

Daily living skills of autistic adolescents and young adults: A scoping review

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Abstract

Introduction: Daily living skills (DLS) are essential for an increased quality of life and autonomous living. DLS are a focus of occupational therapy practice; however, there has been no identified review of DLS acquisition in autistic adolescents or adults. A scoping review was undertaken of which the objective was to evaluate and synthesise the extent, range, and nature of research activity, and to identify research gaps in the existing literature as they relate to DLS acquisition and autistic adolescents and adults.

Methods: A structured search of the literature was conducted. Studies published in English between 2011 and 2021 that included a focus on the acquisition of DLS in autistic adolescents and young adults were included. The titles and abstracts of 103 records were screened, and the full text of 53 records was reviewed. These reference lists were hand searched. Following this process, 25 papers were found to meet the inclusion criteria.

Results: Findings indicate inconsistencies throughout the literature, with a lack of consensus on best practice methods, mediums, and/or tools to support optimal outcomes in terms of DLS acquisition for the autistic population. Themes related to (1) Generalisation of Skills Across Contexts, (2) Skill Maintenance, (3) Technology as a Teaching Method, (4) Participant and Family Perspectives, and (5) The Balance of Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) focus in research were extracted from the reviewed literature. There is a strong consensus in the findings of the identified papers that autistic adolescents and young adults experience poorer outcomes in terms of DLS acquisition than non-autistic peers, and peers with other developmental or intellectual disabilities.

Conclusion: Future research is needed to fill these identified gaps and provide a clearer understanding on interventions to support optimal outcomes for autistic individuals.

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KEYWORDS

adolescent, Autis*, daily living skills, youth and 'young adults'

1 | INTRODUCTION

There is no clear and agreed upon definition of daily living skills (DLS) presented in the literature. In the absence of this, the definition of DLS presented in the Vineland Adaptive Behaviour Scale-Third Edition (Vinelands-3) has been utilised to preface this review. The Vinelands-3 is a leading standardised assessment tool that is commonly used to measure adaptive behaviour in persons with disability, including adolescents and adults with autism spectrum disorder (hereafter autistic) (Pepperdine & McCrimmon, 2018). According to the Vinelands-3, DLS encompass three subdomains that includes personal (caring for oneself), domestic (maintaining a home), and community skills (school/community living) (Sparrow et al., 2016). Thus, DLS encompass both Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs), with ADLs referring to those more basic self-care tasks (e.g., brushing teeth, dressing, and personal hygiene) and IADLs including more complex home and community living tasks (e.g., finance management, meal preparation, and laundry) (Guo & Sapra, 2020). Acquisition of these skills impacts the extent to which a person is capable of living self-sufficiently and independently within their routine environments (Hong et al., 2015).

Autism is a complex neurodevelopmental disorder impacting approximately 1 in 150 Australians (Australian Bureau of Statistics, 2015). Adolescents and adults with autism spectrum disorder show low independence levels and difficulty performing DLS (Cruz-Torres et al., 2020). Recent research focusing on autism in adulthood has included explorations of preferences for person-first or identity first language (Bury et al., 2020). Currently, there is no clear consensus regarding the most preferred language to use when referring to an autistic person (Vivanti, 2020). The results of a mixed methods Melbourne study that included Australian adults who reported having a diagnosis of autism ($N = 198$) found that the largest percentage of participants ranked identity first language as their most preferred (37.9%) (Bury et al., 2020). With full acknowledgement of the limitations of the study with regard to the skewed sample and online nature of the study, the findings have guided the decision to use identity first language throughout this scoping review (Bury et al., 2020).

Independently performing DLS can foster increased quality of life and decrease dependence on others for

Key Points for Occupational Therapy

- Generalisation and maintenance of DLS skill acquisition should be a consideration of occupational therapists working with autistic adolescents and young adults.
- Tech-based and paper-based mediums are both useful in supporting DLS acquisition of autistic adolescents and young adults.
- There is evidence to support that programs/interventions can lead to improvements in DLS of autistic adolescents and young adults.

autistic people (Wertalik & Kubina, 2018). However, mean DLS scores on the Vinelands-3 indicate that the autistic adolescent and adult population are performing significantly below age expectations (Duncan & Bishop, 2015). This has been the case even for individuals with higher levels of cognitive functioning, which is defined as those who have average or higher intelligence quotients (IQs) (Griffiths et al., 2016). According to the learning hierarchy, when learning and mastering new skills, an individual advances through a series of four predictable stages (Szadokierski et al., 2017). These include acquisition (the initial stage of learning), fluency (development of speed and accuracy), generalisation (utilising the skill across contexts), and adaptation (capacity to modify or adapt the skill to fit novel task demands or situations) (Szadokierski et al., 2017). Mastery of these stages leads to skill proficiency and independence (Szadokierski et al., 2017). Given the significant differences in DLS independence and Vinelands-3 scores between autistic people and their peers, it can be determined that autistic adolescents and adults may not be progressing through these stages like their typically developing peers, and therefore may not be achieving skill proficiency and mastery of DLS.

There is a paucity of research that has explored DLS acquisition in the adolescent and adult autistic population. Existing research predominantly focuses on early childhood and primary school-aged children, with a study by Howlin and Magiati (2017) reporting conflicting evidence on how many autistic individuals achieve

optimal outcomes as adults, and a paucity of agreement on how prognosis might be improved (Kilincaslan et al., 2019). One study reported as little as 12% of autistic adults were living independently within their own residence, whereas the remainder of this population were reported to be dependent on family, friends, supported residences, and/or in home care to perform DLS (Duncan et al., 2018).

The reported low levels of independence and conflicting findings between studies regarding DLS for autistic people highlight the need for further research in this area. This is of specific importance given the association between performance of DLS and overall quality of life and participation for young autistic adults (Wertalik & Kubina, 2018). The objective of this scoping review is to evaluate and synthesise the extent, range, and nature of research activity and to identify research gaps in the existing literature relating to DLS of autistic individuals.

2 | METHOD

This scoping review was developed using Arksey and O'Malley's (2005) framework for scoping studies, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR), and the Joanna Briggs Institute (JBI) Manual for Evidence Synthesis (Peters et al., 2020). The research question was 'What is known from existing peer reviewed research of DLS for autistic adolescents and young adults?', including the following sub questions.

1. Within the specified subdomains of DLS in the Vinelands-3, what are the identified strengths and weaknesses of the autistic population?
2. Which subdomain(s) of DLS has gained predominant attention over the last 10 years?
3. What are the strengths and gaps in the literature on DLS in autistic adolescents and young adults?

2.1 | Eligibility criteria

A clear and consistent definition of adolescence and young adulthood is yet to be established and many theorists and scholars use varying definitions. Erik Erikson's theory of psychosocial development defines adolescence as 12 to 18 years and young adulthood as 19 to 40 years (Orenstein & Lewis, 2020). However, the World Health Organisation (WHO) defines adolescence as 10–19 years (WHO, 2021). For the purpose of this scoping review, studies have been included in accordance with these

target populations combined, between 10 and 40 years of age. Participants within studies may experience comorbid conditions, such as anxiety, language disorder, or attention deficit hyperactivity disorder (ADHD), due to the high prevalence of autistic individuals experiencing co-occurring conditions (Lord et al., 2018). The DSM-5 recognises this complexity by allowing for co-occurring conditions, such as ASD and ADHD (Lord et al., 2018).

The following inclusion criteria were used:

1. The study focussed on at least one ADL or IADL as per the definition included within the beginning of this review. Studies involving other populations or topics were included if the findings specific to the eligible population or topic were presented independently for at least one analysis to allow for accurate extraction.
2. Population involves people within the 10- to 40-year age bracket, with a diagnosis of ASD.
3. Published between 2011 and 2021. A 10-year timeframe was utilised to allow for a balanced extraction and comparison of older, established papers and more current publications (Winchester & Salji, 2016).
4. Published in English.
5. Published within a peer reviewed journal.

Articles were excluded if:

1. Topic or outcome measures related only to social skills or communication, executive function and/or employment. These are not considered to meet the DLS definition used to guide this scoping review.

2.2 | Search strategy

A search strategy was devised and performed in the databases CINAHL, Medline, ProQuest, PubMed, and OT Seeker. The search strategy used 'AND' to combine outputs from three strategies using subject headings (MeSH), and 'AND NOT' to exclude studies that do not meet the inclusion criteria. Search terms used included *autis** OR *'autism spectrum disorder*'* OR *'autis* disorder'* OR *asperger** OR *'asperger* syndrome'* AND *'activities of daily living'* OR *'daily living skills'* OR *'life skills'* OR *'living skills'* OR *'adaptive living'* OR *'adaptive function*'* OR *'adaptive behaviour'* OR AND *adolesc** OR *teen** OR *youth* OR *'young adult'* OR *'young person'* OR *'high school student'* OR *'secondary school student'* OR *'school transition'* OR *post-school*. This search strategy was replicated across all searched databases, modifying search terms as required.

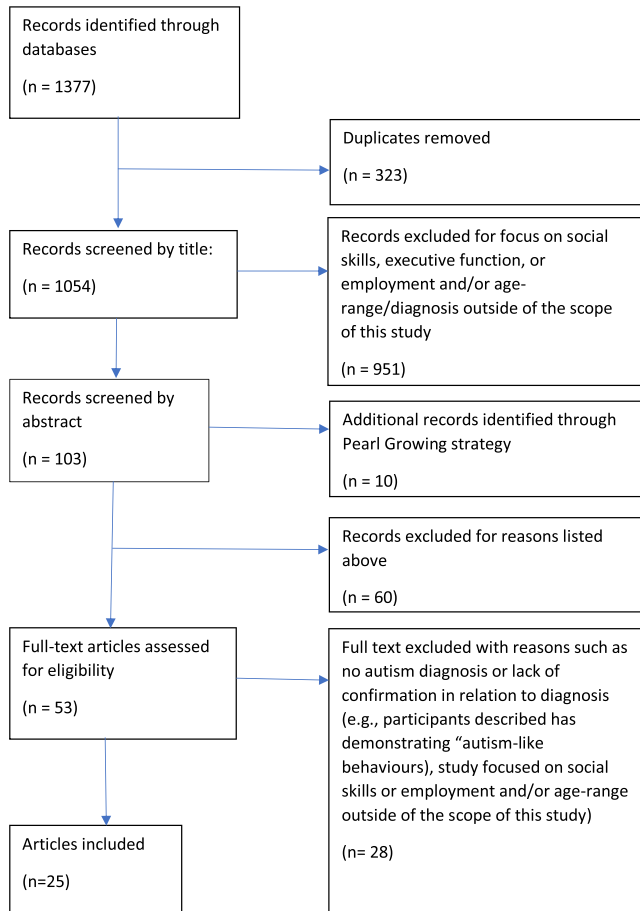


FIGURE 1 Study selection process

2.3 | Study selection

The first author screened the titles and abstracts of 103 records to confirm eligible literature. The full texts of remaining records were then screened by the first author. Literature included peer reviewed research articles. The full text of 53 records was reviewed, and 25 were found to meet the inclusion criteria. Refer to Figure 1 for more details.

2.4 | Data extraction

The authors developed a data extraction chart based on the Joanna Briggs Institute (JBI) Manual for Evidence Synthesis. Sourced from the JBI Manual, in Appendix 11.1. This was used to chart all included papers. As per Arksey and O'Malley's (2005) framework, scoping reviews aim to present an overview of existing research regardless of the quality of individual studies. Therefore, no study was excluded from this scoping review based on quality. The following data items were extracted from the studies:

(1) participant/s characteristics; (2) origin; (3) DLS investigated; (4) environment and context; (5) study design; (6) results; and (7) limitations.

2.5 | Synthesis of results

Thematic construction was utilised to summarise, synthesise, and report the results of the literature, in conformity with stage five of Arksey and O'Malley's (2005) framework. Initially, findings from studies were organised and grouped into areas of interest, and key thematic categories were identified. These categories were refined through a process of informal consensus of the authors. Consensus was established through collaboration, discussion, and agreement among the authors on priority areas within the literature. Following consensus, in accordance with Arksey and O'Malley's (2005) framework, thematic analysis was performed to provide a summary that describes the extent and nature of included studies. These results were reported within the context of the research questions, and interpretations were then made within the context of future research and practice (Westphal et al., 2021).

3 | RESULTS

Following a structured search of the literature, 25 peer reviewed studies were found to meet the inclusion criteria. Figure 1 shows a flowchart of the study selection process. The majority of studies that met the inclusion criteria implemented a pre-test post-test study design ($n = 15$) and were based in the United States ($n = 21$). Five themes were identified (1) Generalisation of skills across context, (2) Skill maintenance, (3) Technology as a teaching method, (4) Participant and family perspectives, and (5) The balance of ADL and IADL focus in research. Themes are discussed in relation to the overarching research question of this review, 'what is known from existing peer reviewed research of DLS for autistic adolescents and young adults?'

3.1 | Generalisation of skills across contexts

A trend identified across 14 studies was the limited consideration and attention given to skill generalisation, which refers to the participant's ability to use skills across multiple environments (Bereznak et al., 2012; Bouck et al., 2014; Brady et al., 2016; Campbell et al., 2015; Caria et al., 2018; Delisio & Isenhower, 2020; Gardner &

Wolfe, 2019; Johnson et al., 2013; Kellems et al., 2017; Mechling et al., 2013; Pérez-Fuster et al., 2019; Tomchek et al., 2017; Wertalik & Kubina, 2018; Wynkoop et al., 2018). Of these 14 studies, 12 were based within the context of the school environment, with no follow up assessment, training, or observation in additional settings or contexts (Bereznak et al., 2012; Bouck et al., 2014; Brady et al., 2016; Campbell et al., 2015; Delisio & Isenhower, 2020; Gardner & Wolfe, 2019; Johnson et al., 2013; Kellems et al., 2017; Mechling et al., 2013; Tomchek et al., 2017; Wertalik & Kubina, 2018; Wynkoop et al., 2018). While the majority of these studies reported marked improvement in terms of levels of independence in DLS, no data were provided that reflects generalisation of skills across different contexts.

Few studies included data or a means for facilitating generalisation of taught skills across environments. Of all included studies within this review, only six were carried out in the natural context, such as the participant's home or in the community (e.g., grocery store) (Burckley et al., 2015; Cohen & McGill, 2020; Cruz-Torres et al., 2020; Ford et al., 2020; Joshi, 2020; Lamash & Josman, 2021). Further, only an additional two studies demonstrated consideration of skill generalisation. These two studies were undertaken by the same researchers and evaluated a DLS program. The program included DLS homework tasks that participants completed with their caregiver, within the natural context (Duncan et al., 2018; Duncan et al., 2021). While not directly assessing or teaching within the natural environments, these two studies included a generalisation support for participants. The outcome of these studies reported improved levels of independence in DLS post program (Duncan et al., 2021, 2018).

While the literature has reported improvements in DLS acquisition within the above studies, most studies were concerned with skill acquisition within a single environment, rather than generalisation of skills across all relevant contexts. Therefore, it cannot be determined if these skills were generalised across multiple environments without evidence of a generalisation support or generalisation data. This should be a consideration for future research.

3.2 | Skill maintenance

A trend identified across studies was the limited collection of long-term maintenance data. Throughout most studies, short-term maintenance data have been collected within a 3-month window. Ten studies did not include any procedures to assess skill maintenance (Campbell et al., 2015; Caria et al., 2018; Cohen & McGill, 2020;

Kellems et al., 2017; Lamash & Josman, 2021; Mechling et al., 2013; Pérez-Fuster et al., 2019; Tomchek et al., 2017; Wertalik & Kubina, 2018; Wynkoop et al., 2018). Seven did not extend collection or analysis beyond 3 months (Brady et al., 2016; Burckley et al., 2015; Cruz-Torres et al., 2020; Delisio & Isenhower, 2020; Ford et al., 2020; Gardner & Wolfe, 2019; Johnson et al., 2013). One of the earliest studies by Johnson et al. (2013) included a short-term maintenance analysis, with one probe conducted 9 weeks following intervention. This was a common trend, with another more recent study in which it was reported that maintenance probes within 11 weeks post intervention cessation were collected, and similarly, data collection did not extend beyond 3 months (Ford et al., 2020).

Only three studies collected data beyond 3 months (Bouck et al., 2014; Duncan et al., 2021, 2018). The earliest study by Bouck et al. (2014) marginally exceeded the 3-month mark and conducted a maintenance phase that occurred 14 weeks post intervention. The remaining two studies extended further and collected maintenance data 6 months post intervention (Duncan et al., 2021, 2018). These two studies, conducted in 2018 and 2021 in the United States included a similar group of researchers, four consistent researchers who were evaluating the efficacy of the same DLS intervention program. However, there was no further maintenance data collection beyond this point and no studies included in this review investigated the long-term outcomes beyond 6 months. While two studies have demonstrated adjustment in study design to allow for longer term follow up, the literature is largely focussed on short-term outcomes.

3.3 | Technology as a teaching method

Technology was identified across studies as a common teaching medium in supporting DLS acquisition in autistic adolescents and young adults. Across studies, technology has been strategically utilised in varying forms, and following varying systematic processes. Most studies found similar positive outcomes in terms of skill progression and independence using technology-based tools. Nine studies investigated video modelling as a primary teaching method and the majority reported improvements in terms of independent performance of DLS (Bereznak et al., 2012; Campbell et al., 2015; Cohen & McGill, 2020; Duncan et al., 2018; Duncan et al., 2021; Tomchek et al., 2017; Wertalik & Kubina, 2018; Wynkoop et al., 2018). Video modelling is a method for teaching DLS that provides a visual recorded example of how to perform the targeted skill, for the autistic individual to view (Wertalik & Kubina, 2018). The autistic

person will then attempt to perform the same task as seen in the video (Wertalik & Kubina, 2018). Video modelling has been explored and discussed across these studies as a medium for facilitating skill progression and autonomy, as the autistic person can access this teaching medium independently, without relying on caregiver support. A case study by Joshi (2020) further, inadvertently, referenced the use of video modelling and its effect, using YouTube videos to teach a young autistic adolescent how to shave successfully.

Eight studies specifically explored the use of video prompting, which differs from video modelling in the way of segmented delivery of video models (Bouck et al., 2014; Burckley et al., 2015; Cruz-Torres et al., 2020; Delisio & Isenhower, 2020; Gardner & Wolfe, 2019; Johnson et al., 2013; Kellems et al., 2017; Mechling et al., 2013). All studies reported improvement in the independent performance of DLS. Only one study explored the use of web-based programs (Caria et al., 2018). The study developed online games to foster money management skills in young autistic adults (Caria et al., 2018). The study results indicated marginal improvement in money management skills 1 week post implementation; however, the participant satisfaction survey derived divided results (Caria et al., 2018). Users found that the application was not user friendly (Caria et al., 2018). Further research is required to understand the efficacy of web-based programs in supporting DLS acquisition.

There were two studies that compared technology with low-tech options, such as pen and paper strategies with high-tech options, including use of an iPad (Bouck et al., 2014; Kellems et al., 2017). Utilising an alternating treatment design, the earlier study by Bouck et al. (2014) sought to compare the levels of task independence when three autistic students performed food preparation tasks. During the intervention, two treatments were compared. These included paper/pencil and the iPad. Across 12 to 14 sessions, students completed an equal number of food preparation tasks under each treatment. The results of this study found that both interventions were successful in decreasing prompt dependency and fostering a greater level of independence. Through a preference assessment, the iPad was identified as preferred by the participants, with a barrier for pen and paper strategies being challenges with fine motor skills (Bouck et al., 2014). Similarly, a later study by Kellems et al. (2017) aimed to ascertain whether static picture prompting or video prompting more successfully increased the independence in DLS for three autistic students, ranging in age from 12 to 15 years. Through a pre-test post-test design, results demonstrated that video prompting appeared to be as effective as static picture prompting (Kellems

et al., 2017). Both studies indicated marginally greater improvement in performance through tech-based strategies when compared with low-tech options (Bouck et al., 2014; Kellems et al., 2017).

As tech evolves, advanced options become available. A recent study investigated virtual supermarket practice combined with a metacognitive intervention to facilitate independence in grocery shopping (Lamash & Josman, 2021). The results demonstrated significant improvement in task independence, which supported the overall notion that technology may be an effective teaching medium to support DLS acquisition.

3.4 | Participant and family perspectives

Most of the studies identified evaluated various intervention strategies and methods. Few studies considered the experience or perspective of autistic individuals and their families in relation to their perception of barriers and enablers to DLS acquisition. Of the pre-test post-test studies, only four included a participant or family feedback procedure within their study design (Caria et al., 2018; Duncan et al., 2018; Ford et al., 2020; Gardner & Wolfe, 2019). These studies aimed to capture the autistic participants and/or family's perspective and satisfaction through feedback sessions, surveys, and/or questionnaires that explored the usability and efficacy of the tool or method. The remaining studies did not include any reported processes that collected participant feedback or satisfaction post intervention.

Only three studies exclusively explored the experiences, perspectives, and/or current outcomes for autistic individuals in relation to DLS performance and how these influenced independent living (Anderson et al., 2016; Cheak-Zamora et al., 2017; Joshi, 2020). These were all qualitative studies that utilised interviews to explore participant perspectives, thoughts, and opinions on independent functioning. The earliest study by Anderson et al. (2016) analysed the perceptions of autistic students on their post-secondary expectations, including living arrangements. The study found that nearly half of the sample planned to move interstate or in with friends; however financial independence and money saving was identified as a barrier to independent living (Anderson et al., 2016). Similarly, Cheak-Zamora et al. (2017) supported Anderson et al.'s (2016) findings in their study which evaluated financial experiences, money management skills and aspirations for financial autonomy among autistic youth. The study confirmed that the importance of financial competence appears to be appreciated by autistic youth; however, like Anderson et al.'s (2016) results suggested, autistic people experience

a lack of skill and support to achieve such autonomy (Cheak-Zamora et al., 2017).

The most recent study that evaluated perspective and current performance in DLS was conducted by Joshi (2020), which discussed the challenges, barriers, and enablers associated with independent living for an autistic adult. Contrary to earlier studies, the participant was reported by his aunt to be managing his finances independently (Joshi, 2020). However, she further discussed during the interview that she had to intervene to utilise the participant's money to purchase a washing machine as he did not understand why he needed one (Joshi, 2020). While the participant was considered to have financial autonomy, he required money management support to utilise money appropriately. These few studies have begun to show consideration of the autistic individual, and family perspective on DLS acquisition and independent living, however, demonstrate the limited focus that has historically been given to this area of research. As evidenced, the few studies broadening their lens to explore or include the voice of the autistic participant and/or their caregiver were published within the last 5 years, demonstrating that research prior to 2016 did not include participant or caregiver insights. Gaining these insights is important to analyse DLS from the experience of the autistic person. Further research is needed to investigate DLS and the experience from the perspective of autistic people and their caregivers.

3.5 | The balance of ADL and IADL focus in research

While both ADLs and IADLs encompass DLS, studies within the last decade have predominantly focussed on the assessment, development, and investigation of IADLs. There has been less focus on progressing independence in performing ADLs. Only eight studies that met the eligibility criteria considered ADLs (Campbell et al., 2015; Cohen & McGill, 2020; Cruz-Torres et al., 2020; Duncan et al., 2021, 2018; Joshi, 2020; Kellems et al., 2017; Wertalik & Kubina, 2018). Within these eight studies, only two exclusively focussed on ADLs (Cohen & McGill, 2020; Wertalik & Kubina, 2018). The remaining studies included an ADL, however maintained predominant focus on IADLs. The most recent study focusing on an ADL was conducted by Cohen and McGill (2020) which explored the short-term outcomes of three caregivers teaching tooth-brushing skills to three autistic adults. While the study demonstrated consideration of supporting ADL independence, it primarily focussed on the coaching and upskilling of caregivers in supporting their autistic participant, rather than on evaluating skill

acquisition or performance among the autistic participants.

The second study that focussed exclusively on ADLs was conducted by Wertalik and Kubina (2018) and investigated the outcomes of two instructional methods to improve independence in applying deodorant, brushing teeth, and face washing. Wertalik and Kubina (2018) included three participants and measured outcomes through Celeration and Level analysis. The study describes Level as 'the mean performance for the frequency of steps performed correctly', whereas Celeration is described as 'the change in frequency of responding over time' (Wertalik & Kubina, 2018). Level comparison identified that two participants achieved between $\times 2.1$ and $\times 10.0$ higher average level of responding under both instructional methods, and while the third participant's average response declined under one instructional method, it improved ($\times 1.2$) under the secondary method. Celeration Comparison demonstrated that the speed at which the study participants learned their self-care skills under both instructional conditions occurred 2–4.6 times faster (Wertalik & Kubina, 2018). These performance outcomes demonstrate the low levels of independence among the autistic participants, and the benefits of targeted intervention to support independence.

The case study by Joshi (2020) further supported these results and findings. The participant's aunty reported that while the participant required extensive support to tend to IADLs, the participant also maintained poor personal hygiene and required teaching in how to complete specific personal care tasks, such as shaving (Joshi, 2020). This case study, combined with the findings of Wertalik and Kubina's (2018) study, demonstrates a clear need for understanding and direct teaching of ADLs for autistic adolescents and young adults.

An additional finding within this theme includes that minimal studies extended their focus beyond three specific DLS and few combined ADLs and IADLs. Most recently, two studies from the same research group developed and evaluated a DLS program that aimed to develop capacity of participants to live independently (Duncan et al., 2021, 2018). The 'Surviving and Thriving in the Real World (STRW)' DLS program targeted ADLs combined with IADLs to support independent living capacity (Duncan et al., 2021, 2018). Skills included morning routine (e.g., personal hygiene and self-care), laundry, cooking, grocery shopping, coping strategies, and money management (Duncan et al., 2021, 2018). This program demonstrated a recent and positive shift in research towards development of capacity rather than a sole focus on improved independence.

These findings demonstrate the low levels of independence in performing ADLs, and the limited focus that

has been given to this area of research within the literature. The literature has largely focussed on developing IADL independence and focussed on a specific task or living skill, rather than a combination of skills. Recent researchers have demonstrated a positive shift towards focusing on both ADLs and IADLs, through development of a DLS development program. Overall, these findings depict that direct teaching is needed beyond childhood, to develop ADL independence in autistic people.

4 | DISCUSSION

Performance in DLS is key to improving quality of life and wellbeing; however, difficulties in the acquisition of DLS for the autistic population have been reported in the literature from 2011 to 2021. Research in recent years has been largely focussed on single settings and short-term outcomes, with limited consideration of skill generalisation and long-term maintenance. Mastery within a simulated or single setting does not provide evidence that taught skills are applied in the natural context (Carruthers et al., 2020). This implicates a deficit in knowledge of whether skills are maintained or generalised across contexts, and therefore, capacity to determine intervention effectiveness is limited.

There is an emergent focus on the use of technology to facilitate DLS acquisition in the autistic population. The majority of research supports the use of tech-based intervention. The few studies which compared tech-based mediums with paper-based supports reported largely similar results. This is an interesting finding as some health professionals may assume a tech-based approach would yield optimal outcomes. It can be determined from the literature that tech-based intervention, such as video modelling, is an effective medium for facilitating DLS acquisition in autistic adolescents and young adults, in addition to paper-based methods. Future research is needed to derive more definitive results in relation to its effectiveness over low-tech options to guide current practitioners and evidence-based practice.

The literature has demonstrated the challenges, and the dependency that autistic adolescents and young adults maintain on caregivers throughout adulthood to perform DLS. Given these findings, it would be expected that research focuses on the development of independence and mastery of both ADLs and IADLs to support optimal outcomes for autistic people. On the contrary, limited attention to ADLs has been a trend within adolescent and adult autism research. As the autistic individual moves from childhood to adolescence, the focus in research and intervention also shifts, and interest is largely given to independent living and community-based

skills. The studies included in this review demonstrate the low levels of independence in ADLs and the limited focus on exploring this within the literature. Further understanding and inclusion of ADLs in autism and DLS research is needed to guide practitioners in supporting autistic adolescents and young adults.

A final trend identified across studies was the limited attention given to the subjective experience of autistic individuals and their families. Over recent years, it has been recognised that the voice of the autistic population has been lacking in the literature, with a breakdown of communication as a central challenge between autistic and non-autistic individuals (Ridout, 2017). Obtaining a greater understanding of the autistic population's perception of barriers and enablers to DLS acquisition would enable researchers to develop a more holistic picture of DLS in this specific population. This would implicate future research by providing a more directed and person-centred focus by incorporating real-life experience into study design, focus and goals.

4.1 | Limitations

A limitation of this scoping review includes the lack of consensus and differing definitions of the adolescent age range. The definition is ambiguous amongst the literature, with theorists and scholars using differing age brackets to capture this population. As a result, when studies refer to adolescence, it is unclear as to the specific age range that is being targeted or referred. For this scoping review, studies were excluded if the ages of participants were not clear, or results were not presented independently to allow for accurate extraction. It is recommended that future researchers clearly present participant ages within their studies, particularly when referring to adolescents.

A further limitation included the inclusion of participants with multiple diagnoses. Within the current evidence base, there is limited research pertaining to the autistic population that excludes participants with co-occurring conditions. This could confound the study findings due to the impact of varying diagnoses. However, due to the limited array of research focusing on the autistic population specifically (excluding co-occurring conditions), the decision was made for participants with comorbidities to be included in this review.

5 | CONCLUSION

This scoping review aimed to investigate the peer reviewed research investigating DLS for autistic

adolescents and young adults. The outcomes of this review have highlighted key findings in relation to the current strengths and gaps within the literature and concluded that autistic adolescents and adults are experiencing poorer outcomes in terms of DLS acquisition and independence, compared to non-autistic peers. Further research is required to better understand, support, and improve DLS outcomes for autistic adolescents and young adults.

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CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

AUTHORS' CONTRIBUTIONS

The first author conducted a systematic search of the literature and screened texts and extracted data. All authors interpreted and synthesised results and prepared a draft. All authors reviewed the results and approved the final version of the manuscript.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

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APPENDIX A: DATA EXTRACTION CHART

(1) Generalisation of Skills Across Context, (2) Skill Maintenance, (3) Technology as a Teaching Method, (4) Participant and Family Perspectives, and (5) The Balance of ADL and IADL Focus in Research.

Citation	Title	Origin and study design	Participant/s details	DLS	Themes				
					1	2	3	4	5
(Anderson et al., 2016)	Post-secondary Expectations of High-School Students With Autism Spectrum Disorders	Cross-sectional descriptive study USA	31 autistic students from Wisconsin ($n = 22$) and Tennessee ($n = 9$) were derived from two larger, ongoing longitudinal studies of autistic adolescents.	Finance management	X	X	X	X	43% of participants expected to continue residing with their parents, whereas 13% planned to move out at some point. Results indicated financial independence and money saving was a barrier to independent living.
(Berezna et al., 2012)	Video Self-Prompting and Mobile Technology to Increase Daily Living and Vocational Independence for Students with Autism Spectrum Disorders	Pre-test post-test USA	Three autistic male high school students were included. They were aged between 15 and 18 years.	Using a washing machine Making noodles Photocopying	X	X	X	X	Results from the task analyses showed an increase in percent of steps performed independently across all DLS tasks for all participants
(Bouck et al., 2014)	High-Tech or Low-Tech? Comparing Self-Monitoring Systems to Increase Task Independence for Students With Autism	Pre-test post-test USA	Female, 13 years old Male, 15 years old Female, 15 years old	Food preparation	X	X	X	X	Both interventions decreased prompt dependency, however, the iPad fostered a greater level of independence when compared to low-tech strategies.
(Brady et al., 2016)	Effects of a Peer-Mediated Literacy	Pre-test post-test USA	Four adolescents with a diagnosis of ASD	Meal preparation	X	X	X	X	Enlisting peers to deliver the LBBT's

(Continues)

<p>Based Behavioral Intervention on the Acquisition and Maintenance of Daily Living Skills in Adolescents with Autism</p>	<p>attended a public charter school for students with ASD were included. Three other adolescents from the same school served as peer partners.</p>	<p>was effective and dramatically increased accuracy. These skills were maintained after the peers stopped reviewing the LBBI stories with them.</p>
<p>(Burckley et al., 2015) An iPad-based picture and video activity schedule increases community shopping skills of a young adult with autism spectrum disorder and intellectual disability</p>	<p>One 18-year-old Caucasian female student with a co-diagnosis of ID.</p>	<p>Visual cues and video prompting substantially increased the participant's shopping skills within two of the three community locations, skill increases maintained after the intervention was withdrawn, and shopping skills generalised to two untaught shopping items.</p>
<p>(Campbell et al., 2015) Handheld Devices and Video Modelling to Enhance the Learning of Self-Help Skills in Adolescents with Autism Spectrum Disorder</p>	<p>Three autistic adolescents.</p>	<p>The study overall demonstrates the efficacy of using video-based interventions on a portable device, such as a phone or iPad, support to skill acquisition and teaching for autistic adolescents.</p>
<p>(Caria et al., 2018) The Design of Web Games for Helping Young High-Functioning Autistics in</p>	<p>Six male individuals were involved. All of them had been diagnosed with</p>	<p>Higher scores were shown on the second trial. On the satisfaction survey, results were mixed. (Continues)</p>

Learning How to Manage Money	'high-functioning' ASD								Three participants reported that the application was not very usable, whereas the other three users judged it usable.
(Cheak-Zamora et al., 2017)	Financial Capabilities Among Youth with Autism Spectrum Disorder	Qualitative study USA	27 autistic youth. Aged 16 and 25 years of age	Finance management	X	X	X	X	The importance of financial competence appears to be understood and appreciated by autistic youth; however, they experience a lack of skill and support to achieve such autonomy, as suggested by the study results.
(Cohen & McGill, 2020)	Video-modelling as an effective solution for coaching carers of autistic adults	Pre-test post-test Israel	Female 28 years old Male 34 years old Male 29 years old	Brushing teeth	X		X		Following intervention, participant independence improved. All participants increased their behavioural teaching techniques by 41.53% on average.
(Cruz-Torres et al., 2020)	Promoting Daily Living Skills for Adolescents with Autism Spectrum Disorder via Parent Delivery of Video Prompting	Pre-test post-test USA	Three participants aged 12 years, 13 years and 17 years and their parents.	Dressing Home maintenance Cooking/meal prep	X	X	X	X	The results of this study indicated that all three parents were successful with the implementation of the VP preparation and intervention.
(Delisio & cisenhower, 2020)	Using Video Prompts to Promote Independent Behavior in Students	Case study USA	16-year-old male with ASD.	Setting up a kitchen for meal preparation and chopping various vegetables			X	X	The participant achieved above the 90% over two sessions' mastery

(Continues)

With Autism Spectrum Disorder			(e.g., carrots and potatoes).	X	X	X	criteria the teachers had selected.
(Duncan et al., 2018)	Preliminary efficacy of a daily living skills intervention for adolescents with high-functioning autism spectrum disorder.	Feasibility pilot study USA	Seven adolescents between the ages of 14 and 18 years who had a diagnosis of ASD.	Morning routine cooking Laundry Money management	X	X	The raw scores and age equivalence scores on the Vineland-II domestic subdomain and DLS domain show statistically significant improvements. The study further found these scores to be maintained at the 6-month follow up.
(Duncan et al., 2021)	A Pilot Randomized Controlled Trial of a Daily Living Skills Intervention for Adolescents with Autism	Randomised Control Trial (RCT) USA	Twelve parent-teen dyads met eligibility criteria.	Morning routine (hygiene) Laundry Kitchen/ Cooking Money management	X	X	Results demonstrated significant gains for the treatment group, when compared to the waitlist control.
(Ford et al., 2020)	Use of a Videoconferencing Intervention and Systematic Hierarchy to Teach Daily Living Skills to Young Adults With Autism Spectrum Disorder	Pre-test post-test USA	Three young adults diagnosed with ASD.	Laundry Cooking	X	X	The researcher reported that post intervention, all three participants performed the target DLS independently at follow-up probes. A satisfaction and confidence survey demonstrated that participant confidence increased; however, ongoing anxiety in relation to DLS performance was reported.
(Gardner & Wolfe, 2019)	Results of a Video Prompting Intervention Package Impacting	Pre-test post-test USA	There were four adolescents who participated in this study. One with an	Dishwashing	X	X	Three of the four participants were reported to acquire dishwashing skills (Continues)

<p>Dishwashing Skill Acquisition for Adolescents With Autism</p>	<p>intellectual disability. Participants were aged between 14 and 19 years of age.</p>	<p>following intervention. Following generalisation probes and maintenance analysis, two participants demonstrated capacity to perform across two different environments and maintain their skills for up to 3 weeks post intervention</p>				
<p>(Johnson et al., 2013)</p>	<p>Evaluating the Effectiveness of Teacher Implemented Video Prompting on an iPod Touch to Teach Food-Preparation Skills to High School Students With Autism Spectrum Disorders</p>	<p>Pre-test post-test USA</p>	<p>Two autistic males, 17 years old.</p>	<p>Making a fruit smoothie Cooking macaroni and cheese in the microwave cooking a frozen pizza in the microwave.</p>	<p>X X X</p>	<p>The results of this study from participant one supports the use of video prompting on an iPod Touch to increase independent performance of autistic learners.</p>
<p>(Joshi, 2020)</p>	<p>Living Alone with Autism</p>	<p>Case study India</p>	<p>24-year-old male with a diagnosis of ASD included. His aunt's perspective included.</p>	<p>Personal hygiene Meal preparation Finance management Domestic skills</p>	<p>X X X</p>	<p>According to the researcher, this study determined that this research paper demonstrated findings contradictory to past studies indicating that autistic adults are least likely to live independently. However, though the participant was living alone, he was dependent on his aunt to ensure he</p>
<p>(Continues)</p>						

was adhering to hygiene requirements and following through with DLS.

(Kellems et al., 2017)	Effectiveness of static pictures vs. video prompting for teaching functional life skills to students with autism spectrum disorders	Pre-test post-test USA	Three students with ASD (level 3 according to the DSM-5), ranging in age from 12 to 15, were involved.	Meal preparation Cleaning Personal hygiene	X	X	Video prompting appeared to be as effective as static picture prompting across most instruction interventions.
(Lamash & Josman, 2021)	A metacognitive intervention model to promote independence among individuals with autism spectrum disorder: Implementation on a shopping task in the community.	Pre-test post-test Israel	56 adolescents (between 11 and 19 years with a diagnosis of ASD). Criteria: • Average or above average IQ was an inclusion criterion.	Grocery shopping	X	X	Both the intervention and the control groups demonstrated substantial improvement.
(Marsack-Topolewski et al., 2021)	Empirical evaluation of the association between daily living skills of adults with autism and parental caregiver burden.	Quantitative analysis of cross-sectional multi-state data. USA	A convenience sample of parents of autistic adults from multiple states.	Finance/money management Community participation Self-care Meal preparation	X	X	Results demonstrated a linear relationship between dependence in ADLs and total caregiver burden, suggesting that parents levels of total caregiver burden are lower when their autistic adult demonstrates higher levels of independence in ADLs.
(Mechling et al., 2013)	Comparing the Effects of Commercially Available and Custom-Made Video Prompting for	Pre-test post-test USA	Four high school students with ASD participated in this study.	Preparing and cooking pancakes, instant mashed potatoes and making instant oatmeal.	X	X	All students reached criterion when viewing the custom-made models.

(Continues)

Teaching Cooking Skills to High School Students With Autism

(Pérez-Fuster et al., 2019)	Enhancing daily living skills in four adults with autism spectrum disorder through an embodied digital technology-mediated intervention.	Single-subject experimental Design Spain	Four males diagnosed with ASD (level 3), Language Impairment and ID. Ages were 31, 26, 25, and 37.	Washing dishes Laundry	X	X	For three out of four participants, DT-mediated intervention was effective for reducing prompts required. DT-mediated intervention was shown to be effective in reducing off-task behaviours for all participants. Technology-based interventions, specifically handheld devices, are effective in fostering daily skill acquisition. Three participants benefited from the DT plus LED light intervention, with reduced prompts recorded.
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(Tomchek et al., 2017)	Occupational Therapy Interventions for Adolescents With Autism Spectrum Disorder	Case study USA	17-year-old autistic male.	Bathing Dressing Meal preparation	X	X	The study provided little information on the outcomes of intervention, however noted that the participant could prepare a meal independently at the conclusion of the intervention. (Continues)
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<p>(Wertalik & Kubina, 2018)</p>	<p>Comparison of TAGteach and Video Modeling to Teach Daily Living Skills to Adolescents with Autism</p>	<p>Single-case experimental design USA</p>	<p>Participants included three 17-year-old male students diagnosed with ASD.</p>	<p>Teeth brushing Face washing applying deodorant</p>	<p>X</p>	<p>The findings demonstrated that both VM and TAGteach saw improvements in DLS on post intervention measures when compared to the control condition.</p>
<p>(Wynkoop et al., 2018)</p>	<p>The Effects of Two Video Modelling Interventions on the Independent Living Skills of Students With Autism Spectrum Disorder and Intellectual Disability</p>	<p>Pre-test post-test USA</p>	<p>Four students participated in the study. One is not to be included in this scoping review due to no diagnosis of ASD.</p>	<p>Home maintenance (taking out the rubbish, wiping out the microwave, rolling silverware)</p>	<p>X</p>	<p>CVM plus P&R appear to be marginally more effective in developing student skills than the other forms investigated.</p>