motivation of the patient. Studies that did not include ‘meaningful’ tasks in their TOT interventions may not have capitalized on the commitment and motivation of the client during the treatment intervention. As a consequence, clients may not have benefitted as much from the treatment sessions because therapists unknowingly provided a less efficacious intervention.

A precise definition of TOT, with key components, could have led to a different implementation plan that included frequently used factors that have been

training is an effective stroke rehabilitation intervention that focuses on the use of client-centered, repetitive practice of activities that are of high intensity and meaningful to the client.

shown to be impactful. An additional barrier to consistent implementation of TOT was revealed by the finding that many studies with significant results did not fully define the intervention making replication and potential efficacy difficult to ascertain. Despite these shortcomings that were revealed during analysis of the current bank of studies, the authors were able to synthesize available data to create a cohesive, operational definition to apply in research and practice so that TOT can be researched and implemented with more rigor in the future.

## **Limitations**

Limitations of this study reflect the breadth of the review process. Only articles written in English from four databases were included in this study. This search strategy could restrict the generalizability of the findings as additional databases may have led to procurement of more articles. Additionally, the lack of access to full articles referenced in the initial search further limited the sample.

## **Directions for future research**

Recognizing the general absence of a definition of TOT in the literature, the current study proposes a comprehensive definition of TOT to facilitate knowledge translation from research to clinical practice. This comprehensive definition can be utilized in future intervention studies to ensure that TOT is carried out consistently. Consequently, comparison of study results will lead to enhanced confidence in the efficacy of this treatment intervention. Furthermore, studies can be replicated with greater accuracy when all components of the intervention are clearly identified.

## **Implications for Occupational Therapy Practice**

This scoping review summarizes the following implications for task-oriented training:

- TOT is an established client-centered intervention for adults post stroke that is heavily rooted in research.
- TOT centers on meaningful and task specific interventions implemented with high repetitions to bring about functional improvements post stroke.
- TOT is specific to each client while still attainable for therapy providers allowing for implementation across settings.

## Conclusion

This scoping review was conducted to address the absence of a consistent definition for TOT in the literature. Principles of motor learning were found throughout the literature reviewed on TOT interventions, but a consistent and comprehensive definition of TOT was lacking. The two-stage analytical review found key concepts from TOT protocols, methodology, and discussions from the literature which served as the foundation for the proposed comprehensive definition. This definition can serve as a guide to consistent implementation of TOT interventions in both research and practice.

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