Keyform Ability Maps and Rasch Analysis in Intervention Planning: A Systematic Review

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Abstract

Importance: Effective occupational therapy intervention planning relies on valid and reliable assessment tools. Keyform Ability Maps and Rasch analysis offer a psychometrically sound approach to measuring client abilities, guiding individualized interventions, and improving therapeutic outcomes.

Objective: To identify, evaluate, and synthesize current literature on using Keyform Ability Maps and Rasch analysis to determine their efficacy in client-centered occupational therapy intervention planning.

Data Sources: A systematic literature search was conducted in May 2025 using PubMed, Google Scholar, Web of Science, AJOT, CINAHL Complete, OT Seeker, and EBSCO (Hawai'i Pacific University's databases). Search terms included "occupational therapy," "keyform maps," and "rasch analysis," along with combinations.

Study Selection and Data Collection: Following PRISMA guidelines, we included published peer-reviewed studies on Keyform Ability Maps and Rasch analysis in occupational therapy intervention planning. Presentations, non-peer-reviewed literature, and dissertations were excluded.

Findings: From an initial 72 studies, six met the inclusion criteria and were assessed for risk of bias, level of evidence, and quality (1 Level II, 2 Level III, 1 Level V, and 2 Level IV). These articles provided relevant information on keyform map use in intervention planning, categorized into

two themes: Psychometric Strength and Application to the OT Process.

Conclusion and Relevance: Keyform Ability Maps and Rasch analysis may effectively improve the accuracy and individualization of intervention planning, enhancing client engagement, satisfaction, and therapeutic outcomes. This systematic review offers a starting point for evaluating these tools in occupational therapy, though more research is needed to further support their use in occupation-specific assessments.

Keywords: Assessment, Client-centered, Efficacy, Intervention planning, Keyform ability map, Occupational therapy, Rasch analysis, Systematic review

Effective intervention planning is a fundamental pillar in occupational therapy, primarily aimed at improving the health and well-being of clients. However, addressing individuals' diverse and often complex needs depends on valid and reliable assessment tools. This is particularly important in critical situations, such as evaluating the driving ability of medically at-risk individuals, where misclassifications carries significant risks (Cheal et al., 2023; Lombard et al., 2023). There are persistent challenges with occupational therapy assessment due to a lack of clinically available and psychometrically reliable tools (Mailloux et al., 2021; Schaaf, 2021).

Psychometric techniques, such as Rasch analysis and Keyform Ability Maps, offer robust solutions for improving assessment accuracy and streamlining intervention planning. These tools help occupational therapists to identify the "just-right challenge" for individual clients, thus optimizing engagement and therapeutic outcomes (Wen et al., 2025). Keyform ability maps, derived from Rasch analysis promote collaborative goal setting by visually displaying client ratings against item difficulty (Wen et al., 2025). This systematic review aimed to identify, evaluate, and synthesize current literature on applying Keyform Ability Maps and Rasch analysis in occupational therapy intervention planning to determine their efficacy in enhancing assessment and client outcomes.

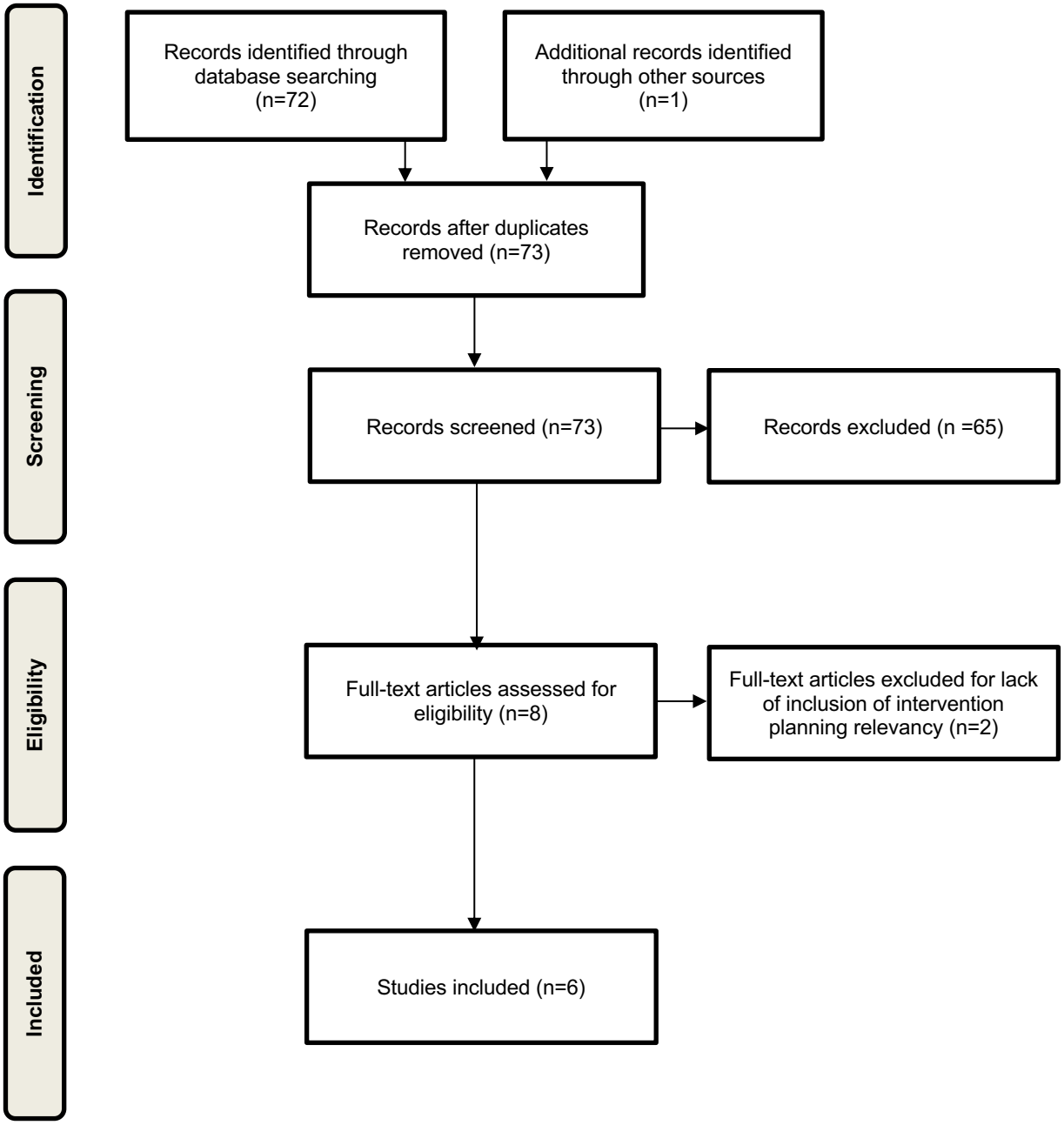
Method

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: Which OT assessments use Keyform Ability Maps and Rasch analysis to support accurate interpretation of assessment data and client-centered intervention planning?

A broad search of the literature occurred between May 15th, 2025, and May 22nd, 2025. An additional search was conducted May 30th, 2025, to ensure all relevant research was included. The inclusion criteria for studies in this systematic review were as follows: peer-reviewed, published in English, and dated between 2018-2025, clients of all ages receiving occupational therapy services, use of Keyform Ability Maps or similar tools from Rasch Analysis, accuracy of assessment interpretation, quality or specificity of intervention planning, evidence of client-centered practices. Exclusion criteria, in addition to those studies that did not meet the inclusion criteria, included articles that were systematic reviews, scoping reviews, dissertations, conference abstracts, editorials, or opinion pieces without empirical data, and presentations. A search for relevant literature was completed using electronic databases: PubMed, Google Scholar, Web of Science, AJOT, CINAHL Complete, OT Seeker, and EBSCO through Hawai'i Pacific University's online library database. Search terms included "occupational therapy" or "occupational therapist" or "occupational therapists" or "ot" and "keyform maps" or "rasch analysis". Appendix A provides an extensive list of all search terms used for this systematic review. The initial search included 72 articles related to the research topic (Figure 1). Four independent reviewers completed the screening and selection of the studies, assessed their quality, and extracted the data. Eight studies met the inclusion criteria and were included in the systematic review.

Figure 1

PRISMA flow diagram



Results

Seventy-two studies met the inclusion criteria to six studies that were accessed according to risk of bias, level of evidence, and quality: 1 Level II, 2 Level III, 1 Level V, and 2 Level IV studies. These six articles included relevant information regarding the use of Keyform Ability Maps in intervention planning. The information from these articles was divided into two themes: Psychometric strength and application to the OT process. 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.

Of these studies, one was Level II evidence, two were Level III, one was Level IV, and one was Level V, based on levels of evidence (Lape & Hissong, 2025). 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. All studies provided evidence that the use of keyform maps and Rasch analysis in intervention planning is effective and potentially beneficial.

Psychometric Strength

DriveSafe Drive Aware (DSDA) measures have high internal reliability and construct validity, high face validity, with low test time of 10 minutes (Cheal et al. 2023). DriveSafe precisely identifies the less safe drivers from safe drivers, while DriveAware provides additional categorizing information on participants (Cheal et al. 2023). DSDA can be reliably used to advise on driving discontinuation (Cheal et al., 2023).

Holmefur (2019) investigated Assessment of Time Management Skills (ATMS-S), which has good test-retest reliability (0.89). The researchers used Rasch analysis to convert ATMS-S

scores into ATMS units, for preintervention-postintervention comparison, finding improvement in each subgroup in pre-to-post testing (Holmefur, 2019).

Lombard et al. (2023) improved the Trinity Student Occupational Performance Profile (TSOPP) by collapsing the 6-point Likert scale to match the 4-point TSOPP scale, having excellent person reliability index (0.91), excellent item reliability (0.99), and strong internal consistency (0.91). TSOPP demonstrated stronger psychometric properties as a single combined scale, and was successfully refined into a 54-item, 4-point measure (Lombard et al., 2023). Rasch analysis was then used to create person-item maps to determine relative occupational performance difficulties for each item-set (Lombard et al., 2023).

Mailloux et al. (2021) determined Evaluation in Ayres Sensory Integration (EASI) vestibular and proprioceptive tests have strong internal reliability and construct validity, ascertaining them to be psychometrically sound (Mailloux et al., 2021). Of six vestibular and proprioceptive tests showed strong evidence of internal validity (≥0.80) (Mailloux et al., 2021). Within these tests, eight of 16 subscale scores met strong internal validity criteria, four demonstrated adequate criteria (≥ .70), and four fell below criteria; within tests Prop: F^c and Prop: F^C (Mailloux et al., 2021). Based on psychometric strength, these EASI tests can be used to test vestibular-proprioceptive challenges to determine performance and participation challenges for occupational therapy intervention (Mailloux et al., 2021).

Schaaf et al. (2021) aimed to determine appropriate outcome measures to use in occupational therapy intervention studies for children with autism. The panel of experts determined psychometric strength of outcome measures using a quality indicator (QI) scoring system based on psychometric strength and measure components including time required,

scope, objective, and scoring (Schaaf et al., 2021). The Assessment of Motor and Process Skills (AMPS) scored highest in measures of ADLs, and Evaluation of Social Interaction (ESI-2) scored highest in measures of socialization (Schaaf et al., 2021).

Wen et al. (2025) examined Functional Cognition-Patient Reported Outcome (FC-PRO). Person separation reliability was between 0.77 to 0.82 for the short forms. A strong correlation (0.91-0.97) was found in person measures of both the short and long forms (Wen et al., 2025). Keyform ability maps for each domain supported the selection of functional challenges that matched the difficulty level appropriate for the patient (Wen et al., 2025).

Limitations of the studies included varying conditions during driving (Cheal et al., 2023), small sample sizes and use of convenience samples (Cheal et al., 2023; Holmefur, 2025, Mailloux et al., 2021; Schaaf et al., 2021), limited geographic representation (Lombard et al., 2023) and recovery stages (Wen et al., 2025), the need for further studies to determine consistent cutoff scores for participants with certain conditions such as dementia or stroke (Cheal et al., 2023), and evaluation of additional assessment psychometrics (Mailloux et al., 2021).

Application to the OT process

In addition to evaluating psychometric properties of assessments, several studies explored the application of using Rasch analysis for evaluation and intervention planning. Cheal et al. (2023) demonstrated the use of a Rasch analysis tool for fitness-to-drive screening. The key takeaway is that the DSDA influences the OT intervention planning phase by using the output to categorize at-risk drivers efficiently. Therapists can then make evidence-based decisions. These assessments involve passing the on-road assessment, failing the evaluation, or

that further testing is required. The research indicates that the touchscreen DSDA effectively identifies participants who need on-road assessments.

The pilot study by Holmefur et al. (2019) supports the application of Let's Get Organized (LGO-S) as an evidence-based, manual-based intervention within occupational therapy. The 10-session program has demonstrated effectiveness as a practical approach to enhancing functional life skills for clients facing neurodevelopmental or mental disorders (Holmefur et al., 2019). The research identifies that the intervention's strength is its occupational therapy perspective that emphasizes skill mastery using real tools like appointment books, homework tasks, emotional regulation, and learning that mistakes are an important part of the process. Participants demonstrated significant and sustained gains not only in time management, organization, and emotional regulation skills, but also in their overall satisfaction with daily occupations and, crucially, an increase in the number of activities they performed (Holmefur et al., 2019). The findings identify LGO-S Part 1 as a promising tool for improving time management and daily occupations.

The application to the OT process in Lombard et al. (2022) research examined assessment and intervention planning for students with mental health disabilities. A Rasch analysis helped refine the Trinity Student Occupational Performance Profile (TSOPP) and the research created a valid person-item map (Lombard et al., 2022). The authors note this map functions as a keyform that can be used within the OT process to collaboratively identify a "just-right challenge." This offers occupational therapists a reliable tool based on scientific principles to assist in goal setting and intervention grading during therapy (Lombard et al., 2022).

Mailloux et al. (2021) used Rasch analysis, including the generation of Wright maps, to validate new tests within the Ayres Sensory Integration framework, providing practitioners with psychometrically sound tools for assessment. For occupational therapists, this means having access to more robust and accessible assessment tools allowing for more precise identification of a child's sensory integration challenges (Mailloux et al., 2021). This is essential to the OT process for developing effective and individually tailored intervention plans.

When selecting the assessment tools for clinical trials, the Rasch analysis was identified as a key indicator for the study by Schaaf et al. (2021). The findings confirm that the most effective way to measure change within the OT process is through these modern, psychometrically valid tools (Schaaf et al., 2021). This influences how therapists choose assessments to show the value of their interventions.

The Level IV instrument validation study by Wen et al. (2025) specifically outlines a direct application of the OT process by detailing the clinical use of Keyform Ability Maps. The researchers found that the FC-PRO serves as a dynamic tool in which the therapist can use the map in real-time with a client. The therapist can work together to establish goals and design interventions using a visual representation of the "just-right challenge," fully integrating assessment and intervention planning into a single, patient-centered action (Wen et al., 2025).

Limitations of these studies were included in the Psychometric Strengths theme and related to varying conditions during driving (Cheal et al., 2023), sample size and use of convenience sample (Cheal et al., 2023; Holmefur, 2025, Mailloux et al., 2021; Schaaf et al., 2021), limited geographic representation (Lombard et al., 2023) and recovery stages (Wen et al., 2025). Additional limitations included having a pre-post design and a high participant

dropout rate (Holmefur et al., 2019), effectiveness of the self-report measure which relies on the student's personal insight (Lombard et al., 2022), COVID-19 pandemic significantly impacting data collection, need for longitudinal research in future research to further understanding (Mailloux et al., 2021), and possible inconsistency of expert ratings due to the varying levels of expertise (Schaaf et al., 2021).

Discussion

The results of this systematic review suggest that the use of keyform maps and Rasch analysis may be effective to improve intervention planning for occupational therapy (OT) stakeholders. Intervention planning is one of the foundational pillars of the OT process, acting as the main method of change in the health and wellbeing of clients in all practice settings (American Occupational Therapy Association [AOTA], 2020). Education and clinical training of occupational therapy practitioners (OTPs) provides the preparation and rationale necessary to inform selection of appropriate intervention methods, though this process is difficult when considering the wide variety of needs, priorities, and conditions present in clients. Minimal qualitative research exists surrounding OTPs' perceptions of keyform maps and Rasch analysis in intervention planning, though these methods have been identified as useful by OT students. Interviews conducted by Sears et al. (2022) found that keyform maps, derived from Rasch analysis, allowed students to efficiently determine task challenge hierarchy to inform decision-making in personalized intervention planning.

In his Slagle lecture, Dr. Craig Velozo (2021) identified assessment as "the core of [occupational therapy]," though occupational therapy practitioners have faced barriers preventing adequate incorporation of standardized measures in service delivery. In exploring

perceptions of healthcare professionals' use of standardized assessments, interviews conducted by Garland et al. (2003) revealed that workload and lack of perceived benefit were the most common barriers in clinicians' willingness to adopt the use of such measures. This reluctance to employ the use of standardized assessment not only discredits the skilled nature of occupational therapy, it denies clients' rights to holistic, comprehensive assessment (Velozo, 2021). Through the lens of Rasch analysis and keyform maps, assessment can directly contribute to intervention planning, simultaneously reducing clinician workload and improving the quality of service delivery.

The use of keyform maps and Rasch analysis supports intervention planning. Researchers such as Wen et al. (2025) report that such tools allow average difficulty rankings to be created for standardized assessments. Identifying which aspects of assessment may be difficult for a range of participants, as well as ranking these items by difficulty, allows occupational therapy practitioners to find the just-right challenge. In addition to simplifying the workload of practitioners, identification of the just-right challenge allows patients to receive the most appropriate intervention methods, reducing the risk of tasks that are either too difficult or too simple.

Strengths and Limitations

The strengths of this systematic review include adherence to PRISMA guidelines during the search process, counsel offered by experienced researchers, and the authors' prior experience with Keyform Ability Maps for occupational intervention. The researchers maintained an accurate audit trail through the use of a PRISMA flow diagram, ensuring that a record of all sources was maintained throughout the search and refinement processes.

Professors of the student researchers provided scholarly guidance throughout the systematic review process, each possessing research expertise relevant to the current inquiry. Furthermore, the focus of this systematic review strongly aligns with the researchers' areas of knowledge. Each author had prior exposure to and practice with Keyform Ability Maps, lending to the clinical reasoning necessary to refine the results of the review.

This systematic review had several limitations. A short time frame of eight weeks significantly impacted the depth of the research conducted, though adherence to PRISMA guidelines maintained quality of work. Scarcity in articles related to Keyform Ability Maps & Rasch analysis in intervention planning resulted in a need to alter the research question, introducing the potential for incongruence in the literature review process. After synthesizing the relevant articles, only 6 out of the 72 identified in the initial search were appropriate for use in this systematic review due to their lack of applicability in intervention planning. Finally, the conclusions and thematic grouping of articles were liable to subjectivity based on researchers' interpretations and prior experience with Keyform Ability Maps

Implications for Occupational Therapy Practice

Evidence suggests that the use of Keyform Ability Maps and Rasch analysis improves occupational therapy intervention planning. Using these tools provides a more accurate assessment of client needs, ultimately improving therapeutic interventions.

- Result of enhanced assessment tools that better ensures client-centered care.
- Streamlined intervention planning that identifies suitable challenges and tasks.
- Focusing on the just-right challenge enhances client outcomes by increasing engagement, satisfaction, and performance.

- Supports evidence-based practice in enhancing credibility and effectiveness of occupational therapy interventions.

Conclusion

Studies included within this systematic review provide evidence on the effectiveness of Keyform Ability Maps and Rasch analysis in occupational therapy intervention planning. Additional research is necessary to further support the use of Keyform Ability Maps and Rasch analysis on occupation specific assessments. When intervention planning, the use of an assessment tool with a keyform map and Rasch analysis enhances client care outcomes.

References

American Occupational Therapy Association. (2020). Occupational therapy practice framework: Domain and process (4th ed.). *American Journal of Occupational Therapy, 74*(2, Suppl.), 1-87. https://doi.org/10.5014/ajot.2020.74S2001.

Cheal, B., Bundy, A., Patomella, A.-H., Kuang, H., & Scanlan, J. N. (2023). Predicting fitness to drive for medically at-risk drivers using touchscreen drivesafe driveaware. *American Journal of Occupational Therapy, 77*(1), 1-7. https://doi.org/10.5014/ajot.2023.050048.

Garland, A.F., Kruse, M. & Aarons, G.A. Clinicians and outcome measurement: What's the use? *Journal of Behavioral Health Services & Research, 30,* 393–405 (2003). https://doi.org/10.1007/BF02287427.

Holmefur,M., Lidström-Holmqvist, K., Roshanay, A. H., Arvidsson, P., White, S., & Janeslätt, G. (2019). Pilot study of let's get organized: A group intervention for improving time management. *American Journal of Occupational Therapy, 73*, 1-11. https://doi.org/10.5014/ajot.2019.032631.

Lombard, K., Nolan, C., & Heron, E. (2022). Refining the psychometric properties of the trinity student occupational performance profile – A self-report measure of occupational performance difficulties within the student role. *British Journal of Occupational Therapy*, *86*(4), 265–274. https://doi.org/10.1177/03080226221107762.

Mailloux, Z., Grady-Dominguez, P., Petersen, J., Parham, L. D., Roley, S. S., Bundy, A., & Schaaf, R. C. (2021). Evaluation in Ayres sensory integration (EASI) vestibular and proprioceptive tests: Construct validity and internal reliability. *American Journal of Occupational Therapy, 75(*6). https://doi.org/10.5014/ajot.2021.043166.

Sears, C. & Egan, B. (2022). A qualitative study on occupational therapy students' perceptions of using keyform maps. *Journal of Education and Training Studies, 10*(29). https://doi.org/10.11114/jets.v10i2.5430.

Schaaf, R. C., Carroll, A., Waskie, E. C., Dumont, R. L., & Ridgway, E. (2021). Choosing performance-based outcome measures of daily living skills and socialization for clinical trials in autistic children. *American Journal of Occupational Therapy*, *75*(6), 7506205060. https://doi.org/10.5014/ajot.2021.044602.

Velozo C. A. (2021). Using measurement to highlight occupational therapy's distinct value. *American Journal of Occupational Therapy, 75*(6), 7406150010. https://doi.org/10.1054/ajot.2021.746001.

Wen, P. S., Waid-Ebbs, J. K., & Velozo, C. A. (2025). Functional cognition-patient reported outcomes short forms and keyform ability maps. *Archives of Rehabilitation Research and Clinical Translation, 7*(1), Article e100421. https://doi.org/10.1016/j.arrct.2024.100421.

Appendix A

Search Terms

occupational therapy OR occupational therapist OR occupational therapists OR ot AND keyform maps OR rasch analysis

Appendix B

Table 1. Keyform Maps and Rasch Analysis in Client-Centered OT Intervention Evidence Table					
Author/Year	**Level of Evidence Study Design Risk of Bias**	**Participants Inclusion Criteria Study Setting**	**Intervention and Control Groups**	**Outcome Measures**	**Results**
Cheal et al. (2023)	Level II Longitudinal Prospective Study *Risk of Bias* Low	Older and cognitively impaired drivers (N=134) ages 18 to 91 years Inclusion criteria: valid driver's license, vision within license-authority guide-lines, completion of at least 1 yr of high school, and English as a first language Off- Road assessments and on-road assessments in Australia and New Zealand	Intervention: DriveSafe DriveAware (DSDA) as a 10 min touch screen assessment for a measure of driving fitness (n=134) Control Group: P-Drive Standardized occupational therapist-administered on-road assessment method (n=134) Each participant in this study was assessed using DSDA and P-Drive	*Cognition* IADLs: Ability to assess fitness for driving examined through sensitivity and specificity Construct validity: *Rasch analysis was used to assess accuracy of DSDA as a measurement for cognition	Significant findings: Effectiveness of identifying safe driving; sensitivity or 91% Reliability in identifying unfit drivers; specificity of 94% Clinical use is supportive for Occupational Therapists; overall accuracy 88% Nonsignificant Findings: Gaps DriveAware subtest suggests inadequate measurement of participants awareness of performance
Holmefur et al. (2019)	Level III One-group pretest-posttest design with 3-mo follow up *Risk of Bias* Low	n=55 with confirmed or suspected mental or neurodevelopmental disorder and self-reported difficulties with time management in daily life. Inclusion Criteria: 1: confirmed or suspected diagnosis of a mental disorder, such as affective disorder or schizophrenia, or a neuro-	Intervention: Swedish version of Let's Get Organized (LGO–S) Part 1, with structured training in the use of cognitive assistive techniques and strategies using trial-and-error learning strategies in 10 weekly group sessions of 1.5 hr.	Time management: -Assessment of Time Management Skills (ATMS-S) to measure skills, organization/planning, and emotional regulation -Weekly Calendar Planning Activity (WCPA-SE) executive functioning in time planning tasks.	Significant findings: Improved time management skills, organization and planning, emotional regulation, and self-satisfaction with daily occupations. Nonsignificant Findings: Within the 3-mo time frame no significant changes observed in time to complete tasks or strategies used during WCPA-SE measure.

		developmental disorder, such as ASD, ADHD, or attention deficit disorder 2: absence of intellectual disability 3: self-reported difficulties in time management in daily life to an extent that negatively affects functioning in daily life. Outpatient psychiatric and habilitation settings		Occupations: -Satisfaction With Daily Occupations (SDO-13) Patient reported satisfaction with daily activities across different domains.	
Lombard et al. (2023)	Level III Psychometric validation using Rasch Analysis *Risk of Bias* Low	University students with mental health disabilities (N=667) who had completed Part Three of the Trinity Student Occupational Performance Profile (TSOPP) between 2007 and 2017. Ages ranged from 17 to 46 years. Inclusion criteria: Formally registered with the disability services at one of the two participating Irish universities.	Intervention: The Trinity Student Occupational Performance Profile (TSOPP) as a 54-item measure with a 4-point response scale, analyzed as a combined item-set. Control Group: The Trinity Student Occupational Performance Profile (TSOPP) as a 74-item measure with a 6-point response scale, with items analyzed as separate Person, Environment, and Occupation (PEO) item-sets (as well as an initial combined 74-item analysis)	Psychometric properties of the TSOPP using Rasch analysis: Item and person fit statistics, rating scale functioning, dimensionality (including local independence), reliability (person/item reliability indices, Cronbach's Alpha), separation indices (person and item), and item difficulty hierarchy and targeting.	Significant findings: -TSOPP demonstrated stronger psychometric properties as a single combined scale and was successfully refined into a 54-item, 4-point measure -Refined 54-item TSOPP is a valid and reliable self-report measure of student occupational performance difficulties, showing excellent reliability. Nonsignificant Findings: -Generalizability of results is limited because the data is from only two Irish universities. -Limited clarification of response patterns to understand sources of person misfit.
Mailloux et al. (2021)	Level IV	n=150 typically developing (TD) children	N/A	Six Evaluations in Ayres Sensory Integration (EASI) tests were	Significant findings:

	Instrument validation *Risk of Bias* Low	n=84 children with sensory integration (SI) concerns Inclusion Criteria: 1. Age 3 years, 0 months to 12 years, 11 months 2. English as primary language. -TD group: children developing within age expectations reported by parent and tester observation 4. SI group: SI difficulties reported by a therapist, assessment, and/or clinical observation Exclusion Criteria: -TD group exclusion if they had experienced SI concerns or had prior SI intervention -Children with physical disabilities, visual or hearing impairments, and significant cognitive deficits		completed by each participant, with the results being analyzed for construct validity and internal reliability. Rasch analysis was used to generate indicators of construct validity, and the Winsteps software was used to generate person reliability. Cronbach's α was calculated for each test and subscale.	Over 96% of the items from the EASI tests were found to fit the expectations of the Rasch model. The group of typically developing children scored significantly higher than the SI group in the majority of tests. Five of the EASI tests and eight of the multiple-item subscale scores demonstrated strong evidence for internal consistency and moderate to strong person reliability per Rasch analysis Nonsignificant Findings: Two of four EASI tests did not meet Rascha strata value criteria set by the research team. One of six tests did not yield statistically significant differences between the typically developing and sensory integration groups. The Proprioception: Force measure exhibited lower validity and reliability data than other measures.
Schaaf et al. (2021)	Level V Mixed methods Instrument Validation *Risk of Bias* Low	n=7 measures Five performance-based ADL measures Two performance-based socialization measures	N/A	"Sensitivity of the instrument to detect change in response to treatment" Psychometric strength of outcome instruments toward clinical trials, research, and evidence in support of OT based on 92 possible point QI score	Significant findings: *Measures of ADLs* ABLLS-R: 40/92, AFLS: 27/92, AMPS: 75/92, DASH-3: 19/92, GOAL: 52/92 *Socialization Measures:* ESI-2: 70/92 and SP: 37/92 Nonsignificant Findings: 14 outcome measure instruments excluded based on:

					-not being performance based -parent/caregiver rating -questionnaire/ checklist instrument
Wen et al. (2025)	Level IV Instrument validation *Risk of Bias* Low	n=90 who self-reported a moderate to severe TBI and who completed the Functional Cognition-Patient Reported Outcomes (FC-PRO).	N/A	FC-PRO long and short forms for attention, memory, processing speed, and emotional management domains.	Significant findings: -Person separation reliability was between 0.77 to 0.82 for the short forms. A strong correlation (0.91-0.97) was found in person measures of both the short and long forms. -Keyform ability maps for each domain supported the selection of functional challenges that matched the difficulty level appropriate for the patient. Nonsignificant Findings: Short form for the domain of Emotional Management fell below person separation reliability criterion of 0.80.
Note. IADLs, Instrumental Activities of Daily Living; FC-PRO, Functional Cognition-Patient Reported Outcome; Evaluation in Ayres Sensory Integration, EASI.					

Appendix C

Table 2. Risk of Bias for Studies with No Control Group

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 and after intervention	Overall risk of bias assessment (low, moderate, high risk)
Cheal et al. (2023)	Y	Y	Y	N	Y	Y	Y	Y	Y	N	N	L
Holmefur et al. (2019)	Y	Y	Y	N	Y	Y	Y	N	N	Y	Y	L
Lombard et al. (2023)	Y	Y	N	N	Y	NR	Y	NR	Y	NR	NR	M
Mailloux et al. (2021)	Y	Y	N	Y	Y	NR	Y	N	Y	Y	N	M
Schaaf et al. (2021)	Y	Y	Y	NR	Y	NR	Y	NR	NR	NR	NR	M
Wen et al. (2025)	Y	Y	Y	N	NR	NR	Y	N	Y	Y	N	M

Note. Y = yes; N = no; NR = not reported. Scoring for overall risk of bias assessment is as follows: 0–3 N, Low risk of bias (L); 4–8 N, Moderate risk of bias (M); 9–11 N, High risk of bias (H).

Citation. Table format adapted from National Heart Lung and Blood Institute. (2014). Quality assessment tool for before–after (pre–post) studies with no control group. Retrieved from https://www.nhlbi.nih.gov/health-topics/study-quality-assessment-tools