Interventions that Support Adults with Brain Injuries, Learning Disabilities and Autistic Spectrum Disorders in Dating or Romantic Relationships: A Systematic Review.

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Abstract

Purpose: To evaluate the current evidence on dating interventions, their theoretical underpinnings and effectiveness for adult neuro-atypical populations.

Methods: A literature search was completed using CINAHL, Communication Source, PsycARTICLES, PsycINFO, SocINDEX, MEDLINE, Embase, AMED and EMB Reviews (all), for English-language, peer-reviewed studies into interventions for relationships or dating among adults with acquired brain injuries (ABI), learning disabilities or autistic spectrum disorder (ASD). Demographic data and intervention details were extracted for all included studies. Standard checklists were used for methodological quality and intervention description. Narrative synthesis for studies rating above poor quality.

Results: A total of 11 studies (13 articles) were eligible, ABI (n=6), learning disability (n=4), ASD (n=1). These comprised five comparison or control group studies, two pre-post studies and four case studies. The methodological quality was varied, but intervention descriptions were generally poor. While all studies reported positive outcomes, firm conclusions on their effectiveness are difficult due to the high number of before-after analyses and variation in content and outcome measures used.

Conclusions: More high-quality studies are needed to assess the effectiveness of interventions. Also, greater consensus is needed on the key behaviors for dating and relationships and the measures to assess these.

Keywords: ABI, ASD, dating, intervention, learning disabilities, relationships

Introduction

There is an increasing understanding that adults with developmental or acquired neurological conditions still experience the same desire for intimate relationships as neurotypical adults [1, 2, 3]. Jacobs (as cited in McColl et al) [4] expressed this succinctly in relation to people with acquired brain injuries (ABI) by stating that for fulfilment people want "something to do, somewhere to live, and someone to love". The impact of ABI on sexual and personal relationships is widely recognized [5]. While the awareness of the rights of neuro-atypical adults to have relationships is growing and has been acknowledged by the UK and Scottish Governments [6, 7], education and interventions aimed at relationships and sexuality remain controversial [8].

Intimacy and relationships impact on life satisfaction. Intimate and sexual relationships are among the highest areas of dissatisfaction and one of the top three unmet needs following ABI [9, 10, 11, 12]. Adults with ABI who are in a relationship report higher quality of life (QoL) than those without a relationship [13]. Neuman and Reiter [14] reported a similar association among adults with learning disabilities. Additionally, relationships lead to higher perceived self-concept compared to people who have a close friendship but no relationship.

Dating and intimate relationships require nuanced social behavior [2]. There is a narrow distinction between appropriate and inappropriate dating behaviors [15]. Adults with Autistic Spectrum Disorder (ASD) often engage in inappropriate versions of these behaviors and fail to understand why they are unsuccessful. These behaviors may include approaching inappropriate dating partners and pursuing a potential relationship for too long despite a negative response. Impairments with social and communication skills are central to ASD and Asperger's Syndrome [15], but other neuro-atypical populations also experience difficulties in these areas. Impairments in social cognition (the ability to identify and interpret interpersonal cues) are common following severe ABI [16]. These impairments may link to the disinhibited and inappropriate behaviors shown by many people with brain injuries. For example, an inability to judge the emotional stance of a conversation partner or correctly interpret another person's intentions or feelings which impair a brain injured person's ability to offer a socially appropriate response [16, 17]. Adults with ABI may also experience difficulties with sexuality and relationship for other reasons. Difficulties with communication can affect expression of intimacy; physical difficulties can affect both the ability to engage in sexual activities and people's perceptions of themselves as desirable, romantic individuals; and changes in cognitive skills can result in role changes which can lead to conflict or uncertainty in relationships [18]. Despite all this, dating and relationships are often neglected areas of rehabilitation [19].

Both the content and approach to training and support for dating and relationships are important but subject to debate. There is often a reactive approach, rather than the proactive use of training and support that would acknowledge the importance of this area to human experience [20, 21]. Some approaches may focus on protection [6], while others can focus on the physical act of sex, separating this from intimacy and relationships [22]. However, simply

increasing knowledge of sex may not help people to meet their needs [23, 24]. Lockhart et al [23] found similar levels of sexual knowledge, but a higher level of sexual need in adults with learning disabilities displaying sexualized challenging behavior, compared to those showing non-sexualized challenging behavior. They concluded that knowledge of sex alone was not sufficient to help people to meet their needs.

Training for wider areas related to sexuality and relationships may be more beneficial [14, 22], as areas, such as communication, have been described as key to maintaining intimacy and relationships [25]. Training can also be targeted at people in a supporting role, as their stereotypes and attitudes may be a barrier to supporting neuro-atypical adults to engage in dating and intimate relationships [6, 7].

There is a range of views regarding which professional group is best placed to address sexuality and relationships in rehabilitation. Harris and Brady [26] argued that Speech and Language Therapists were well placed to support people to express needs and feelings associated with relationships, due to their role in supporting communication skills. Calloway, Sloan and Winkler [27] and McCarthy [28] recommend that Occupational Therapists can support the skills needed to maintain social networks and relationships, for example by including social contacts in daily rehabilitation activities, provide education on cognitive-behavioral changes and support shared, community activities to encourage social integration and development of support networks. Simpson [19] advocated for a multidisciplinary team approach, both due to the need to establish a team consensus and the skills required to address an area that has physical, cognitive and communication components. Krantz et al [20] and Dyer and das Nair [29] highlight this lack of consensus as a barrier to providing input.

Research suggests professionals may avoid addressing sexuality and relationships. This may create a further barrier beyond the lack of identified responsibility. Rosenbaum, Vadas and Kalichman [30] and McGrath et al [18] found that professionals working with adults after stroke often do not raise these issues with their patients, despite being aware of the impact of stroke on sexuality. This lack of support can leave people feeling unprepared [30, 18]. Dyer and das Nair [29] highlighted that professionals can perceive this as an intrusive area requiring specialist knowledge or training. It can also be seen as complicated or overwhelming to deal with, especially when there may be no professional support structure available to seek advice from.

Dating and relationships may be sensitive areas to address in rehabilitation, but they impact life satisfaction and QoL. Given the paucity of research in this field, there is a need to more clearly understand the current evidence base, to better guide professionals working in this area. The purpose of this systematic review is to explore what interventions exist to support three neuro-atypical populations (ASD and Asperger's syndrome, learning disability and ABI) in dating and intimate relationships. It was felt necessary to include a range of populations as initial database searches indicated that focusing on one population would yield minimal results. In these three populations impaired social interaction skills have been commonly identified and there is research indicating that people in these populations may struggle to engage in dating, or maintaining relationships [2, 3, 16, 31, 32]. Adult populations were focused on due to the different settings and life experiences likely between adult and adolescent populations which may impact interventions. The review will address the following questions:

- What interventions have been developed to support adults with ABI, learning disabilities, ASD to learn skills for engaging in dating or intimate relationships?

- What theoretical principles have been used to develop these interventions?
- What is the evidence for the effectiveness of these interventions?

Method

This systematic review has been conducted and reported following PRISMA guidelines and registered with PROSPERO (CRD42019120222).

Search Strategy

A systematic search of nine databases was completed on 23/12/2018 and re-run on 01/05/2020 by the first author: CINAHL, Communication Source, PsycARTICLES, PsycINFO, SocINDEX, MEDLINE, Embase, AMED and EMB Reviews (all). No date limits were placed on the search. The search terms used were:

1. Population terms: “ASD” OR “autis*” OR “aspergers” OR “stroke” OR "brain injur*" OR "head trauma" OR “head injur*” OR “brain damage” OR "mental* retard*” OR "learning dis*" OR “developmental* dis*” OR “intellectual* dis*” OR “neurodevelopmental* dis*” AND
2. Intervention terms: “Interven*” OR “therap*” OR “treatment” OR “program” OR “training” OR “education” OR “coaching” OR “group” AND
3. Type of intervention terms: “Dating” OR “dating-skills” OR “romance” OR “romantic” OR “intimate” OR “intimate relationship” OR “romantic relationship” NOT “violent” NOT “violence”.

Study Selection

Studies had to meet the following inclusion criteria: (1) testing an intervention to support dating or intimate relationships; (2) published in a peer reviewed journal; (3) in English, with

the full text available; (4) participants were 18 years or older; (5) participants were diagnosed with either ABI, learning disability, developmental disability, intellectual disability, neurodevelopmental disability, mental retardation, ASD or Asperger's Syndrome (although Asperger's syndrome is no longer a separate category in the DSM-V, it was previously identified separately and due to the lack of date limits on the search it was felt possible that there may have been studies focusing on this population separately). The term "learning disabilities" has been used throughout this paper to mean people whose ability to understand new or complex information is significantly impaired and their ability to manage their lives independently is reduced [33]. This term is interchangeable with "intellectual disabilities" which may be more commonly used in some countries such as the USA, Canada and Australia [33]. All study designs were considered for inclusion. Due to the limited number of intervention studies identified during the initial searched it was decided that there would be a more complete understanding of the current literature if all study types were considered.

All articles identified in the database searches were subjected to title and abstract review by the first author. The software program EPPI reviewer [34] was used to organize the articles according to the inclusion and exclusion criteria. Full text review was completed by the first and last author, who compared the full text articles to the inclusion criteria. Disagreements were resolved by the second author. The first author has over 5 years of clinical experience working with a range of adult populations, the second and third authors both have over 20 years of clinical and research experience.

Study Appraisal

The description of the interventions for included articles was rated using the Template for Intervention Description and Replication (TIDieR) checklist, a 12-item checklist, by Hoffman

et al [35]. This evaluated the thoroughness of the intervention descriptions, which has implications for future research and for the ability of clinicians to implement interventions into clinical practice.

Risk of bias was rated according to study design. Studies with control or comparison groups were rated with the Physiotherapy Evidence Database (PEDro) scale [36], which is a reliable and valid 11-item scale [37, 38]. Total scores show whether a study is of poor (less than 4/10), fair (4-5/10), good (6-8/10) or excellent quality (9-10/10) [39]. Studies using only pre-post measures were rated with the Quality Assessment Tool for Before-After Studies with No Control Group [40]. This 12-item scale has been increasingly used to consider the quality of studies using this type of design [e.g. 41, 42]. This tool does not have cut-off scores for quality ratings; instead reviewers use their own judgment to categorize the quality of the study [40]. Therefore, we adopted a pragmatic approach and considered studies scoring less than 4/12 as at a high risk of bias as this represented achieving less than a third of scale items. The Risk of Bias in N-of-1 Trials (RoBiN-T) scale [43] was chosen to assess the quality of single case study and case series designs. This scale provides quality ratings for case studies with well controlled designs, such as multiple baseline designs. Less well controlled designs, such as A-B designs, are excluded before rating due to the high risk of bias. This scale has been used by other systematic reviews to evaluate this study design [e.g. 44, 45]. All ratings were completed by the first and last author, with differences resolved by consensus. Percentage scores for inter-rater agreement were calculated.

Data Extraction and Synthesis

Data extraction was completed by the first author. The participant details which were extracted included demographic characteristics such as the age and gender, diagnosis and,

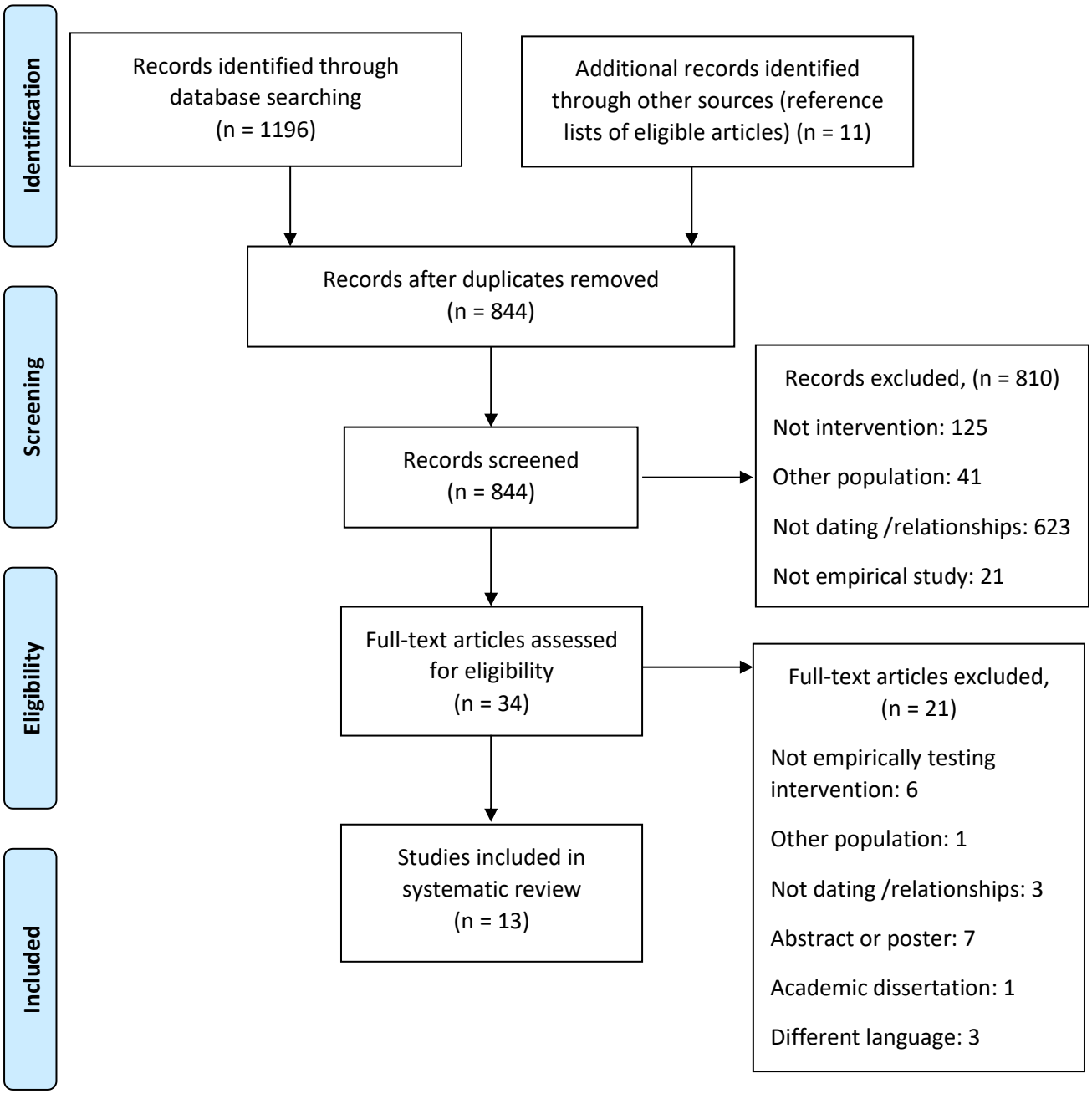
where appropriate, years since the diagnosis and years in a relationship. The intervention details extracted included the dosage and areas covered by the intervention. Underlying approaches were also identified by grouping intervention techniques into broader categories: cognitive, behavioral, psycho-emotional or education approaches and group processes. These categories were drawn from those developed and defined by Meulenbroek et al [46] in a review of social communication skills. The studies were grouped by population (i.e. ABI, learning disability, and ASD). For all included studies, the participant and intervention details intervention outcomes were summarized, describing and comparing the interventions within each population group. For synthesis of results, poor quality studies (i.e. those scoring below 4 on the PEDro scale and the Quality Assessment Tool for Before-After Studies with No Control Group, or studies excluded by the RoBiN-T scale) were excluded to prevent unwarranted weight being given to their findings due to the high risk of bias. Standardized mean differences and effect sizes were not possible to calculate due to the range of outcome measures used.

Results

The initial database search identified 1196 articles, with a further eleven identified through checking reference lists. The number of potential articles was reduced to 844 after duplicates were removed. Following a check of the title and abstract 810 articles were excluded, the full text of 34 articles was checked against the inclusion criteria. Thirteen articles met the inclusion criteria, these described eleven studies. Two studies were described in two articles each [47, 48 and 49, 50]. Six studies focused on an ABI population, four on a learning disability population and one on an ASD population. Six of these studies occurred in the USA

[47, 48, 51, 52, 53, 54, 55], two in the UK [57, 59], the remaining three [49, 50, 56, 58] do not clearly state location. Figure 1 shows the study selection process.

Figure 1, the study selection process.



The studies comprised five comparison or control group studies [49, 50, 51, 52, 53, 54], two pre-post studies [55, 47, 48), and four case studies or case series [56, 57, 58, 59].

The study selection process achieved good inter-rater agreement between the two reviewers (30/34 articles, 88%). Disagreements were resolved by consensus (1 article) and review by the second author (3 articles). These disagreements focused on the authors clarifying the level of detail and investigation required to test an intervention.

Participant characteristics

Table 1 shows an overview of the participant characteristics and intervention details. Authors were contacted via email for information not reported in the studies; however, we were unable to retrieve any further information. The six studies on adults with ABI involved 114 participants. M:F ratio was not reported in two of the studies [51, 55] which compromise 31 participants. The remaining four studies [49, 50, 56, 57, 58] had a M:F ratio of 61:22. Age range was not reported in three of the studies [49, 50, 51, 55], the remaining three studies had an age range of 22-64. The four studies on adults with learning disabilities [47, 48, 52, 53, 59] involved 99 participants (M:F = 55:43, with one unspecified from Valenti-Hein et al [53]. The age range was 18-51 years. One study [54] considered adults with ASD, comprising 38 participants, M:F ratio was 30:8, age range was not clearly reported.

The studies considered different types of relationships. Four of the six studies involving participants with ABI focused on maintenance of existing relationships [49, 50, 51, 55, 57]. All of the studies involving participants with learning disabilities focused on dating behaviors. Two studies, Cunningham et al [54], (ASD population) and Gutman and Leger [58], (ABI population) recruited both single and partnered participants. One study [58]

considered homosexual relationships. The other studies either did not specify sexuality, or only included heterosexual participants.

Severity of condition was variably reported. All of the case studies include descriptions of the impairments, allowing the reader to infer severity [56, 57, 58, 59]. In the group studies, only Valenti-Hein et al [53] reported the assessment used to rate severity. Ward et al [47, 48] do not give a description or classification of severity. The other studies reported severity without explaining how it was assessed

Most studies across the populations (7 out of 11) recruited participants living in the community (including supported accommodation). Mueser et al [52] and Valenti-Hein et al [53] recruited participants from a range of settings, including community and residential living. Gutman and Leger [58] focused on participants in a residential unit. Valentich and Gripton's [56] case study was in transition between residential and community living.

Table 1. Participant and intervention characteristics

Study	Design	Sample size	Age Mean +/-SD (range)	Gender (M:F)	Diagnosis (as stated in article)	Time (years) since injury Mean (SD)	Years in a relationship Mean (SD)	Delivery and Intervention Dosage	Areas covered in intervention	Approaches, used
ABI										
Kreutzer et al [49], Graham et al [50]	RCT	75 participants with their partners	Treatment group: 47.3 +/- 13.1 Control group: 47.4 +/- 14.0	30:15	TBI: 91% Stroke: 3% Aneurysm: 1% Non-progressive neurological problem: 5%	Treatment group: 2.75 +/- 4.3 Control group: 5.23 +/- 7.98	Years prior to injury. Treatment group: 12.0 (11.3) Control group: 10.6 (13.0)	As couples 2-hour, weekly sessions for 5 weeks, option for a 6th session in week 6.	Understanding brain injury, communication, problem solving, intimacy, taking care of self and relationship. Optional session on parenting.	Cognitive Educational Psycho-emotional
Backhaus et al [51]	RCT	22 participants with their partners	Treatment group: 50.09 +/-10.58 (NR)* Control group: 52.14 +/-12.39 (NR)*	Not reported	Moderate-severe TBI (N=16) Intercranial haemorrhage (N=1) Ischemic stroke (N=4) Hypoxia (N=1)	Treatment group: 2.61 (1.35) Control group: 4.35 (4.47)	Treatment group: 25.7 (5.33) Control group: 20.75 (7.43)	Group 16 weekly sessions, duration not specified	Understanding relationships and brain injury, recognizing needs, managing emotions and communication	Cognitive Educational Psycho-emotional

Study	Design	Sample size	Age Mean +/-SD (range)	Gender (M:F)	Diagnosis (as stated in article)	Time (years) since injury Mean (SD)	Years in a relationship Mean (SD)	Delivery and Intervention Dosage	Areas covered in intervention	Approaches, used
Backhaus et al [55]	Before-After study	9 participants with their partners	47.06 +/- 11.42 (NR)*	Not reported	Moderate-severe TBI (N=6) Ischemic stroke (N=2) Hypoxia (N=1)	4.00 (3.71) Range: 0.67-12.87	18.22 (11.41) Range: 6-37 Median: 16 Mode: 10	Group 2 hourly sessions for 16 weeks, frequency not specified	Psychoeducation on brain injury and relationships, emotions and empathy, communication and interpersonal skills, relationship strategies	Cognitive Educational Psycho-emotional
Valentich and Gripton [56]	Case study	1 person	29 years old	Male	TBI	11 years	Not applicable – dating intervention	Individual Not specified	Cognitive restructuring, assertiveness, social skills, behavioural assignments and practice.	Behavioural Cognitive
Yeates et al [57]	Case series	4 participants with their partners	Participant 1: 56 years Participant 2: 64 years Participant 3: 61 years Participant 4: 42 years	Male brain injured participants all with female partners	Participant 1: Ischemic stroke Participant 2: haemorrhage Participant 3: Stroke Participant 4: TBI	Participant 1: 1.5 Participant 2: 10 Participant 3: 6 Participant 4: relationship formed after the TBI	Not reported for all couples	Individual 6-25 session, frequency and duration not specified	Engagement and de-escalation, interaction patterns, integration of gains	Cognitive Psycho-emotional

Study	Design	Sample size	Age Mean +/-SD (range)	Gender (M:F)	Diagnosis (as stated in article)	Time (years) since injury Mean (SD)	Years in a relationship Mean (SD)	Delivery and Intervention Dosage	Areas covered in intervention	Approaches, used
Gutman and Leger [58]	Case series	3 participants	Participant 1: 26 years Participant 2: 22 years Participant 3: 36 years	2:1	TBI	Participant 1: 8 Participant 2: 6 Participant 3: 11	2 case studies in relationships formed after the brain injury, duration not reported.	Individual 6 months of input, frequency and duration of sessions not specified	Verbal and non-verbal interpersonal skills and dealing with rejection.	Behavioural Cognitive
Learning Disabilities										
Chandler, Swift and Goodman [59]	Case study	1	25 years	Male	Learning disability	N/A	Not applicable – dating intervention	Individual 11 sessions, frequency and duration of sessions not specified	Psychoeducation on law, relationships, locus of control, meaningful occupation and online safety.	Cognitive Educational
Mueser, Valenti-Hein and Yarnold [52]	Random allocation to treatment groups	41 participants	28.4 +/- NR* (18-51 years)	24:17	Mild-moderate mental retardation	N/A	Not applicable – dating intervention	Group 90-minute sessions for 12 weeks, frequency of sessions not specified	Conversation and listening skills, emotions, arranging dates, sexual functioning and birth control.	Behavioural Cognitive Group Processes

Study	Design	Sample size	Age Mean +/-SD (range)	Gender (M:F)	Diagnosis (as stated in article)	Time (years) since injury Mean (SD)	Years in a relationship Mean (SD)	Delivery and Intervention Dosage	Areas covered in intervention	Approaches, used
Valenti-Hein, Yarnold and Mueser [53]	RCT	26 participants	Mean: NR*(18-50 years) Split between treatment and control groups not stated	Treatment group: 7:6 Control group: 6:6 One participant gender not reported	Mental retardation Borderline-Moderate intellectual functioning	N/A	Not applicable – dating intervention	Group 90-minute sessions, twice weekly for 12 weeks	Problem solving approach, covering conversation and listening skills, emotions, arranging dates, rejection, sexual functioning and birth control.	Behavioural Cognitive Group Processes
Ward et al [47, 48]	Before-After Study	31 participants	NR*	17:14	Intellectual or developmental disability	N/A	Not applicable – dating intervention	Group 90-minute sessions, twice weekly for 10 weeks	Emotions, relationships, communication, boundaries, meeting people, dating and social activities, safety, sexual health and gender differences.	Behavioural Educational

Study	Design	Sample size	Age Mean +/-SD (range)	Gender (M:F)	Diagnosis (as stated in article)	Time (years) since injury Mean (SD)	Years in a relationship Mean (SD)	Delivery and Intervention Dosage	Areas covered in intervention	Approaches, used
ASD										
Cunningham et al [54]	RCT Random allocation to treatment group	38 participants	Treatment group 1: 18–29: 14 30–39: 1 40–49: 1 50 and over: 2 Treatment group 2: 18–29: 14 30–39: 3 40–49: 1 50 and over: 1 One age not reported	30:8	Autistic Spectrum Disorder or Asperger's Syndrome (numbers for each diagnosis not stated) Mild-moderate severity	N/A	35 ppts were single, 3 were married, duration of relationships not reported.	Group 2 hourly sessions, held weekly for 8 weeks	Relationship Enhancement Program.	Behavioural Educational

Abbreviations:
ABI Acquired Brain Injury
ASD Autism Spectrum Disorder
N/A Not Applicable
NR Not Reported
RCT Randomised Controlled Trial
TBI Traumatic Brain Injury

TIDieR ratings

The TIDieR scale was used to rate the description of the interventions, ratings are shown in table 2. The two studies that were each split across two articles [47, 48, 49, 50] have both been considered together to provide an overall impression of the completeness of information available. There was a good level of inter-rater agreement for the TIDieR scale (80%). Overall, the descriptions of interventions were poor. There were significant gaps in the descriptions, 82% of studies scored 6 or below. Only two studies achieved good ratings [47, 48, 55]. The most commonly described items were procedure (item 4, 64%) and mode of delivery (item 6, 82%). The least commonly described items were assessment of fidelity (item 12, 9%) and tailoring (Item 9, 18%) and modification (item 10, 18%).

Table 2, Scores from the TIDieR rating scale for the description of the interventions used

	TIDieR Check list items*												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
ABI													
Kreutzer et al [49], Graham et al [50]	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	No	No	7/12
Backhaus et al (51)	Yes	Yes	No	Yes	Yes	Yes	No	No	No	No	Yes	No	6/12
Backhaus et al [55]	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	No	8/12
Valentich and Gripton [56]	No	Yes	No	No	No	No	No	No	No	No	No	No	1/12
Yeates et al [57]	Yes	Yes	No	No	Yes	Yes	Yes	No	No	Yes	No	No	6/12
Gutman and Leger [58]	No	Yes	No	Yes	No	Yes	No	No	Yes	No	No	No	4/12
Learning Disability													
Chandler, Swift and Goodman [59]	No	Yes	No	Yes	Yes	Yes	No	No	No	Yes	No	No	5/12
Mueser, Valenti-Hein and Yarnold [52]	Yes	No	No	Yes	No	Yes	Yes	Yes	No	No	No	No	5/12
Valenti-Hein, Yarnold and Mueser [53]	Yes	No	Yes	Yes	No	Yes	Yes	Yes	No	No	No	No	6/12
Ward et al [47, 48]	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	9/12
ASD													
Cunningham et al [54]	Yes	Yes	No	No	Yes	Yes	No	Yes	Yes	No	No	No	6/12
Total	8/11	9/11	3/11	8/11	7/11	10/11	3/11	6/11	3/11	2/11	3/11	1/11	

*TIDieR checklist items are as follows: (1) brief name, (2) why, (3) what materials, (4) What procedures, (5) who provided, (6) how, (7) where, (8) when and how much, (9) tailoring, (10) modifications, (11) how well, planned, (12) how well, actual.

Abbreviations:
ABI Acquired Brain Injury
ASD Autism Spectrum Disorder

Quality Ratings

The PEDro scale was used to rate studies with control or comparison groups, scores are shown in table 3.

The PEDro scale produced a high level of inter-rater agreement (95%). Two studies, Kreutzer et al [49], Graham et al [50], Backhaus et al [51], were good quality, two studies, Valenti-Hein et al [53] and Cunningham et al [54] were fair quality and one, Mueser et al [52] was poor quality.

Table 3, Risk of bias ratings for control or comparison groups from the PEDro scale.

	PEDro Scale Items*											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**Total**
ABI												
Kreutzer et al [49]	No	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes	6/10
Backhaus et al [51]	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	7/10
Learning Disability												
Mueser, Valenti-Hein and Yarnold [52]	No	Yes	No	Yes	No	No	No	No	No	Yes	No	3/10
Valenti-Hein, Yarnold and Mueser [53]	No	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	5/10
ASD												
Cunningham et al [54]	Yes	Yes	No	Yes	No	No	No	No	No	Yes	Yes	4/10

*PEDro scale items are as follows: (1) eligibility criteria (not used to determine total score), (2) random allocation, (3) concealed allocation, (4) similarity at baseline, (5) blinding of subjects, (6) blinding of therapists, (7) blinding of assessors, (8)adequate follow-up, (9) intention to treat, (10) between group comparisons , (11) measures and variability for outcomes.

Abbreviations:
ABI Acquired Brain Injury
ASD Autism Spectrum Disorder

Table 4 details the quality ratings for Before-After studies, using the Quality Assessment for Before-After studies with no Control Group. There was a fair level of inter-rater agreement at 77%. Both studies were of fair quality.

Table 4, Quality rating scores for the Before-After studies

	Quality Assessment Tool for Before-After Studies with No Control Group items*												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
ABI													
Backhaus et al [55]	Yes	Yes	No	Yes	No	No	Yes	No	No	Yes	No	N/A	5/11
Learning Disability													
Ward et al [47, 48]	Yes	Yes	No	No	No	Yes	No	No	Yes	Yes	No	N/A	5/11

*Before-After Scale items are as follows: (1) research question, (2) eligibility criteria, (3) sample, (4) enrolment, (5) sample size, (6) intervention, (7) outcomes, (8) blinding of assessors, (9) adequate follow up, (10) statistical measures, (11) multiple baseline and outcomes, (12) individual or group level data.

Abbreviations:
ABI Acquired Brain Injury

All case studies and case series [56, 57, 58, 59] were excluded from data synthesis as they were A-B study designs, which could not be rated by the RoBiN-T scale due to high risk of bias [43].

Data Synthesis

Six studies were of sufficient quality to be included in the data synthesis. Three studies [49, 50, 51, 55] represented 106 participants with ABI and their partners. Ward et al [47, 48] and Valenti-Hein et al [53] included 57 participants with learning disabilities (M:F 30:26). Cunningham et al [54] included 38 participants with ASD (M:F 30:8).

Detailed information on outcomes for all five studies is provided in table 5.

Table 5, Outcome measures and results for the included studies

Construct being Measured	Outcome measure	Outcomes
Kreutzer et al [49], Graham et al [50] (RCT)		
Relationship quality and distress in relationships	Revised Dyadic Adjustment Scale (RDAS) [60]	Significant different between treatment and control group pre-treatment-post-treatment (patient: t(df)=3.52 (78.2), p<0.001; Partner: t(df)=3.44 (76.9), p<0.001)
Relationship stability and potential for separation	Marital status Inventory [61]	Not reported
Perceived psychosocial and educational needs after brain injury	Family Needs Questionnaire (FNQ-R) [62]	Results adjusted due to significant differences between the treatment and control groups. Significant difference between treatment and control groups on 5 of the 6 subscales (health information p<0.001; Emotional support p=0.001; Professional support p=0.003; Community support p=0.002; Care involvement p=0.009).
Caregiver burden	Zarit Burden Interview (ZBI) [63]	No significant difference between treatment and control group (after adjusting scores for baseline characteristics)
Performance on 6 areas of functioning, covering emotional, physical, cognition and communication.	Neurobehavioral Functioning Inventory (NFI) [64]	Used to assess for differences between the treatment and control groups. Partners reported significant differences between the groups for depression (t^b= -2.20, p=0.031), memory/attention (t^b= -3.84, p=<0.001) and communication (t^b= -0.96, p=0.008).
Backhaus et al [55] (pre-post)		
Relationship adjustment and satisfaction	Dyadic Adjustment scale (DAS) [65]	Significant pre-post change: t(8)=2.48, p=0.02, CI=1.46-17.49
Relationship quality	Quality of marriage Index (QMI) [66]	Significant pre-post change: t(8)=2.54, p=0.018, CI=0.75-7.33
Negative communication patterns	4 Horsemen of the Apocalypse questionnaire [67]	Significant pre-post change: t(8)=3.69, p=0.001

Backhaus et al [51] (RCT)		
Relationship adjustment and satisfaction	Dyadic Adjustment scale (DAS) [65]	Significant interaction effect of group x time: $F=4.77$, $p=0.01$, $\eta^2=0.10$ Treatment group showed significant improvement pre-post ($p=0.03$) and pre-follow up ($p=0.002$).
Relationship quality	Quality of marriage Index (QMI) [66]	No significant changes between groups or across time
Negative communication patterns	4 Horsemen of the Apocalypse questionnaire [67]	Significant interaction effect of group x time: $F=3.19$, $p<0.05$, $\eta^2= 0.07$ Treatment group showed significant improvement pre-post ($p=0.01$) and pre-follow up ($p=0.01$).
Valenti-Hein et al [53] (RCT)		
Knowledge of dating	Stacking the Deck Procedure [68]	Significant interaction effect of group x time: $F(2, 46)=4.96$, $p<0.02$ Significant group main effect: $F(1, 23)=16.6$, $p<0.01$ Treatment group showed improvement over the control group.
Social Anxiety	Social avoidance and Distress scale [69]	No significant differences between groups
Frequency of same and opposite sex interactions	Naturalistic observations	No significant differences between groups

Performance in pre-set scenarios	Role plays	Significant interaction effects of group x time pre-post for: Style $F(2, 46)=4.4$, $p<0.05$ Positive emotions $F(2, 46)=3.7$, $p<0.05$ Significant interaction effect of group x time pre-follow up for: Overall skill $F(2, 46)=2.9$, $p<0.05$ Content $F(2, 46)=7.3$, $p<0.01$ Style $F(2, 46)=3.0$, $p<0.05$ Comprehension $F(2, 46)=5.0$, $p<0.05$ Significant group main effects pre-post for: Physical attractiveness $F(1, 23)=3.9$, $p<0.05$ Style $F(1, 23)=6.3$, $p<0.05$ Positive emotions $F(1, 23)=5.4$, $p<0.05$ Treatment group showed greater improvements than control group.
Ward et al [47, 48] (pre-post)		
Composition of social network	Social Network Measure	Significant change Pre-follow-up: Estimate= -2.34, standard error= 0.71, $p<0.01$, CI-3.77, -0.92
Experiences of violence	Interpersonal Violence Inventory [70]	Significant pre-post change: $F(1.21, 19.42)=7.84$, $p=0.01$
Cunningham et al [54] (pre-post)		
Social skills	Social responsiveness scale 2 [71]	Significant pre-post change: $F(1, 34)=6.03$, $p=0.02$, $\eta^2=0.15$ Significant pre-post changes in three subscales: Social communication: $F(1, 34)=5.2$, $p=0.03$, $\eta^2=0.13$ Social motivation: $F(1, 34)=7.84$, $p=0.01$, $\eta^2=0.19$ Restricted and repetitive behaviours: $F(1, 34)=9.88$, $p<0.01$, $\eta^2=0.23$
Social skills	The Autism Spectrum Quotient [72]	No significant difference pre-post-test
Dating and assertiveness skills	The Dating and Assertion Questionnaire [73]	Significant pre-post change: $F(1, 32)=7.89$, $p=0.01$, $\eta^2=0.2$
Empathy	The Empathy Quotient [74]	Significant pre-post change: $F(1, 33)=4.66$, $p=0.04$, $\eta^2=0.12$
Social support	Social Provisions Scale [75]	No significant difference pre-post-test

Abbreviations:
RCT Randomised controlled trial

ABI

Intervention description and underlying theoretical principles: There were three studies [49, 50, 51, 55] which focused on supporting married couples' post-injury. Kreutzer et al [49] and Graham et al [50] considered the Therapeutic Couples Intervention (TCI), which is based on the assumptions that a brain injury will cause substantial changes in a relationship, but these changes can be ill-defined, challenging the couples' ability to adapt and move towards an effective, stable relationship. The intervention aims to support both people in the couple to take an active role in decisions, in supporting the relationship and in caring for themselves. While Backhaus et al [51, 55] focused on the Couples Caring and Relating with Empathy After Brain Injury Intervention. This aims to address common marital stressors in the context of post-injury difficulties. The TCI has a dual focus of addressing relationship quality and caregiver burden post-injury. While the Couples Caring and Relating with Empathy focuses solely on relationship quality. Both interventions were delivered in 2-hour sessions, for either 5 weeks with a 6^{th} optional session on parenting post-ABI (Kreutzer et al, Graham et al) or 16 weeks (Backhaus et al). Both interventions provided psycho-education on ABI and relationships post-ABI and draw on Cognitive Behavior Therapy, which combines an understanding of cognition (including thoughts, beliefs and attributions) with an understanding of the behavioral response to these cognitions [76]. The TCI also uses psychological support for stress and emotional difficulties in the relationship. Whereas, the Couples Caring and Relating with Empathy Intervention draws on two other approaches, (1) Dialectical Behavior Therapy, which addresses the impact of emotional dysregulation on behavior and ability to cope with life stressors, including addressing the underlying cognition and behavioral consequences [77]; and (2) Gottman Couples Therapy, which focuses on

increasing empathy, positive communication and encourage shared future planning between couples [78].

Intervention effectiveness: Kreutzer et al [49] and Graham et al [50] measured relationship quality (Revised Dyadic Adjustment Scale, RDAS) [60], perceived family member needs post-injury (Family Needs Questionnaire, FNQ-R) [62] and caregiver burden (Zarit Burden Interview, ZBI) [63]. The authors also measured functioning across six domains, covering cognition, communication, physical ability and emotions (Neurobehavioral Functioning Inventory, NFI) [64]. They used these variables to adjust the scores from the RDAS, FNQ-R and ZBI during analysis, due to significant difference between the treatment and control groups for some subscales. There was also a satisfaction questionnaire given to the treatment group following the intervention. The authors showed a significant difference between the treatment and control groups with the RDAS (patient: $t(df)=3.52$, (78.2), $p<0.001$; Partner: $t(df)=3.44$ (76.9), $p<0.001$), five subscales of the FNQ-R (health information $p<0.001$; emotional support $p=0.001$; professional support $p=0.003$; community support $p=0.002$; care involvement $p=0.009$). There was no significant difference on the ZBI. There was a high level of support for the intervention. It was rated as helpful by 82% of people with brain injury and 88% of partners, all participants indicated that they would recommend the intervention.

Both studies by Backhaus et al [51, 55] assessed relationship adjustment and satisfaction (Dyadic Adjustment scale (DAS), [65], relationship quality (Quality of Marriage Index (QMI), [66], and use of negative communication styles (the Four Horsemen of the Apocalypse Questionnaire, [67] and an evaluation form developed by the authors. Backhaus et al [55] showed significant pre-post change with the DAS ($p=0.02$) and the 4 Horsemen of

the Apocalypse questionnaire (p=0.001). Backhaus et al [51] showed moderate effect sizes between treatment and control groups across time (interaction effects) (DAS: p=0.01, η^2=0.10; Four Horsemen: p<0.05, η^2= 0.07). Only Backhaus et al [55] found significant pre-post improvements in the QMI for the treatment group (p=0.018). Both studies reported high satisfaction with the intervention: 90% [51] to 100% [55] reported that they would recommend the intervention to a friend.

Learning disabilities

Intervention description and underlying theoretical principles: The two studies in this group focused on a group approach with skills practice. Valenti-Hein et al [53] focused on dating skills, while Ward et al [47, 48] additionally addressed prevention of violence in relationships. A behavioral learning approach is common to these studies, Ward et al [47, 48] drew on the stages of learning, instruction, modelling, role play and rehearsal in context [79], while Valenti-Hein et al [53] focused predominantly on role-play. Valenti-Hein et al [53] also made use of a cognitive approach and group processes through the use of problem solving by consensus, to prevent a rigid focus by individuals on ineffective solutions. Both interventions were delivered to groups, using twice weekly, 90-minute sessions, for either 10 (Ward et al) or 12 weeks (Valenti-Hein et al).

Intervention effectiveness: Valenti-Hein et al [53] assessed knowledge of dating (Stacking the Deck procedure, STD) [68], social anxiety (Social Avoidance and Distress scale, SAD) [69], frequency of opposite-sex interactions and social competence and attractiveness within role plays. Valenti-Hein et al [53] found a significant interaction effect for the STD, ($F(2, 46)=4.96$, $p<0.02$) and significant pre-post-test changes in the role plays (appropriate style,

$p<0.05$, and expression of positive emotions, $p<0.05$) or pre-test-follow-up changes (general skill $p<0.05$, appropriate content, $p<0.01$, appropriate style, $p<0.05$ and comprehension, $p<0.05$). There was no significant change for the SAD scores or the frequency of same- or opposite-sex interactions during naturalistic observations.

Ward et al [47, 48] considered the size and composition of social networks (The Social Network Measure, SNM, developed by the authors) and participants' experiences of violence (the Interpersonal Violence Interview, IVI) [70]. They found a significant pre-post-test changes on the SNM ($p<0.01$), and pre-test-follow-up changes ($p<0.01$). There was a significant difference for the IVI across time ($p=0.01$).

ASD

Intervention description and underlying principles: Cunningham et al [54] used the relationship enhancement program "Ready for Love" [80] with adults with ASD. This has been used with other neuro-atypical populations and achieved good results for social skills, empathy and social support. This intervention assumes experience in relationships, although no details are given about how much experience is assumed, or what type of experience. The comparison group was given the original intervention with additional teaching on flirting, identifying romantic interest and asking a person on a date. Both the original and comparison interventions used a combination of education and behavioral approaches. The intervention was delivered in weekly, 2-hour sessions for 8 weeks.

Intervention effectiveness: The authors used several self-report outcomes, measuring social skills (The Social Responsiveness Scale 2 (SRS-2) [71] and The Autism Spectrum Quotient (AQ) [72], dating and assertiveness skills (The Dating and Assertion Questionnaire (DAQ)

[73], empathy (The Emotion Quotient (EQ) [74] and levels of social support (Social Provisions Scale (SPS) [75]. There were no significant interaction effects between treatment group across time, suggesting that the additional teaching modules offered no benefit to the intervention overall. Following this the authors collapsed the results from the groups and presented a pre-post analysis. Significant pre-post-test changes were found with the DAQ ($p<0.01$) and the EQ ($p=0.04$). There was a significant main effect for time with the SRS-2 ($F(1, 34)=6.03$, $p=0.02$, $\eta^2=0.15$). The AQ and the SPS were non-significant.

Discussion

This review has focused on interventions to support adults in three neuro-atypical populations to engage in dating and romantic relationships. The database search identified 11 eligible studies including, five RCTs [49, 50, 51, 52, 53, 54], two pre-post designs [47, 48, 55], and four case studies or case series [56, 57, 58, 59]. Six studies focused on an ABI population, four of these on marital relationships [49, 50, 51, 55, 57] and two on dating [56, 58]. Together these included 114 participants. Four studies focused on adults with learning disabilities [47, 48, 52, 53, 59] and comprised 99 participants. One study focused on adults with ASD [54] and included 38 participants.

What interventions have been developed?

The studies in this review represent a range of newly developed and existing interventions. Two studies used existing interventions applied to different clinical populations [54, 57]. There were seven newly developed interventions [49, 50, 47, 48, 52, 55, 56, 58, 59] and two studies were further explorations of two of those [51, 53].

The TiDieR ratings demonstrated that overall, the descriptions of these interventions were poor. Key elements, such as tailoring and modifications, materials used and where the intervention was conducted were often omitted, significantly affecting replication, and application to clinical settings.

The different interventions showed a range of possible approaches. Psychoeducation was common but appeared to be influenced by population and dating context. Only interventions targeted at an ABI population [49, 50, 51, 55] included psychoeducation on the impact of this on relationships, this may link to the acquired nature of ABI. In learning disabilities, only Chandler et al [59] included psychoeducation on the law, this may link to the history of underage contact and involvement with the police reported in their case study. Behavior rehearsal was commonly present in the dating interventions [52, 53, 47, 48, 58, 56], but not in the marital interventions [49, 50, 55, 51, 57]. These variations suggest that when selecting or designing an intervention, the population and the context of intervention are important considerations. This is important to note for any future interventions and may also suggest the need for further research to clarify which approaches are best suited to each population and context.

There is also variation in the specific elements of the interventions. While there are common elements, for example teaching social and communication skills in the dating interventions [52, 53, 47, 48, 56]. Other elements show variation, for example, knowledge of the dating process is included by Mueser et al [52], Valenti-Hein et al [53], and Ward et al [47, 48], but not mentioned by Gutman and Leger [58], Valentich and Gripton [56] or Chandler et al [59]. It is unclear why some choices have been made, for example only Cunningham et al [54] included flirting, despite it being suggested that flirting has not been well studied in ASD

[81]. Emotional regulation is considered by Backhaus et al [51, 55] and Yeates et al [57]. Gutman and Leger [58] show a limited application of this topic through focus on dealing with rejection, but no other intervention clearly addresses it. Ward et al [47, 48], developed the only intervention with a dual aim of reducing violence in relationships, linked to this, it was the only intervention to include a specific personal safety section. The range of different elements across the interventions suggests poor consensus on what functions are important to dating and relationships. This lack of consensus is likely to negatively impact the ability to select the most appropriate interventions for different populations and relationship contexts, affecting the support neuro-atypical people may be given.

Protection and vulnerability were rarely referred to in the intervention studies. Only one study [47, 48] considered the vulnerability of the neuro-atypical population. One other study considered protection where the adult with learning disabilities was the perpetrator [59]. This is surprising as previous literature has highlighted that interventions may focus too much on protection [6, 7, 22]. However, this finding may be due to this review focusing on interventions for dating skills. Other literature reviews which have included interventions for both dating and sex education have found that curricula do include teaching on exploitation and abuse [8, 82].

Only one study included any online communication [59]. Given the relatively recent rise in online dating and the documented risks associated with this [83, 84, 85], further research into how neuro-atypical populations use this medium may be needed.

Marital interventions focused exclusively on the communication and interaction between the relationship partners. This is a much narrower focus compared to dating interventions.

Cunningham et al [54] offered a broader, dating intervention, but recruited a small number of participants in relationships. At the end of the program these participants reported a preference for a more tailored intervention involving their partners. This suggests that it may be preferable to develop different interventions for neuro-atypical adults in relationships and those who want to date. This would allow the marital interventions to be personalized based on the needs of each couple.

Overall, there was a wide range of different interventions. The type of relationship (i.e. marital or dating) influenced the elements of an intervention. However, there was also substantial variation within the interventions, even when they focused on the same type of relationship, for example the focus on protection in one dating intervention [47, 48] but no others, or the inclusion of flirting in only one dating intervention [54]. This variation and lack of clear agreement on key areas and approaches is likely to limit the ability to select or design the most appropriate interventions, affecting the support neuro-atypical populations are given.

Principles and Theoretical underpinnings of the interventions

Some studies made clear reference to the theories underpinning the approaches used [e.g. 58], however others were less clear [e.g. 53]. By considering the techniques described in the interventions the authors grouped these under broad, theoretical perspectives to allow comparison between the interventions. Many of the dating interventions included a behavioral approach by using modelling, role-play, rehearsal in context or feedback [52, 53, 47, 48, 56, 54, 58]. An education approach was also common, with many studies using psychoeducation for different elements of their intervention [47, 48, 49, 50, 51, 54, 55, 59]. A cognitive approach was also used as seen in the form of problem solving, self-regulation training, addressing attributions or loci of control [49, 50, 51, 52, 53, 55, 56, 57, 58, 59].

Neuro-atypical population and relationship context appeared to influence how the cognitive approach was applied, for example maladaptive attributions were a common focus in the marital interventions and one dating intervention in the ABI group [49, 50, 51, 55, 56, 57] but only seen once in the learning disability group [59]. A psycho-emotional approach (a psychological approach aimed at providing emotional support or management) was only present in the marital interventions [49, 50, 51, 55, 57]. Six of the studies used groups to deliver the interventions [47, 48, 51, 52, 53, 54, 55], however only two of these studies [52, 53] made explicit use of group processes as part of their approach, by using problem solving by consensus. This approach was not seen in other studies, despite rigid thinking and learning styles potentially being present in adults with ASD as well [86]. Overall, behavioral, cognitive and educational approaches appear to be the most commonly used, but with variation depending on population and relationship context.

Effectiveness of the interventions

Only six studies were included in the data synthesis [47, 48, 49, 50, 51, 53 54, 55]. There were methodological concerns with each of them. No study had blinded the participants, therapists or assessors although this may be considered impractical for intervention studies [87]. In the RCTs, only Backhaus et al [51] had adequate follow-up, although both Kreutzer et al [49], Graham et al [50] and Backhaus et al [51] included intention-to-treat in the analyses. The low response rate and the lack of intention-to-treat analyses means the random allocation may have become distorted in the other two RCTs.

Overall, the studies in the synthesis reported positive results, however, there are important questions over the outcomes that were used. Kreutzer et al [49], Graham et al [50] and Backhaus et al [51, 55] used self-report measures. When rating quality or satisfaction in a

relationship these are valuable. However, when an individual is rating their own skills, as in Cunningham et al [54], their ratings cannot be objective and they will be influenced by, for example, their self-awareness and their desire to show improvement after a treatment. In Ward et al [47, 48] there is a lack of clarity. They reported increased social network size, but not composition of the network (including number of dating partners), despite this being a function of the SNM. It is unclear why this outcome was chosen, yet not reported in full. There is also a wide range of outcome measures covering a wide range of constructs. Each intervention also appears to have focused on measuring different constructs, suggesting a lack of clarity about what is important for dating and relationship interventions and what the interventions will improve. This range of targeted constructs complicates the comparison between studies, preventing knowledge of which interventions are more effective at addressing specific skills and behaviors.

Why has this area received such little attention?

There are a range of possible reasons for the low priority given to dating and sexuality. Professionals may view dating and sexuality as intrusive or difficult to deal with, and so avoid it [18, 29, 30]. There can also be a lack of awareness; Saxe and Flannagan [88] showed that 87.5% of support workers were unaware of their workplace policy on intimate relationships among service users. Dyer and das Nair [29] also highlighted the lack of relevant outcome measures. Recent examples of outcome measures that address this problem include the Quality of Life After Brain Injury (QOLIBRI) scale [12] and the Brain Injury Questionnaire of Sexuality (BIQS) [89]. However, the QOLIBRI only includes one item on sexuality and while, the BIQS is an entire measure on sexuality, it includes limited items on existing relationships and none on dating or potential relationships.

It is also worth considering the attention paid to marital relationships and to dating separately. In the ABI group, four of the six studies focused on marital relationships [49, 50, 51, 55, 57], while only two focused on dating [56, 58]. The studies into interventions for marital relationships included pre-post analysis [55] and RCTs [49, 50, 51]. While both studies into interventions for dating post-ABI were poorly controlled case studies. None of the studies in the learning disability group considered marital relationships. The only study in the ASD group included participants in pre-existing relationships, but the intervention was not specifically designed to support them. This suggests that there is an imbalance in the focus on dating compared to marital relationships across different populations.

Limitations and suggestions for further research

This review includes studies of small sample sizes and a high degree of variability in the knowledge and behaviors targeted and the outcome measures used. This impacts the generalizability of the results and the statistical synthesis of the data (ability to generate standardized mean differences and effect sizes). Greater agreement over target behaviors and outcome measures used would allow the results of different studies to be included in a meta-analysis, resulting in more confidence on the effectiveness of interventions.

There was a lack of control and quality in the study designs. Only three out of the ten studies included a control condition [49, 50, 51, 53]. There was a higher number of before-after studies [55, 47, 48, 54] and all case studies were A-B design rather than multiple baseline or ABAB design [56, 57, 58, 59]. Bland and Altman [90] argue that before-after analyses have poor control over variables, so cannot be used to understand the effectiveness of interventions. There is a need for more good quality, controlled studies to fully understand the impact of interventions to support dating and relationships and guide clinical practice.

This review was limited to three neuro-atypical populations, ASD, learning disability and ABI. Inclusion of other populations, such as those with mental health difficulties should be considered in future studies [91].

Conclusion

This review has demonstrated that there is limited research into interventions to support dating or relationships in three neuro-atypical populations. Across all three populations there were only eleven studies, between them exploring five dating interventions, three marital interventions and one framework for intervention that could be applied to either. The research identified was generally of low quality with gaps in the reporting of the interventions, limiting replication or clinical use of these findings. There were commonalities between the interventions, such as the frequent use of behavioral, educational and cognitive approaches, however the specific application of these approaches varied widely between populations and interventions. Dating and intimate relationships impact on QoL and life satisfaction. The neuro-atypical populations in this review have identified difficulties that can hinder their ability to form and maintain relationships. The lack of research, varied use of theoretical approaches and apparent lack of agreement over the key content has implications for the ability of clinical practitioners to support adults from neuro-atypical populations in this key aspect of their lives. Greater clarity is needed around the behaviors that are important to dating, how to measure these and how best to support neuro-atypical adults to successfully engage in dating and romantic relationships.

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