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REVIEW

Atypical anorexia nervosa: A scoping review to determine priorities in research and clinical practice

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Abstract

Background: There is currently a limited understanding of the identification, nature, and treatment of Atypical Anorexia Nervosa (AAN). Recent systematic reviews have identified only small numbers of candidate papers, and some areas lack any meaningful review so far – particularly treatment outcomes. A key issue is the lack of clarity in the literature regarding the definition of weight loss criteria.

Objectives: This scoping review aimed to determine the nature and extent of our knowledge of AAN, in order to assist in the development of future systematic reviews and meta-analyses, as well as indicating what further research is needed.

Method: Following the identification of 6747 records, 317 records using the term AAN or a defined equivalent were identified from six databases, including the 'grey' literature.

Results: Of the 317 studies, 111 provided participant characteristics, and only 10 provided discrete treatment outcomes. Each of these subsets of the data are tabulated and supported with supplementary material, so that future systematic reviewers can access this resource.

Discussion: The pattern and content of the existing studies allows recommendations to be made regarding future reviews, research and clinical practice. There is a particular need for clear weight/weight loss criteria and adequate interventions.

KEYWORDS
atypical anorexia nervosa, interventions, scoping review, weight criteria, weight loss

Highlights

- Our identification of Atypical Anorexia Nervosa (AAN) and associated interventions lacks the evidence-based clarity that can be provided by effective reviews of the field.
- Relatively few studies provide discrete characteristics or treatment outcomes of AAN.

- Guidance is outlined regarding reporting criteria for such studies for authors and journals.

1 | INTRODUCTION

The term 'Atypical Anorexia Nervosa' (AAN) first attained the status of a diagnostic entity in DSM-5 (American Psychiatric Association [APA], 2013). Similar constructs have been detailed in previous diagnostic manuals (e.g., Eating Disorders Not Otherwise Specified, where some AN criteria were met – DSM-IV, APA, 1994; ICD-10, code 50.1, World Health Organization, 2016). The ICD-11 classification is somewhat more complex, including a number of categories that are not distinguished in DSM-5 (e.g., AN in recovery with a normal body weight; other specified/unspecified AN). These differences in criteria have led to some diagnostic considerations (e.g., whether or not those who are recovering from AN should be considered as experiencing AAN – Eddy & Breithaupt, 2023) and new diagnostic proposals (e.g., whether AAN should 'trump' other atypical eating disorders – Thomas & Gydus, 2023).

Atypical eating disorders have been considered in clinical recommendations (e.g., National Institute for Health and Care Excellence [NICE], 2017), which generally advocate therapeutic approaches based on the nearest equivalent full disorder. However, that approach lacks empirical support, especially in the case of AN. The introduction of the AAN diagnosis in DSM-5 was intended to serve a general clinical need for categorisation of a group of patients where clinical and research understanding was limited. The aim was to create a single umbrella term for cases where the cognitive and emotional elements of AN and the starvation elements are present due to significant weight loss, even though the individual is not underweight.

Within DSM-5, to be diagnosed with AAN, all criteria for full threshold AN need to be met (restriction of intake, intense fear of weight gain, disturbance in the experience of weight and shape), but "despite significant weight loss, the individual's weight remains within or above the normal range" (APA, 2013). This diagnosis acknowledges the importance of identifying cases where weight loss is either ongoing towards underweight status or has occurred in a non-underweight individual who previously sat at a higher weight, even where weight loss has ceased at the time of diagnosis. These two patterns of weight loss can result in starvation symptoms even among individuals who are currently at a normal or higher weight, which can lead to the cognitive rigidity and emotional instability that characterises other eating disorders.

Unlike the literature on the identification and treatment of other eating disorders, the past decade has seen limited progress in our understanding of AAN. At least in part, this is because the key diagnostic differentiator is not clearly defined. There is currently no consensus guidance to suggest what constitutes 'significant weight loss', when the weight loss had to occur, or over what period. Consequently, the criteria for AAN are unclear, and treatment planning is hampered. Clinical experience suggests that clinicians routinely use idiosyncratic weight-based definitions, or do not consider the issue of weight loss at all in using the diagnosis. Furthermore, protocols do not clearly explain how to engage a patient with AAN in necessary weight gain to achieve biological stability where that might be necessary. In working with AN, clinicians are often directed to focus on achieving weight gain to much lower levels than would be appropriate for those with AAN. For example, Fairburn (2008, p. 180) recommends aiming for a BMI of 19–19.9 in treating AN patients, which AAN patients are usually above when they reach services.

An imprecise definition of AAN clearly has implications for those living with such a vague diagnosis. Living with a diagnosis that is not well defined is likely to reinforce the perception that AAN is not as serious as other full-threshold eating disorders, despite evidence to suggest those with AAN have similar or higher levels of impairment and eating disorder pathology than those with AN (Eiring et al., 2021; Walsh et al., 2023). Indeed, individuals living with an AAN diagnosis report being subject to weight stigma, and are often not taken seriously by healthcare professionals (Eiring et al., 2021). The imprecise definition of AAN and associated stigma are also likely to act as a barrier to accessing support (Cunning & Rancourt, 2023). There have been previous systematic reviews and meta-analyses focussing on AAN, though the issue of treatment outcomes is not one that seems to have been addressed in such papers. However, each such review has summarised a relatively limited literature. For example, Walsh et al. (2023) identified that individuals with AAN experience levels of eating and related psychopathology are broadly comparable between AAN and AN, but they used DSM-5 criteria, identifying only 24 suitable papers since those criteria were published in 2013. In a similar meta-analysis but using a wider set of DSM iterations, Johnson-Munguia et al. (2023) identified only 20 papers in a search window dating back to 2003. Similarly, prevalence studies

have been reviewed, but the number of papers here is also relatively low (e.g., 75 studies from 2007 to 2020 rated as eligible by Harrop et al., 2021, but only 17 used community-based epidemiological samples). Finally, the limited number of papers also affects our understanding of medical issues in AAN. Both Moskowitz and Weiselberg (2017) and Vo and Golden (2022) address what is known about medical complications and management of such cases, but acknowledge the limited literature on the subject. For example, Brennan et al. (2023) found only nine papers detailing levels of medical risk in adolescents with AN versus AAN. A summary of the reviews to date might be that the number of papers identified to address each question (characteristics, medical issues) is very limited and inconsistent across reviews, and that the domain of treatment outcomes seems to have been relatively neglected in this field.

In order to progress our understanding of AAN, it will be important to undertake further systematic reviews and meta-analyses on the nature, characteristics, and treatment outcomes of people who meet criteria for this diagnosis. Such systematic reviews should allow a definitive synthesis of that literature to date, thus contributing to the advancement of the identification, treatment, and management of AAN. However, such a systematic approach requires a clear idea about the amount, nature and adequacy of the existing research, given differences in definitions and treatment approaches. A scoping review is a necessary first step to identifying the literature that is available. This will aid the direction of future research, systematic reviews, and treatment efforts.

Therefore, this scoping review aims to demonstrate the extent of our knowledge of AAN, in order to assist in the development of research in this area to provide more definitive conclusions. In keeping with the nature of a scoping review, we will detail the definitions used in the literature, the characteristics of the studies that distinguish AAN patients, and the extent of the treatment literature. We will also present recommendations for future research, based on gaps that we find in the literature. However, we do not aim to present a synthesis of the literature. Rather, our findings will be presented in supplementary tables of relevant papers that future authors are able to use as a resource in conducting systematic reviews and meta-analyses. Search criteria will be provided in full, so that the available literature can be updated in future reviews.

2 | METHOD

The 'PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation' (Tricco et al., 2018) and 'Guidance for Conducting Systematic Scoping Reviews' (Peters et al., 2015) guidelines were used to conduct this review. The work was registered with OSF (https://osf.io/v73rn). There were two amendments from the registration – EMBASE was not searched, as it was not available to the researchers, and there was no second screening of papers due to the very large number identified. This lack of second screening is recognised as a limitation of the review.

2.1 | Inclusion and exclusion criteria

The literature sources included peer-reviewed journal articles, any relevant book chapters, and grey literature. The search was refined to include sources in the English language only (records not in English can be found in Supplement G, and do not contribute towards the numbers in the PRISMA diagram). A Population Concept Context (PCC) Framework was used to guide the inclusion of papers in this review (see Table 1).

2.2 | Search methods

As outlined in Peters et al. (2015), the approach for searching for studies for a scoping review followed a two-step methodology.

Step 1: Used the basic search terms outlined in Appendix 1 to conduct an initial, limited search on MEDLINE.

Step 2: Analysed the titles and abstracts of results of the MEDLINE search. Relevant search terms were identified and added to the initial list of search terms above. This updated list was used to generate a final search string, which was used to search MEDLINE, PsycINFO, CINAHL, Web of Science, Scopus, and the Cochrane Library. This search was conducted on 18/05/23, using all entries since the inception of each database. Thus, although AAN was formally introduced as a diagnosis in DSM-5 in 2013, any papers referring to AAN or equivalent (e.g., restricting type EDNOS, subthreshold AN) published in any year (including pre-2013) were included in the search. Google Scholar was not used as it is not reproducible due to its lack of a transparent ranking algorithm. It also has a search character limit, and it is not possible to limit the bibliographic fields being searched (Harari et al., 2020). The full search terms for each database are provided in Appendix 1, to aid replicability in future searches.

2.3 | Data management and extraction

All records were exported to Zotero to be managed and screened by JB. Any uncertain allocations were discussed

TABLE 1 Inclusion criteria for papers in the scoping review.

PCC	Inclusion criteria
Population	• Participants will be anyone with a diagnosis of AAN or equivalent diagnosis under earlier diagnostic schemes. No restrictions will be applied (e.g., age, gender). Papers that do not provide a description of AAN diagnosis (e.g., diagnostic tool used) will be excluded (see Supplement E).
Concept	• To describe empirical research into the nature, definition and treatment of atypical anorexia nervosa. • No restrictions will be placed on type of study (e.g., Randomised Controlled Trials [RCT], observational, qualitative), or on intervention (e.g., psychological, pharmacological, medical etc.). • Reviews, editorials, opinion papers and project protocols were not included where there were no data.
Context	• No limits will be placed on setting (e.g., inpatient, community), or on location (e.g., country of study). • No date restrictions will be applied. • Only publications in the English language will be included in the review.

between the authors to reach a resolution. Title and abstracts were screened first for relevance. Full articles were then screened, with reasons for exclusion recorded for each. Data were screened using the eligibility criteria outlined in the PCC framework (Table 1). PsycINFO, CINAHL, and the Cochrane Library yielded the grey literature included in the review.

Where available, the following data were extracted, in order to generate databases that future authors can use to develop reviews and research: Author(s); Year of publication; Source origin/country of origin; Aims/purpose of study; study sample size (any duplicate use of data over multiple papers was noted); Definition of AAN used; Methodology - design (e.g., case studies, randomised controlled trial [RCT], etc.), pre-registration, ethical clearance, and sample size calculation; Intervention type (NICE recommended treatment or not) and comparator; Goal of intervention; Duration of intervention; How outcomes were measured; Effect sizes to assess effectiveness of interventions; and any other key findings that relate to the nature, definition and treatment of AAN.

The extracted data were classified under the following overarching categories, for purposes of summarising the scope of the existing research: (a) Definition and nature of AAN; (b) Intervention characteristics; (c) Aims of studies; (d) Key findings; and (e) Gaps in the research.

3 | RESULTS

The numbers of studies identified and included for review are reported and detailed in the PRISMA flow chart (Figure 1). An overview of all studies included in this review can be found in Supplement A. Each study has been assigned a number (1–317) corresponding to those used throughout this review. It is noteworthy that a relatively large number of studies (N = 196) included AAN (or equivalent terms) and defined such cases at some level, but presented all subsequent data combined with those of other eating disorder groups (largely AN or EDNOS/OSFED). Therefore, there was a substantial loss of viable papers between the definition stage and the other stages in presentation of the findings. The number of papers excluded (e.g., due to lack of specificity of diagnostic groups) is reported in Figure 1. In keeping with the final elements of that PRISMA diagram, the core data from the scoping review are reported in three parts and tables, each supported by a more detailed supplementary table to allow future researchers access to the details of the papers.

3.1 | Definitions of atypical anorexia nervosa used in the literature

While all included papers (N = 317) used the term 'AAN' or a defined equivalent (see Table 2 and Supplement A), the level of operationalisation of the diagnostic criteria used was limited (see Table 2 and Supplementary Table A). Thus, while all papers stated that they used the relevant diagnostic criteria, they did not operationalise them fully or partially, leaving uncertainty about the criteria that were applied to reach the diagnosis for most of the papers. Specifically, only 92 (29%) detailed the relevant BMI or equivalent cut-off used. Few studies included definitions relating to aspects such as body

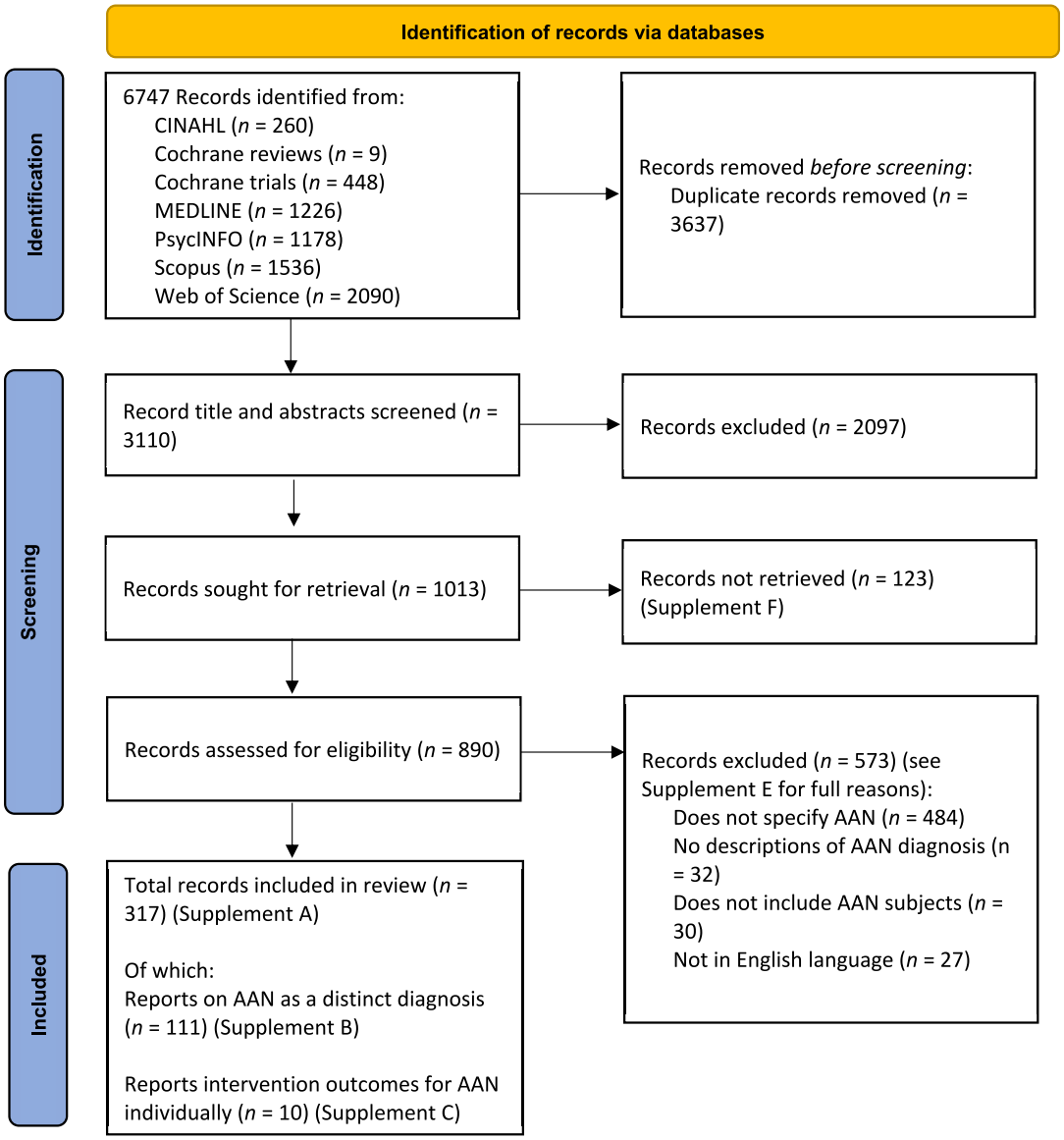

FIGURE 1 PRISMA diagram.

image disturbance or fear of gaining weight, and the majority of those doing so did not provide a replicable operationalisation such as cut-off scores on eating disorder measures.

Crucially, only 13 (4.1%) studies provided any operationalisation of the weight loss that the authors treated as meeting the criteria for being 'significant'. One study stated a weight loss of ≥5% body weight, four stated a loss of ≥10% of pre-morbid body weight or BMI, one stated a loss of >15% body weight, and one stated >25% of pre-morbid weight. A further two stated a weight loss to below 100% ideal body weight (IBW) (but above the 85% cut-off for AN), two stated weight loss <15% body weight (thus not meeting weight loss criteria for AN), one stated a reduction of 1.3 kg/m^2 in BMI, and one stated a reduction in %IBW that is ≥2 standard deviations of the cohort mean for change in %IBW. Two of the studies stated that the weight loss should have occurred within the past 3 months. An additional paper (not one of the 13 papers mentioned above) investigated the effects of a 5%, 10%, and 15% loss of body weight, finding those who had lost even 5% presented with a clinically significant eating disorder (Forney et al., 2017; paper number 87). The remaining studies not included in the second part of Table 3 either simply stated which diagnostic tool was used to identify AAN with no other operationalisation, or provided a very broad operationalisation such as 'meets all but one criterion for AN'. A large proportion of studies published before 2015 operationalised AAN based on the presence of menses (only five studies used this operationalisation after 2015 and reported using the DSM-IV or ICD-10). As the amenorrhoea criterion is no longer

TABLE 2 Diagnosis and definition of atypical anorexia nervosa (AAN), including the number of papers that cite each diagnostic scheme and the number that give operational definitions of AAN.

Definition given	Papers (numbered as per supplement A)	Number of papers	% of included papers
Diagnostic label used[a]			
None	See Supplement E (excluded studies, with reason)	32	N/A
DSM-5 (AAN, subthreshold AN, subclinical AN, EDNOS-AN, OSFED-AN)	1–3, 5, 6, 9, 10, 12, 13, 16, 17, 20, 21, 23, 30, 31, 33, 34, 41, 42, 45, 46, 48–50, 55–57, 64–66, 70, 71, 73, 75, 76, 79, 83, 85, 87, 90, 91, 93, 94, 98–100, 106, 108, 116, 117, 120, 126–134, 136, 141, 148, 151, 156–159, 164, 175, 177–185, 188, 190–196, 198–204, 206, 212–215, 217–221, 223, 227, 229, 230, 237, 239, 244, 247, 251–253, 255–257, 259, 260, 262, 265, 266, 270, 272, 281, 284, 287, 291, 292, 296, 298, 301, 302, 304, 305, 308, 311, 317	140	44.2
DSM-IV/DSM-IV-TR (AAN, subthreshold AN, subclinical AN, subsyndromal AN, sub diagnostic AN, partial AN, EDNOS restricting type, EDNOS-AN, OSFED restricting type, non-fat phobic, EDNOS-Wt.)	4, 7, 11, 15, 20, 22–29, 32, 38–41, 43, 47, 51–54, 58, 60, 61, 63, 67–69, 72, 74, 77, 78, 80–82, 88, 89, 92, 95, 96, 102, 104, 105, 107, 111, 113–115, 118, 121, 122, 130, 135, 137–141, 143, 145–147, 149, 150, 152, 155, 158, 160, 161, 163, 165–173, 176, 187, 189, 197, 205–209, 211, 216, 217, 222, 224, 226, 228, 230, 232–236, 238, 242, 243, 245, 246, 248–250, 252, 254, 264, , 267–269, 271, 274–280, 282–286, 289–291, 295, 300, 301, 303, 306, 307, 309, 310, 312, 313, 316	145	45.7
DSM-III/DSM-III-R (AAN, non-fat phobic, EDNOS-AN, subclinical AN)	89, 101, 103, 109, 153, 174, 273, 294	8	2.5
ICD-11	N/A	0	0
ICD10 (F50.1)	8, 14, 18, 19, 35–37, 44, 59, 62, 84, 97, 110, 119, 123–125, 142, 144, 162, 186, 209, 210, 225, 240, 241, 258, 261, 263, 288, 297, 299, 314, 315	34	10.7
ICD8 or 9	156, 288	2	0.6
Other (EDDS, EDE, BCD-ED, great Ormond Street)	112, 205, 209, 293	4	1.3
Mostly commonly reported operationalisation of AAN[b]			
Restriction of energy intake/weight control behaviour	50, 94, 102, 106, 109, 185, 211, 267, 294	9	2.8
Fear of weight gain/becoming fat	4, 5, 15, 76, 98, 109, 149, 150, 154, 188, 211, 226, 269, 217, 277, 294	16	5.0
Body image disturbance	4, 5, 49, 51, 76, 94, 98, 102, 106, 149, 185, 188, 211, 224, 226, 269	16	5.0
Non-fat-phobic	18, 39, 52, 60, 69, 111, 122, 149, 153, 164, 207, 208, 245, 248, 261, 273, 290	17	5.4
'Significant' weight loss	5, 16, 72, 79, 111, 116, 120, 166, 222, 246, 247, 256, 270	13	4.1
Cut-off criteria for low/high BMI or equivalent at recruitment	2, 4–6, 10–12, 17, 21, 22, 30, 31, 34, 35, 39, 45, 51, 52, 57, 60, 64, 65, 68, 69, 72, 76, 77, 89, 90, 97, 103, 104, 108, 110, 114–117, 119–121, 124,129, 134–138, 141, 143–145, 147, 148, 154, 164, 181, 183,	92	29.0

TABLE 2 (Continued)

Definition given	Papers (numbered as per supplement A)	Number of papers	% of included papers
	186, 195, 197, 210–213, 220–222, 226, 230, 232, 233, 239, 245–247, 249, 250, 252, 254, 257, 268, 273, 275, 278, 279, 296, 303, 305, 307, 308, 312		

Note: Total number of papers at this stage = 317.

Abbreviations: AAN, Atypical Anorexia Nervosa; AN, Anorexia Nervosa; BCD-ED, Broad Categories for the Diagnosis of Eating Disorders; EDDS, Eating Disorder Diagnostic Scale; EDE, Eating Disorder Examination; EDNOS, Eating disorder not otherwise specified; EDNOS-Wt., EDNOS not meeting weight criterion; OSFED, other specified feeding and eating disorder.

[a]Percentages do not total 100%, as some papers use more than one diagnostic tool.

[b]Percentages do not total 100%, as these elements can overlap in the same paper.

used in the DSM-5, the full number of studies using this operationalisation is not reported here. Supplementary Table A shows details of these findings on a paper-by-paper basis.

3.2 | Reported methodological characteristics of studies distinguishing atypical anorexia nervosa cases

Table 3 reports on methodological characteristics of the 111 papers that distinguished AAN cases within the 317 studies. Further detail of the relevant papers is given in Supplementary Table B.

The studies emanated from a wide range of countries, though the westernised nations were over-represented. Approximately a quarter of the studies were based on non-clinical samples. While the clinical samples were diverse (though nearly all from eating disorder services), outpatients were the most likely group to be involved in such research. Study designs were largely investigatory, with cohort and retrospective approaches used in nearly 75% of studies. The quality and openness of the research were also relatively weak, with almost no pre-registration or sample size calculations, and with ethics not clearly obtained in over 20% of studies.

3.3 | Treatment outcomes of those with a diagnosis of atypical anorexia nervosa

Table 4 reports on the characteristics of the 10 papers that report treatment outcomes specific to AAN, detailing the measures used most widely. Further detail of the relevant papers is given in Supplementary Table C. Table 4 provides calculated effect sizes for change in %mBMI/BMI and Eating Disorder Examination (EDE)/Eating Disorder Examination Questionnaire (EDE-Q) global scores using means and standard deviations for pre- and post-intervention groups. For the study reporting medians and quartiles for the EDE (Ricca et al., 2010, study 235), the mean was estimated using the method described by Wan et al. (2014) and the standard deviation was estimated using the Cochrane handbook method (In Higgins & Green, 2008, as cited in Wan et al., 2014). Six studies included sufficient data to calculate effect sizes. Effect sizes varied, but were mostly small to medium.

Five papers (total sample $N = 94$) used broadly cognitive/cognitive-behavioural approaches, while a further three (total sample $N = 250$) used Family Based Treatment (FBT). The remaining two papers (total sample $N = 87$) reported the outcomes of a nutrition-based intervention. Most studies were conducted in outpatient settings, and comparison conditions were absent or weak. While all papers reported on BMI and eight reported on eating cognition scores as outcome variables, fewer reported on biological factors (e.g., heart rate, menses), emotional outcomes (e.g., depression, anxiety) or eating behaviours, and none considered quality of life.

Among the five studies with a cognitive/cognitive-behavioural focus, two were case reports (Bailer et al., 1999, study 14; Liyanag et al., 2019, study 164). Both patients began eating regular meals and gained weight throughout treatment. It should be noted that one patient's baseline BMI was 12.8 but was considered to have AAN due to the absence of fat-phobia (Liyanag et al., 2019). This patient was treated using enhanced cognitive behavioural therapy (CBT-E) and their post-intervention EAT-26 scores significantly improved from pre-treatment scores. The patient in study 14 (Bailer et al., 1999) was treated using a cognitive-behavioural self-help manual plus support from a psychiatric resident. Although the patient's eating behaviours had improved, they did not show a significant improvement in EDI-2 scores at follow up. The remaining three studies had AAN sample sizes between 18 and 50. Two studies had a focus on reducing eating disorder behaviours/psychopathology and normalising eating (Ricca et al., 1999, 2010)

TABLE 3 Characteristics of the studies that distinguish atypical anorexia nervosa (AAN) from other clinical groups.

Study characteristic	Identified detail (frequency)
Country of origin	USA (40); Australia (12); Italy (7); Germany (6); Sweden (6); Japan (5); Canada (4); Finland (4); Spain (4); UK (4); Denmark (3); Poland (2); Multinational (3); Other (11)
Setting	Non-clinical (27), Outpatients (21); Specialist eating disorders clinic (17); Inpatients (15); Inpatients and outpatients (6); Inpatients, day patients and outpatients (3); Day patients (1); Clinical research centre (2); Laboratory (1); Mixture of clinical and non-clinical (3); Maternity hospital (1); Unclear/not stated (14)
Study design	Cohort/case series/cross-sectional (55); Retrospective/secondary analysis (23); Prevalence (14); Case control (4); Experimental (3); Case Study (3); Qualitative (1); Randomised controlled trial (1); Clinical audit (1); Scale development (1); Other (5)
	Presence or absence
Ethical/Institutional Review Boards (IRB) approval	Stated to be present = 86
	Stated not to be needed = 3
	Not stated = 22
Pre-registration	Stated to have pre-registered the study = 1
	No mention of pre-registration = 110
Sample-size/power calculation	Provided = 4
	Not provided = 107

Note: Total number of studies at this stage = 111.

and one focused on body image disturbance (Gledhill et al., 2017). The two studies focussing on eating disorder behaviours used cognitive behavioural therapy (CBT). Both used the EDE to measure eating disorder pathology, which showed a significant improvement at post-intervention. The study focussing on body image disturbance used a cognitive biased training programme aiming to recalibrate participants' perception of body size. There was a significant reduction in weight, shape, and eating concerns measured by the EDE-Q.

All three studies reporting on FBT aimed to reduce eating disorder behaviours and restore or maintain weight (Hughes et al., 2016, study 116; Loeb et al., 2007, study 166; Swenne et al., 2017, study 280). Each study used the EDE to measure eating pathology. One study showed a significant improvement in EDE scores at post-intervention (Hughes et al., 2016), and one study found that according to the EDE-Q, 65% of participants had recovered at 1 year post-intervention (i.e., EDE-Q < 2.0) (Swenne et al., 2017). Loeb et al. (2007) did not separate AAN from AN in their analyses but did report that all AAN participants met criteria for a good outcome at the end of treatment (i.e., >85% IBW, resumption/onset of menses). One study found those with an EDE-Q < 2.0 at follow up had greater weight gain (Swenne et al., 2017), and one did not find a significant change in %mBMI (Hughes et al., 2016).

The two studies reporting on nutrition-based interventions aimed to resolve medical instability (Garber et al., 2022, study 90; Peebles et al., 2017, study 221). Both studies compared outcomes in AAN to other DSM-5 eating disorders. Peebles et al. (2017) found significant increases in %mBMI at post-treatment for AAN. Garber et al. (2022) reported an increase in %mBMI from admission to discharge, but reported this was 0.3% mBMI per day slower than for those with AN. Interestingly, Garber et al. (2022) also found that medical stability was restored more quickly in those with AN compared to those with AAN, which required three additional days.

In short, despite considerable interest in AAN in the clinical research field (Figure 1), the number and quality of intervention studies to date is very limited. The outcome domains are also limited, focussing on BMI (though not on whether AAN criteria had been addressed) and cognitions. This pattern of outcomes is very scant, relative to what has been studied in AN research (e.g., Fairburn et al., 2013).

4 | DISCUSSION

This scoping review aimed to provide an overview of the nature and extent of existing research into AAN, in order to identify research gaps and facilitate potential future reviews. A total of 317 studies using the term 'AAN' or a

TABLE 4 Treatments used for atypical anorexia nervosa (AAN) and outcomes.

Intervention	Paper number (Supp. C)	Reporting changes in												Calculated effect size (d + 95% CI)
		NICE compliant	Number of AAN patients treated	RCT	Other controlled designs	Intensive treatment (in/day patient)	Using follow-up	BMI/ weight	Eating behaviours	Cognitions	Emotions	Biology (not BMI)	Quality of life	
CBT guided self-help for BN	14	No	1	0	0	0	1	1	1[†]	1	1	0	0	N/A[‡]
High nutrition food intake	90	Yes	48	0	1	1	1	1	0	0	0	1	0	%mBMI: $d = 0.35$ [-0.06 – 0.75]
Cognitive bias training for body image	94	No	18	0	0	0	1	1	0	1	0	0	0	Training day 1–30: EDEQ: $d = -0.48$ [-1.14 – 0.18]
FBT	116	Yes	42	0	0	0	0	1	1	1	1	1	0	%mBMI: $d = 0.16$ [-0.27 – 0.59] BMI: $d = 0.25$ (−0.17 – 0.68) EDE: $d = -0.72$ [−1.29 to −0.14]
CBT-E	164	Yes	1	0	0	1	0	1	1[a]	1	1	0	0	N/A[‡]
FBT	166	Yes	7	0	0	0	0	1	1	1	1	0	0	N/A
High nutrition food intake	221	Yes	39	0	1	1	1	1	0	0	0	1	0	%mBMI: $d = 0.73$ [0.27–1.19]

(Continues)

TABLE 4 (Continued)

Intervention	Paper number (Supp. C)	Reporting changes in												Calculated effect size (d + 95% CI)
		NICE compliant	Number of AAN patients treated	RCT	Other controlled designs	Intensive treatment (in/day patient)	Using follow-up	BMI/ weight	Eating behaviours	Cognitions	Emotions	Biology (not BMI)	Quality of life	
Medication + CBT-E	234	Partial	24	0	0	0	1	1	0	1	1	0	0	Venlafaxine: BMI: $d = 2.61$ [1.52–3.69] EDE: $d = -0.38$ [−1.18 – 0.43] Fluoxetine: BMI: $d = 3.44$ [2.18–4.7] EDE: $d = -0.54$ [−1.35 – 0.28]
CBT	235	Yes	50	0	1	0	1	1	1	1	1	0	0	BMI: $d = 0.46$ [0.07–0.86] EDE: $d = -0.48$ [−0.88 to −0.08]
FBT	280	Yes	201	0	0	0	1	1	0	1	1	0	0	N/A

Note: Total number of papers at this stage = 10.

Abbreviations: BMI, body mass index; BN, bulimia nervosa; CBT, cognitive behavioural therapy; CBT-E, enhanced cognitive behavioural therapy; EDEQ, Eating Disorder Examination Questionnaire; FBT, family based treatment; NICE, National Institute for Health and Care Excellence; RCT, randomised controlled trial.

defined equivalent were identified and included. Of those, only c.35% (111 studies) provided separate demographic and/or clinical characteristics of patients with an AAN diagnosis, and only 10 studies provided clinical outcomes specific to those with AAN. It is also noteworthy that the methodological design of the studies was limited (Table 4), with very few studies that would allow for causal conclusions or that had demonstrably adequate samples. The remaining 196 papers provided no more than the AAN label (or equivalent), thereafter lumping the details of the samples, outcome, etc. in with other eating disorder diagnoses (e.g., AN or EDNOS).

Therefore, the existing state of the literature means that findings specific to AAN could not be extracted in the majority of studies. Furthermore, only 163 studies provided some form of operationalisation of AAN (e.g., fear of weight gain, BMI cut-off). Only 13 of these studies provided an operationalisation of the weight loss that the authors treated as meeting the criteria for being 'significant'. These operationalisations varied widely, from 5% weight loss to 25% weight loss. Only two of the 13 studies stated a time period for which the weight loss had to occur (three months, in each case). All 13 of those studies operationalising weight loss were published from 2007 onwards. In short, it appears that AAN and equivalent terms have been predominantly used in the literature without clear definition or distinction, as shown by the disparate range of diagnostic schemes and criteria used (Table 3).

One possibility is that clinical researchers have assumed that AAN is similar to AN (and/or to other EDNOS/OSFED groups). It could be hypothesised that the term has been used to enable researchers to build larger samples of 'anorexia-type' patients for studies that are more focused on AN. While such an approach is intuitively appealing, especially in light of the recommendation that AAN should be treated broadly in the same way as AN (NICE, 2017), the different clinical targets (e.g., weight regain from underweight to low normal vs. weight regain from normal or above to a higher weight) suggest that guidelines need to reconsider this assumed equivalence of treatment approach. While it is too early to reach conclusions about the most effective intervention for AAN (given the small number of studies that address this point – Table 4), it is clear that NICE-recommended approaches (treat AAN as if it were AN) are being considered already.

In keeping with the nature of this scoping review, it is important to summarise the potential in this research and clinical domain. Therefore, we will now consider the future directions for research, for clinical work, for review activity that is currently viable (based on the outcome of this scoping review), and for reviews that are not currently viable but which could be possible when the identified research gaps have been more comprehensively filled.

4.1 | Recommendations for future research

Based on the nature of the research to date, it is clear that there are many gaps in the field, particularly when contrasting the AAN literature with the quality and extent of research into other eating disorders and 'atypical' disorders. For example, the literature on binge eating disorder (BED) was extensive and substantive before it was moved from DSM-IV "Criteria Sets and Axes Provided for Further Study" to the main body of DSM-5. In contrast, AAN has been treated as a full example of a diagnostic entity without the same level of preliminary research and summative review. The DSM could consider providing "Criteria Sets and Axes Provided for Further Study" for AAN as they did for BED. In addition, based on the studies to date, we recommend that the following details for AAN patients should be reported in all studies that include individuals with a diagnosis of AAN, in addition to stated diagnosis, and that journals should make such details an essential requirement of publication:

1. Current weight/BMI.
2. Explicit weight/BMI loss criteria used to operationalise 'significant weight loss', including clear records of BMI/weight before weight loss and the amount and proportion of such loss, so that outcomes and pathology can be understood in terms of both relative and absolute weight loss. While Forney et al. (2017) found significant eating concerns associated with only a 5% reduction in weight, this is likely to be an operationalisation that requires further investigation before it can be seen as part of the diagnostic process.
3. Whether the weight loss has ended at the point of measurement, or whether it is still happening.
4. Validated measures of restriction, fear of weight gain, and body image (as per treatment outcomes – see below). Mood and quality of life should be considered, too, in order to understand the wider level of distress involved in AAN.

Furthermore, studies to date have used relatively weak research designs, and have substantial limitations in terms of open science (see Table 3). Therefore, where AAN patients are to be included in a sample, it will be important for future research to pre-register aims and methodology, justify sample sizes, and seek ethical approval.

Only when the literature on treatment outcomes has grown substantially (see Table 4) will it be viable to suggest 'best treatments' for AAN. This scoping review reports on the findings of each of the 10 studies. Whilst the majority of those studies reported largely positive outcomes for AAN (i.e., significant improvements in EDE scores or increasing BMI/%mBMI), the wide range of treatment goals and

targets means it is difficult to draw any conclusions about the effectiveness of these therapies. This review also indicates that the literature is characterised by (mostly) small sample sizes and relatively weak designs, with limited outcome variables reported. In order to ensure comparability with the existing literature on other eating disorders, we suggest that:

1. Priority should be given to randomised controlled designs, testing a range of therapies and including a follow-up period of at least 1 year, to avoid the risk of undetected further weight loss and to determine whether patients have reached a reasonable 'set point' in weight terms by the end of treatment. Allocation to treatment groups within both AAN and AN diagnoses within trials will allow for outcomes for AAN versus AN to be compared.
2. A wide range of outcome variables should be used in all studies of the pathology and outcomes of AAN, based around a core measurement set of: weight/BMI (with reference to the establishment of a sustainable weight, given weight loss in the case); eating attitudes and body image; mood; biological rehabilitation; and quality of life.
3. Secondary analyses on existing data sets should be conducted to determine whether separating the AN and AAN subgroups reveals different or similar patterns of biopsychosocial characteristics and treatment outcomes, which were lost in the original data reports when the groups were collapsed into one. Similarly, in studies where a substantial subsample have AAN, moderation analyses could provide further knowledge of treatment outcomes.
4. Qualitative studies with those who have lived experience of AAN are needed. This will further our understanding of the experience of those living with such a vague diagnosis, and its implications in terms of accessing treatment, for example, Such studies might also provide further insight into how AAN can be better defined, or whether individuals even view the separate AAN diagnosis as necessary or helpful.

4.2 | Recommendations for clinical practice

While it cannot be confirmed, it seems plausible to assume that if research to date has left substantial gaps in how AAN is defined, then that is likely to be the case in clinical practice. We recommend that clinicians should be encouraged to assess the following as a matter of course, in order to determine whether a patient has a diagnosis of AAN or whether another diagnosis (e.g., Unspecified Feeding or Eating Disorder - UFED) should be considered instead:

1. Weight loss over a specified time (as part of a detailed weight history, with attention to what is suggested to constitute 'substantial' weight loss over what time frame).
2. Determining whether weight/weight trajectory/weight history and reported eating tie up (e.g., some patients show weight stability concurrent with reported eating that is at a level that is far too low to explain that stability). However, it should also be considered that the same level of weight loss in one individual can cause more physical complications than it might in another individual, and physical monitoring should be undertaken where there has been weight loss, at least until stability is ensured.

While the label might not be the clinician's first concern, it is possible that a misdiagnosis will lead clinicians to treat AAN or UFED as being potentially less serious than AN, when it would be more appropriate to focus on medical and cognitive indices of starvation (e.g., as detailed in the medical emergencies in eating disorders [MEED] guidance) rather than BMI per se.

These recommendations are not made with the intention of treating AAN or UFED as 'lesser' eating disorders in any way. Rather, the goal is to ensure that the treatment targets are appropriate (e.g., not pushing for weight gain where there has not been substantial weight loss). Finally, armed with the recommendations here, training for clinicians in the appropriate diagnosis of AAN should be implemented, as the lack of clarity about weight loss criteria is likely to have led to very varied practice between clinicians and between clinical centres.

4.3 | Recommendations for future reviews of the literature on atypical anorexia nervosa

The ultimate aim of this scoping review was to provide researchers with a resource that they could use to interrogate the existing data on AAN. Although over 300 studies were identified in this review, it appears that research to date has been relatively piecemeal. A wide range of research topics have been covered (e.g., social functioning, quality of life, gender diverse individuals), but with a lack of replication within topics to enable sufficient systematic reviews. The outcomes of this scoping review is thus more indicative of what further research is needed before reviews and meta-analyses can be conducted. Nevertheless, the following topics seem viable for review at this time. It is

recommended that the summaries provided here and in the supplementary tables should be used as the basis for larger, more inclusive reviews of:

1. The characteristics of those with AAN, including contrasts between those identified under different diagnostic schemes.
2. Comorbidity.
3. Further understanding of medical instability associated with AAN, particularly focussing on Bone Mineral Density and hormone differences, which have not been considered in previous systematic reviews.

In all cases, and in keeping with Walsh et al. (2023), it is recommended that contrasts and comparisons should be made relative to those with diagnoses of AN and other non-underweight eating disorders, to determine where AAN's characteristics sit relative to other eating disorders.

The two areas where it is currently less viable to conduct a meaningful review are treatment outcomes and weight loss criteria. There were only six treatment papers identified that would yield an effect size for BMI/%mBMI and/or eating disorder pathology (measured by the EDE). Similarly, only 13 reported explicit, replicable weight loss criteria (and they varied substantially). However, it is hoped that the identification of research guidelines and journal requirements (above) will encourage an extensive expansion of research in these areas, so that the search terms and inclusion criteria used here can be used in future to find a larger number of viable papers for future reviews on how AAN is best defined and treated.

5 | CONCLUSION

The goal of this scoping review was to provide a baseline understanding of the AAN literature, and resources that will allow researchers to plan future systematic reviews and meta-analyses. It has identified a large number of studies that mention using AAN patients, but there was a strong tendency to collapse AAN participants into other groups without reporting characteristics of the AAN patients or contrasting them with those other groups. Fewer than a third reported the characteristics of AAN patients, and only a very small number reported treatment outcomes for this group separately. Therefore, while this scoping review has been able to identify some areas for that might be ready for systematic review, other areas are not ready to be assessed in that way (e.g., treatment outcomes). Consequently, we have also recommended areas for future research and guidance regarding reporting criteria for such studies for authors and journals, to enhance future reviews and clinical guidance.

CONFLICT OF INTEREST STATEMENT

The authors have no conflict to declare.

IRB STATEMENT

Not applicable (review).

DATA AVAILABILITY STATEMENT

All data are available as supplementary tables via the journal website.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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