



Review

Avoidance in nonepileptic attack disorder: A systematic review and meta-analyses

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ABSTRACT

Background: Avoidance is the active process of trying to escape from or not experience situations, places, thoughts, or feelings. This can be done through behavioral or cognitive strategies, or more broadly, a combination of both, utilized in an attempt to disengage from private experiences referred to as experiential avoidance (EA). Avoidance is considered important in the development and maintenance of nonepileptic attack disorder (NEAD). This review aimed to understand avoidance in NEAD and evaluate its role as a contributory factor.

Methods: Fourteen articles were identified by searching Cumulative Index to Nursing and Allied Health (CINAHL), MEDLINE Complete, PsycINFO, and EMBASE and were combined in a narrative synthesis. Six of these articles were included in a meta-analysis comparing levels of EA for individuals with NEAD and healthy controls (HC), and four were included in a meta-analysis comparing EA in NEAD to epilepsy comparisons (EC).

Conclusions: Experiential avoidance appears to be a strategy that is used by a high proportion of the population with NEAD. The group with NEAD utilized significantly more avoidance compared with both the HC and EC. However, further research is needed to understand the extent and types of avoidance that are relevant.

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1. NEAD and avoidance

1.1. NEAD

Nonepileptic attacks (NEAs) are involuntary episodes resembling epileptic seizures believed to be caused and maintained by psychological factors rather than biological physiopathology [1–5]. Nonepileptic attack disorder (NEAD) is complex, and is more common in women than men [6], and to date, there is no clear singular psychological process that has been identified as critical to its development [5,7].

Meta-analytic studies have implicated psychological processes and environmental risk factors such as somatization, alexithymia, dissociation, childhood sexual abuse, insecure attachment, previous head trauma, and seizure exposure [5]. Higher rates of childhood trauma [8,9] and insecure attachment styles [4] have consistently been found within the population of individuals with NEAD when compared to the general population or the population of individuals with epilepsy. Although both have been identified as risk factors, neither alone can explain the phenomenon of NEAD. Although

childhood trauma is commonly reported within the population with NEAD, not all individuals with NEAD report these experiences [10] or have insecure attachment styles [4]. Furthermore, childhood trauma is not specific to NEAD and has been implicated in multiple disorders such as psychosis [11], interpersonal difficulties [12], rumination [13], worry [14], disassociation [15], and somatization [16]. Research is now needed on processes that may be triggered by such difficult experiences and contribute to the development and maintenance of NEAD.

1.2. Avoidance as a maintaining factor

Avoidance is the active attempt to disengage or escape from thoughts, feelings, physical sensations, memories, experiences, or places [17]. It has been identified as a common feature of individuals with NEAD [18]. Dissociation, a similar construct, has also been identified as being common within the population with NEAD [5]. Avoidance and dissociation are similar yet distinct constructs [19]. Avoidance is the process of trying to separate from distressing thoughts, while dissociation is the state in which one is separated from their thoughts [2]. The process of dissociation is beyond the awareness of the individual [19] and results in the individual experiencing a loss of awareness of their current sense of self [2]. In contrast, avoidance is considered a more active process, which can be, but is not necessarily beyond, the conscious awareness of the individual [19]. Previous research has identified that

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many but not all individuals with NEAD experience dissociation [5]. Less is known about the subtleties of how the process of attempting to distance oneself from distressing experiences contributes to NEAD, and was therefore the focus of this review.

Avoidance can manifest as observable external behaviors that involve avoiding activities, places, or things that trigger unwelcome thoughts and feelings, and/or avoidance can be private and internal, for example the use of cognitive and emotional strategies such as suppression, denial and attentional distraction to prevent the experiencing of unwanted thoughts and feelings. Although avoidance can theoretically be separated into cognitive and behavioral avoidance, these strategies are highly interrelated and are used either in tandem or individually to achieve the same end result, not experiencing the unwanted thoughts or feelings [20,21].

Experiential Avoidance (EA) refers to a broad definition of avoidance and encompasses both cognitive and behavioral strategies that are used to avoid difficult private experiences as a result of a fear of such experiences [20]; EA is an aspect of a number of disorders such as anxiety, depression, self-harm, posttraumatic stress, and somatization [21]. Within healthy college students, EA was found to mediate the link between childhood abuse and general psychological distress [22], as well as, the relationship between childhood distress and somatization (an integral component of NEAD) [23].

Avoidance within NEAD has been explored in several empirical papers [24–26], and has been reviewed in a limited fashion under the broader constructs of emotional processing, coping styles, and defensiveness. However, published peer reviewed studies exploring avoidance within NEAD have yet to be synthesized in a detailed and systematic way. This review aimed to explore avoidance (inclusive of behavioral, cognitive, and EA) in adults affected by NEAD. A specific aim was to determine whether avoidance differs in those affected by NEAD in comparison to the general populations as well as those affected by epilepsy.

2. Method

The Preferred Reporting Items for Systematic Reviews and Meta-Analysis [PRISMA; 27] was used as a guideline. An a priori protocol was established and utilized to complete the review.

2.1. Search strategy

To identify relevant empirical papers, scoping searches were conducted using the Primo Central database and Google Scholar [28]. Databases to be searched were identified via preliminary reading of key papers, as well as discussion with an academic librarian [5,21]. Cumulative Index to Nursing and Allied Health (CINAHL), MEDLINE Complete, PsycINFO, and Excerpta Medica database (EMBASE) were searched. All databases except for EMBASE were searched using the EBSCO host platform; OVID was used to search EMBASE. Final searches were completed on November 30th 2018 and started from the inception date of each journal.

Search terms included free text and medical subject headings (MESH) where applicable. All terms were searched for in the title, abstract, and keyword fields. The NEAD and EA search terms were identified from previous literature (see Table 1 for search terms). Following the identification of papers, hand searching was conducted on all identified papers as well as recently conducted systematic literature reviews, focusing on NEAD.

2.2. Inclusion and exclusion criteria

Studies were included if NEAD and EA were explored in an adult population, using quantitative methodology. Studies were required to be peer reviewed and published in the English language or fully translated into English.

Table 1
Search terms for NEAD and Avoidance.

NEAD terms combined with OR	Avoidance terms combined with OR
nonepileptic	experiential n1 avoidance
non epileptic	distract\$
pseudoseizure\$	suppress\$
dissociative n3 seizure\$	reappraisal
pseudoepilep\$	cognitive n3 change
hysterical n3 seizure\$	cognitive n3 appraisal
hysterical n3 convulsion\$	coping n3 style
conversion n3 seizure\$	coping n3 mechanism
psychogenic n3 seizure\$	coping n3 strateg\$
functional n3 seizure\$	avoid\$
functional n1 neurological	
conversion n1 disorder	

Note: Final searches combined NEAD and Avoidance terms with AND, n3 indicates that search terms must appear within three words of each other.

Studies that included young children <12 years or whose primary focus was on a child population (mean age < 18 years), and/or people with intellectual disabilities, and studies combining patients with NEAD and/or other functional neurological disorders were excluded. Studies that did not focus on avoidance but considered related concepts such as dissociation and alexithymia were excluded as both processes are conceptualized as being unconscious and automatic [19].

2.3. Data extraction

The work of Brown and Reuber [5] was consulted to create a bespoke data extraction form, which was piloted against three papers. No problems were identified; it was therefore used for the remaining studies. See Appendix 1-A for data extraction form.

2.4. Meta-analysis

Papers included within the narrative synthesis were further searched to determine the feasibility and appropriateness of meta-analysis with either epilepsy comparisons (EC) or healthy controls (HC) as comparison groups. Studies included within the meta-analyses were required to report original data, inclusive of means and standard deviations (SD) comparing EA levels to either an HC or EC group. Studies whereby the means and SDs of the variables of interest were unable to be obtained were not included. Random effect models were used, to allow for potential heterogeneity between the effects explored [29]. An a priori hierarchy was used to determine which measure of avoidance would be included when multiple measures of avoidance were taken within one study (See Appendix 1-B).

2.5. Quality assessment

The Effective Public Health Practice Project (EPHPP [30]) tool was used to assess study quality. The EPHPP [30] is a reliable and suitable tool to assess nonrandomized studies [31]. Eight facets are evaluated: study design, selection bias, confounders, blinding, data collection, withdrawals and drop-outs, and intervention integrity. However, as no studies were intervention-based, the intervention integrity category was excluded. Despite the strength of this tool, it is acknowledged that the lack of a consideration of power is a limitation to its robustness. Quality assessment was independently conducted by two reviewers. Following independent assessment an interrater reliability of 92.9% was established. The remaining article was then discussed and a consensus reached.

3. Results

Electronic searches identified 584 citations with 103 duplications. One article was identified via hand searching [32], and thus 481 titles

and abstracts were read to identify relevant articles, 460 citations were excluded based on title and abstract. The remaining 22 articles were read in full to determine eligibility. Eight articles were excluded: five did not consider constructs, which could be considered avoidance [3, 33–35]; two used a mixed group with NEAD and functional neurological disorder [36,37], and one was excluded as only a summary was translated into English [38]. Thus, 14 papers were included in the narrative review; six of these articles were included in the meta-analysis comparing NEAD to an HC group; and four were included in the meta-analysis comparing NEAD to an EC group (Fig. 1).

3.1. Quality assessment

Study quality is outlined in Table 2. Five of the studies received an overall rating of strong [26,40,43,47,48]; eight received an overall rating of moderate [24,32,39,41,42,44,45,49]; and one received an overall rating of weak [46].

3.2. Study characteristics

Included studies were published between 1999 and 2017. All but one [46] used a quasi-experimental case-control design using either a

comparison group and/or an HC or EC group. Myers, Fleming, Perrine, and Lancman [46] used an observational cross-sectional design. Four studies compared individuals with NEAD to both an HC group and an EC group [39,42,43,49]. Six compared participants with NEAD to an HC group only [24,32,41,44,45,48]. Novakova, Howlett, Baker, and Reuber [48] used normative data from 224 healthy participants supplied by the creators of the emotional processing scale-25 (EPS-25 [50]) as their control. Goldstein and Mellers [26] compared NEAD to an EC group, Myers, Troblier, Bortnik, and Lancman [47] compared females to males with a diagnosis of NEAD, and Baslet, Tolchin, and Dworetzky [40] compared individuals with NEAD who had altered responsiveness during an NEA to individuals who did not. Six of the included studies were conducted in the UK [25,26,32,42,44,48], four in the USA [40,46, 47,49]; Bagherzade, Mani, Firoozabadi, and Asadipooya [48] was conducted in Iran; Bakvis, Spinhoven, Zitman, and Roelofs [24] the Netherlands and Cronje and Pretorius [41]; and Gul and Ahmad [45] in Pakistan. (See Table 3 for study information.)

3.3. Sample characteristics

In total, 1215 participants were included (620 NEAD, 468 HC, 127 EC). There was no significant difference in mean participant age

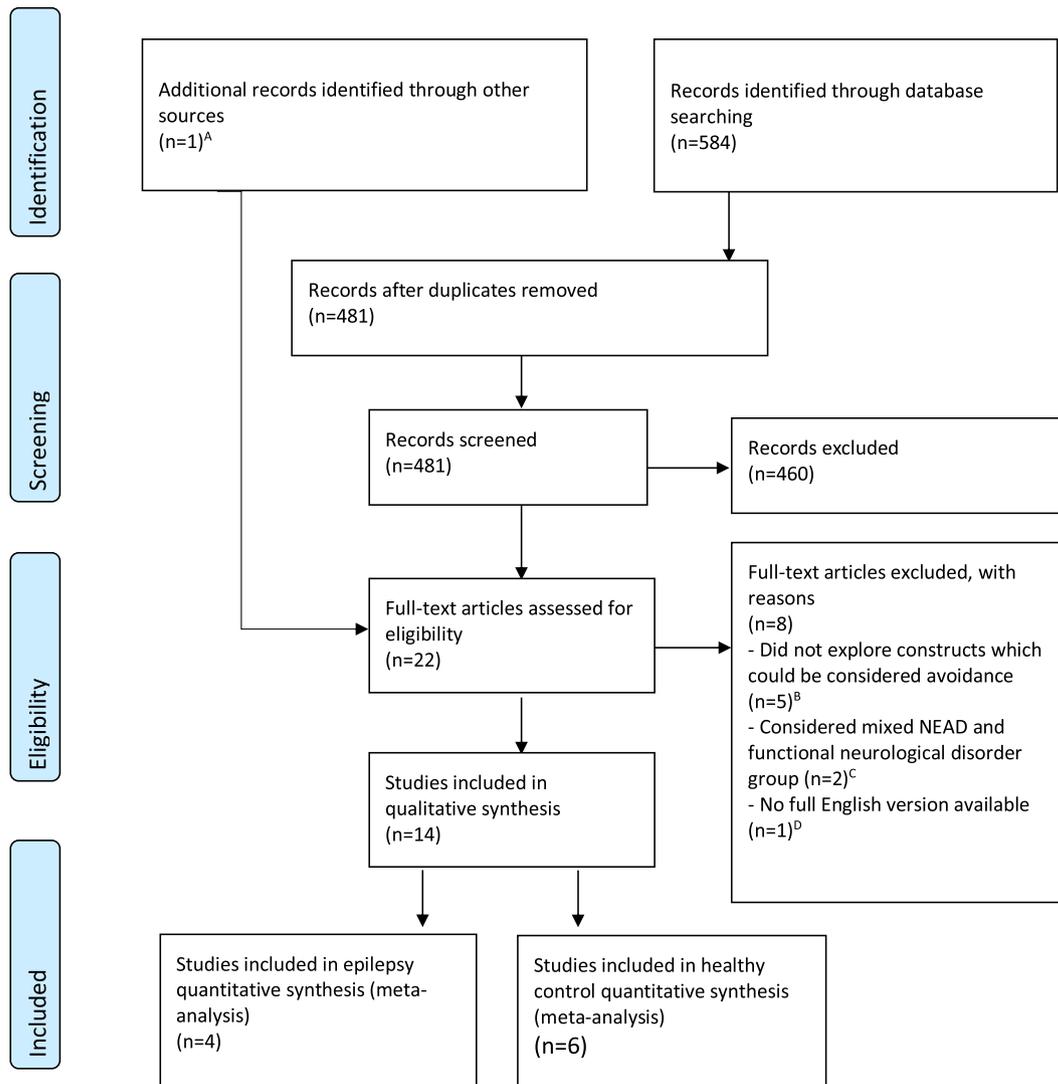


Fig. 1. Prisma diagram for. Note. A = Urbanek, Harvey, McGowan, and Agrawal [32]; B = Bodde, Janssen, Theuns, Vanhoutvin, Boon, and Aldenkamp [3]; Brown, Bouska, Frow, Kirkby, Baker, Kemp, Burness, and Reuber [4]; Harden, Jovine, Burgut, Carey, Nikolov, and Ferrando [33]; Myers, Matzner, Perrine, and Lancman [35]; Uliaszek, Prenskey, and Baslet [34]; C = Gulec, Ynanc, Yanartap, Uzer, and Gulec [36]; Morris, To, Baek, Chang-Webb, Mitchell, Strelchuk, Mikheenko, Phillips, Zandi, Jenaway, Walsh, and Voon [37]; D = Uhlmann [38].

Table 2
Quality assessment table using the EPHPP tool [30].

Study	Study design			Selection bias			Confounders			Blinding			Data collection			Analysis	Overall
	Study design	Randomized	Study design Rating	Representative	High % agreed	Selection of bias rating	Groups the same	High % cofounders controlled	Confounders rating	Assessor unaware	Participants unaware	Blinding rating	Measures valid	Tools reliable	Data collection rating	Statistics appropriate	
Bagherzade, Mani [39]	case control	no	M	likely	?	M	yes	<60%	S	?	?	M	yes	yes	S	yes	Moderate
Bakvis, Spinhoven [24]	case control	no	M	?	?	W	no	>60%	M	?	?	M	yes	Yes	S	yes	Moderate
Baslet, Tolchin [40]	case control	no	M	likely	?	M	no	>60%	M	?	?	M	yes	Yes	S	yes	Strong
Cronje and Pretorius [41]	case control	no	M	unlikely	?	W	yes	>60%	S	?	?	M	yes	yes	S	yes	Moderate
Dimaro, Dawson [42]	case control	no	M	unlikely	?	W	yes	>60%	S	?	N	M	yes	no	M	yes	Moderate
Frances, Baker [43]	case control	no	M	likely	?	M	yes	>60%	S	?	?	M	yes	yes	S	yes	Strong
Goldstein, Drew [44]	case control	no	M	unlikely	?	W	yes	>60%	S	?	?	M	yes	yes	S	yes	Moderate
Goldstein and Mellers [26]	case control	no	M	likely	?	M	yes	>80%	S	?	?	M	yes	yes	S	yes	Strong
Gul and Ahmad [45]	case control	no	M	unlikely	?	W	yes	>60%	M	?	?	M	yes	no	M	yes	Moderate
Myers, Felming [46]	cross-sectional	no	W	unlikely	?	W	–	–	–	?	?	M	yes	yes	S	yes	Weak
Myers, Trobliger [47]	case control	no	M	likely	?	M	yes	>60%	S	?	?	M	yes	yes	S	yes	Strong
Novakova, Howlett [48]	case control	no	M	likely	yes	M	yes	>60%	M	?	?	M	yes	yes	S	yes	Strong
Testa, Krauss [49]	case control	no	M	unlikely	?	W	no	>60%	M	?	?	M	yes	yes	S	no	Moderate
Urbanek, Harvey [32]	case control	no	M	unlikely	No	W	no	>60%	M	?	?	M	yes	yes	S	yes	Moderate

Note: numbers relate to ratings provided by the EPHPP tool [30]. Section ratings of S = strong, M = moderate, and W = weak.

Table 3
Results summary table showing: study characteristics, key findings, and measure of avoidance.

Study	Location	Healthy control group	Comparison group	Group with NEAD	Avoidance measure	Type of avoidance	Key findings
Bagherzad, Mani [39]	Iran	N = 33 Mean Age = 36.65 (SD not reported) 36% female 40% college educated	Temporal Lobe Epilepsy N = 33 Mean Age = 35.67 (SD not reported) 27% female 60% college educated	NEAD diagnosed by physician N = 33 Mean Age = 39.9 (SD not reported) 66% female 13% college educated	WCQ Subscales used: distancing and escape-avoidance	Experiential	Participants with NEAD used significantly more escape avoidance ($p < .001$), and distancing ($p < .05$) than healthy controls. Although the means for participants with NEAD were higher than the mean for the EC group, no posthoc between group significant testing was conducted between the two groups. Using the mean, n, and SDs provided <i>t</i> -tests were conducted, identifying that the participants with NEAD used significantly more escape avoidance ($p < .001$) but not significantly more distancing ($p > .05$) than the EC group.
Bakvis, Spinhoven [24]	The Netherlands	N = 20 Mean Age = 31.9 (SD = 12.7) 75% female Education not reported	No comparison group	NEAD confirmed by EEG telemetry N = 12 Mean age = 36.8 (SD = 12.9) 66% female Education not reported	Approach-avoidance task	Behavioral	Group with NEAD showed higher levels of approach avoidance for angry faces than controls even with anxiety controlled for.
Baslet, Tolchin [40]	USA	No healthy control	NEAD with altered responsiveness during an NEA N = 24 Mean age = 39.13 (SD = 11.23) 89.40% female 13.75 Mean years in education	NEAD intact responsiveness during an NEA N = 47 Mean age = 38.15 (SD = 14.26) 91.7% female 13.00 mean years in education	AAQ-II Full scale used	Experiential	Participants with NEAD with altered responsiveness during NEA had higher levels of EA. Altered responsiveness during an NEA, was considered a more severe NEA.
Cronje and Pretorius [41]	South Africa	N = 22 Age matched to NEAD group Gender matched to group with NEAD 59% College educated	No comparison group	NEAD confirmed by EEG telemetry N = 22 Mean age = 32.77 (SD = 14.4) 77% female 24% college educated	WCQ subscales used: distancing and escape avoidance	Experiential	The group with NEAD was higher on escape avoidance and distancing than HC. Posthoc regression found that escape avoidance and distancing were significant negative predictors of health-related quality of life.
Dimaro, Dawson [42]	UK	N = 31 Mean Age = 42.97 (SD = 13.93) 67.7% female 25.8% university educated	Epilepsy N = 25 Mean age = 39.40 (SD = 16.49) 64% female 28% university educated	NEAD confirmed by EEG telemetry N = 30 Mean age = 40.87 (SD = 12.88) 73.3% female 16.3% university educated	MEAQ full scale used	Experiential	Participants with NEAD had significantly more EA than HC and EC group. EA and somatising could identify epilepsy or NEAD diagnosis in 83.6% of cases using logistical regression. EA was positively correlated with NEA frequency, and no correlation was found between seizure frequency and EA for the EC group.
Frances, Baker [43]	UK	N = 30 Mean Age = 33.7 (SD = 13.8) 66.6% female 12.2 mean years in fulltime education	Epilepsy N = 30 Mean age = 36.2 (SD = 12.9) 66.6% female 14.5 mean years in fulltime education	NEAD confirmed by EEG telemetry N = 30 Mean age = 36.9 (SD = 13.7) 66.6% female 11.03 mean years in fulltime education	WCQ subscales used: distancing and escape avoidance	Experiential	Escape avoidance was higher for individuals with NEAD than HC group. There was no significant difference between the EC group and the group with NEAD on either distancing or escape avoidance. A significant difference was found using multivariate analysis of variance (MANOVA) between all three groups on the distancing subscale. However, results were not directly reported for the difference between HC and NEAD. Using the reported sample size, group means and SD, a <i>t</i> -test was conducted. The difference between HC and NEAD was found to be significant with $p = .029$.
Goldstein, Drew [44]	UK	N = 20 Mean age = 35.95 (SD = 8.46) 45% Female Education not reported	No comparison group	NEAD confirmed by EEG telemetry N = 20 Mean age = 34.35 (SD = 13.49)	WCQ subscales used: distancing and escape avoidance	Experiential	Escape-avoidance was significantly higher in the group with NEAD than in the healthy control group. There was no significant difference found between HC and group with NEAD on the distancing subscale.

Table 3 (continued)

Study	Location	Healthy control group	Comparison group	Group with NEAD	Avoidance measure	Type of avoidance	Key findings
Goldstein and Mellers [26]	UK	No healthy control	Epilepsy N = 19 Mean age = 35.84 (SD = 10.81) 73.% females Education not reported	80% female Education not reported NEAD predominantly confirmed by EEG N = 25 Mean age = 35.52 (SD = 13.49) 76% female education not reported	Fear Questionnaire subscales: agoraphobia, social phobia, and blood and injury	Behavioral	The group with NEAD was higher in agoraphobia subscale than the EC group however no differences were found for either social phobia or blood and injury subscales.
Gul and Ahmad [45]	Pakistan	N = 72 Mean age = 23.93 (SD = 3.09) 55.5% female 65.2% had further education beyond high school	No comparison group	NEAD diagnosis not confirmed N = 72 Mean age = 28.36 (SD = 3.93) 51.8% female 58.3 had further education beyond high school	Emotion Regulation Questionnaire Emotional suppressions subscale	Experiential	The group with NEAD had significantly higher levels of emotional suppression than healthy controls. Emotional suppression was linked with a deficit in cognitive switching and errors in a facial recognition task.
Myers, Felming [46]	USA	No healthy control	No comparison group	NEAD diagnosis not confirmed N = 82 Mean age = 39.7 87.8% female Education not reported	CISS Avoidance subscales	Experiential	15.9% of patients endorsed heightened levels of EA, which was fewer than reported lower task oriented and elevated emotion coping EA was found to predict low positive emotions and was not predicted by demographic variables or trauma history.
Myers, Trobliger [47]	USA	No healthy control	Males with NEAD Mean age = 34.34 (SD = 13.43) Education not reported	NEAD confirmed by EEG telemetry Females with NEAD Mean age = 37 (SD = 13.29) Education not reported	CISS Avoidance subscales	Experiential	Women and men varied on EA, with men using more EA and had higher levels of depression. Women experienced higher levels of dissociation and were more likely to have experienced sexual abuse.
Novakova, Howlett [48]	UK	EPS-25 data N = 224 Median age = 32 (SD not reported) 86.2% female Education not reported	No comparison group	NEAD diagnosis confirmation not reported N = 50 Median age = 39 (SD not reported) 86.0% female Education not reported	EPS-25 Avoidance and suppression subscales	Experiential	Avoidance and suppression subscales of the EPS-25 were higher in NEAD than in the normative healthy control data. Of the five emotional process scores measured using the EPS-25 suppression was highest in the group with NEAD. A trend that was not endorsed within the healthy control data. There was no difference in levels of avoidance or suppression when within group with NEAD comparisons were done based upon seizure frequency.
Testa, Krauss [49]	USA	N = 40 Mean age = 39.65 (SD = 11.32) 82.5% female Average highest grade of education 15.31	Epilepsy N = 20 Mean age = 36.6 (SD = 12.52) Average highest grade of education 15.4	NEAD confirmed by EEG telemetry N = 40 Mean age = 36.67 (SD = 11.17) 92.5% female Average highest grade of education 13.7	COPE mental disengagement, denial, behavioral disengagement, and substance use, subscales	Experiential, except for substance use subscale which is behavioral.	The group with NEAD did not engage in significantly more mental disengagement, behavioral disengagement, substance abuse or denial than either the HC group or the EC group. There was a positive correlation between distress and use of denial as a coping strategy for the group with NEAD, that was not found for either the HC control group or EC group.
Urbanek, Harvey [32]	UK	N = 88 Mean Age = 27.2 (SD = 9.3) 64% female 58.0% university educated	No comparison group	NEAD confirmed by EEG telemetry N = 56 Mean age = 39.2 (SD = 13.6) 70% female 17.9% university educated	CECS Subscales of emotional control for angry, anxious, depressive and a total scale.	Experiential	The total scale on the CECS was higher in NEAD than in HC. Considering the individual subscales levels of controlling and avoiding emotions, the anxiety and depression subscales were higher in individuals with NEAD than HC. however, levels were not significantly different for anger subscales between HC group and the group with NEAD.

between NEAD comparison or control groups, other than Urbanek, Harvey, McGowan, and Agrawal [32] where participants with NEAD were found to be significantly older than the control group. Cronje and Pretorius [41], included participants with NEAD as young as 14 years old; however, the mean age of participants was 32.77 years (SD = 14.40) and was considered an adult sample. Mean age of HC participants ranged from 23.9 (SD = 3.09) to 42.97 years (SD = 13.93); participants with NEAD mean age ranged from 28.36 (SD = 3.93) to 40.87 years (SD = 12.88). The comparison groups ranged from a mean age 34.35 (13.43) to 39.4 years (SD = 11.49).

All studies had more female than male participants. Nine of the twelve studies that had comparison and/or control groups matched participants for gender. The gender matched studies had a percentage of female participants that ranged from 66% [24] to 86% [48]. Urbanek, Harvey, McGowan, and Agrawal [32] did not match for participant gender; however, no significant difference was identified between the proportion of males and females in each group. Bagherzade, Mani, Firoozabadi, and Asadipooya [39]; Goldstein and Mellers [26]; and Testa, Krauss, Lesser, and Brandt [49] all had more females in the group with NEAD.

Nine studies confirmed NEAD diagnosis using electroencephalogram (EEG) telemetry, the gold standard [24,26,32,41–44,47,49]. It is worth noting that although Goldstein and Mellers [26] used EEG telemetry for the majority (56%) of the participants with NEAD; they were not able to confirm diagnosis using this technique for all participants because of insufficient NEA frequency for EEG telemetry, in which instance history and clinical opinion of two consultant neurologists/neuropsychiatrists were used. Bagherzade, Mani, Firoozabadi, and Asadipooya [39] stated that NEAD diagnosis was confirmed via a physician; however, further details were not provided. The remaining studies either did not confirm the NEAD diagnosis or report enough information to determine if participants' NEAD diagnosis was confirmed [40,45,46,48].

3.4. Avoidance measures

Thirteen studies measured avoidance using self-report measures [26,32,39,41–45,47–50]. The reviewer identified all measures to be reliable and valid, as all had available psychometric data.

3.4.1. Ways of Coping Questionnaire (WCQ [52])

The Ways of Coping Questionnaire (WCQ) was the most frequently used measure and was used by four studies [39,41,43,44]. Two subscales were considered relevant to avoidance and both thought to measure EA: Distancing and escape avoidance. Escape avoidance was used in meta-analyses as it was thought to be a better measure of EA, due to it being more highly correlated with another measure of EA [51].

3.4.2. Coping Inventory for Stressful Situations (CISS [54])

The CISS was used by two studies [46,47]. Avoidant oriented coping is measured by two subscales, distraction and social diversion, which both tap into the broad construct of EA, inclusive of both behavioral and cognitive avoidance [52].

3.4.3. COPE inventory [53]

Only Testa, Krauss, Lesser and Brandt [49] used the COPE. Four dimensions were considered relevant to the broader concept of avoidance: mental disengagement, behavioral disengagement, denial, and substance use [54].

3.4.4. The Fear Questionnaire [55]

Goldstein and Mellers [26] used the Fear Questionnaire, which is a reliable and valid measure of specific avoidance behaviors. There are three subscales: agoraphobia, social phobia, and blood and injury [55]. The agoraphobia subscale was considered within the meta-analysis.

3.4.5. EPS-25 [56]

Novakova, Howlett, Baker, and Reuber [48] used the EPS-25 [56]. Two relevant subscales were identified: avoidance and suppression subscales which measure behavioral and cognitive avoidance. Therefore, both were considered to measure the construct of EA.

3.4.6. The Emotion Regulation Questionnaire [57]

Gul and Ahmad [45] used the Emotion Regulation Questionnaire. The emotional suppression subscale was used as it measures the want to avoid emotions. It was therefore considered a measure of EA [58].

3.4.7. The Courtauld Emotional Control Scale (CECS [59])

Urbanek, Harvey, McGowan, and Agrawal [32] used the Courtauld Emotional Control Scale (CECS). The CECS asks participants to rate how often they employ emotional control and disengagement strategies to avoid negative feelings.

3.4.8. Multidimensional Experiential Avoidance Questionnaire (MEAQ [60])

Dimaro, Dawson, Roberts, Brown, Moghaddam, and Reuber [42] used the Multidimensional Experiential Avoidance Questionnaire (MEAQ), which is a valid and reliable measure of EA. The total score was used in the meta-analysis.

3.4.9. The Acceptance and Action Questionnaire-two (AAQ-II [53])

The Acceptance and Action Questionnaire-two (AAQ-II) used by Baslet, Tolchin, and Dworetzky [40] is a valid and reliable measure of EA [52].

3.4.10. Experimental paradigm to measure avoidance

Only Bakvis, Spinhoven, Zitman, and Roelofs [24] used an experimental paradigm to measure avoidance. Behavioral avoidance was measured via trials that involved incongruent and congruent affect-approach conditions. In the congruent condition, participants were asked to approach happy faces and avoid angry faces; the opposite was required in the incongruent condition.

3.5. NEAD compared to HC

3.5.1. Narrative synthesis

Of the ten studies that compared avoidance (EA and behavioral avoidance) in participants with NEAD and HC, nine found avoidance to be significantly higher in the groups with NEAD [24,32,39,41,43,45, 48]. In the study by Bakvis, Spinhoven, Zitman, and Roelofs [24], there was no difference between congruent and incongruent trials for the HC, whereas the incongruent condition took the participants with NEAD significantly longer ($p < .05$) to complete than the congruent task, demonstrating that individuals with NEAD have a higher propensity for socially avoidant behavior. Only Testa, Krauss, Lesser, and Brandt [49], found the participants with NEAD and HC to be statistically similar in their levels of EA. It is worth noting that although the difference between groups was not found to be statistically significant, the group with NEAD had higher mean T scores than the HC group across all subscales considered to tap into the construct of avoidance.

3.5.2. Meta-analyses

Two random effects meta-analyses were conducted using Review Manager version 5.3. The first focused on the standardized mean difference between HC and NEAD on levels of EA. The analysis included 207 individuals with NEAD and 208 HC, combining the data from six studies [39,41,42,44,45]. Urbanek, Harvey, McGowan, and Agrawal [32]; Novakova, Howlett, Baker, and Reuber [48]; and Testa, Krauss, Lesser, and Brandt [49] were excluded as the required data were not available. The work of Bakvis, Spinhoven, Zitman, and Roelofs [24] was not included because of the heterogeneity concerns and the nature of the data. Although the funnel plot was not entirely symmetrical, publication bias was not observed because of the higher proportion of studies using

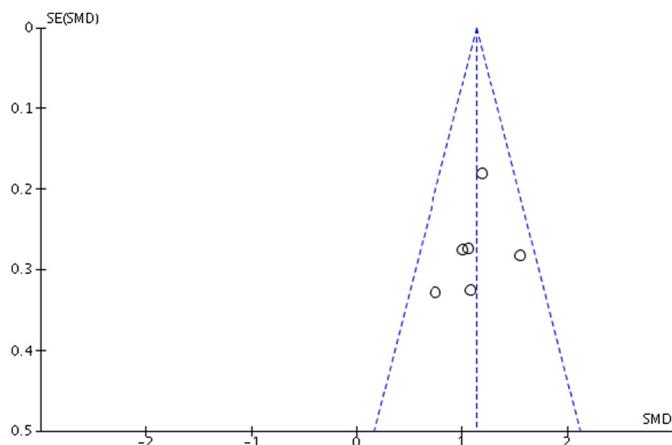


Fig. 2. Funnel plot for NEAD compared to healthy control meta-analysis.

smaller sample sizes being identified with lower standardized mean differences (Fig. 2). No heterogeneity was identified ($I^2 = 0\%$, and $\chi^2(5) = 3.95$, $p = .56$). An overall large and significant effect was found d (95% confidence interval [CI]) = 1.14 (0.093,1.35), $Z = 10.69$, $p < .00001$). See Fig. 3 for forest plot.

3.6. NEAD compared to EC

3.6.1. Narrative synthesis NEAD

Four studies [26, 40, 45, 48,] directly compared participants with NEAD to an EC group. Dimaro, Dawson, Roberts, Brown, Moghaddam, and Reuber [42] found that participants with NEAD had significantly higher levels of EA than the EC group. Goldstein and Mellers [26] found that individuals with NEAD used significantly more avoidance behaviors in relation to agoraphobia than individuals with epilepsy. However, no statistically significant difference was identified between the group with NEAD and the EC group on avoidant behaviors relating to social phobia or blood and injury phobia. Although not statistically significant the means of both groups with NEAD were higher than the group with epilepsy on both social and blood phobia. The authors of this review conducted posthoc power calculations, using G^* power 3 [59]. It was found that Goldstein and Mellers [26] would only have been able to detect a statistically significant difference for a large effect size $F(1,42) = 0.043$, considering 80% power, and an alpha value of 0.05. Frances, Baker, and Appleton [43] found no statistically significant difference between the levels of EA used by the group with NEAD and the EC group, as measured by the distancing and escape-avoidance subscale on the WCQ. Bagherzade, Mani, Firoozabadi, and Asadipooya [39] identified a difference between all groups using an omnibus analysis of variance; they did not specifically compare NEAD to EC groups in the pair-wise posthoc tests. However, they provided the mean, SD, and sample size per group; therefore, a t -test was conducted by the present

authors. The group with NEAD was found to use significantly more ($p < .001$) escape avoidance than the EC group. The group with NEAD and the EC group were not found to differ significantly on their levels of distancing [39]. This is again likely attributable to limited power, as based on a posthoc power analysis, it was found that there was only a 27.5% chance of identifying an effect. Testa, Krauss, Lesser, and Brandt [49] using analysis of covariance (ANCOVA) did not find a significant difference between the group with NEAD and EC group on any measures of avoidance. However, it is possible that this finding may be attributable to limited power and the appropriateness of the statistical tests performed. Testa, Krauss, Lesser, and Brandt [49] did not have equal numbers of participants in each group, which reduces statistical power within ANCOVA [60]. Furthermore, there is controversy surrounding the appropriateness of using ANCOVA within nonrandomized designs [61]. Dimaro, Dawson, Roberts, Brown, Moghaddam, and Reuber [42] using univariate binary logistic regression for group membership between NEAD and EC, found that EA made a unique contribution to identifying group membership ($\beta = 0.02$, $p < .01$), with participants with NEAD having higher levels of EA. Dimaro, Dawson, Roberts, Brown, Moghaddam, and Reuber [42] also found that EA was correlated with ‘seizure’ frequency within the group with NEAD ($r = 0.55$, $p < .05$) but not for the EC group ($r = -0.02$, $p > .05$). Novakova, Howlett, Baker, and Reuber [48], however, did not find a significant difference between EA levels based upon subgroupings of individuals with NEAD when group membership was based upon seizure frequency. In addition, Urbaneek, Harvey, McGowan, and Agrawal [32] stated that Spearman’s correlations were run on self-reported NEA characteristics, including the following: how bothersome NEAs were found to be, severity, and frequency. However, no results were reported with regard to the correlations between avoidance and any seizure characteristic. Although not explicitly stated, this may indicate that no correlations were significant (positive correlations were reported with regard to additional measures taken such as alexithymia and seizure severity).

3.6.2. Meta-analysis

The NEAD to EC meta-analysis included four studies [26,39,42,43]. The analysis included 118 individuals with NEAD and 107 individuals with epilepsy. Potential risk of bias was identified by the funnel plot; although because of the small number of included studies, it is possible that this difference is attributable to random error (Fig. 5). Because of the small number of studies included as well as the possibility of publication bias, the results of this meta-analysis should be considered with caution. Low levels of heterogeneity were identified ($I^2 = 14\%$, and $\chi^2(3) = 3.5$, $p = .32$). An overall large effect was found, with the 95% CI placing the effect within the medium to large effect size categorizations $d(95\% CI) = 0.79$ (0.49, 1.08), $Z = 5.22$, $p < .00001$. See Fig. 4 for forest plot.

3.7. Within NEAD comparisons

Different levels of avoidance were found based upon different subgroupings of NEAD by the two studies that compared different

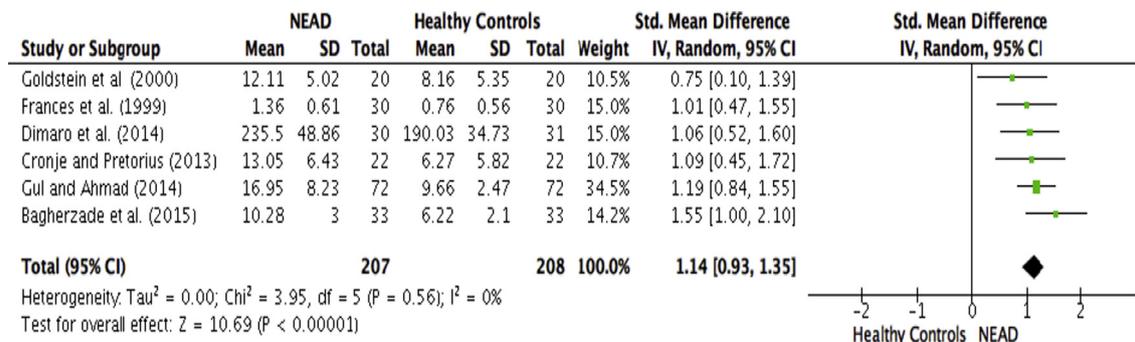


Fig. 3. Forest plot for HC group compared to group with NEAD on avoidance.

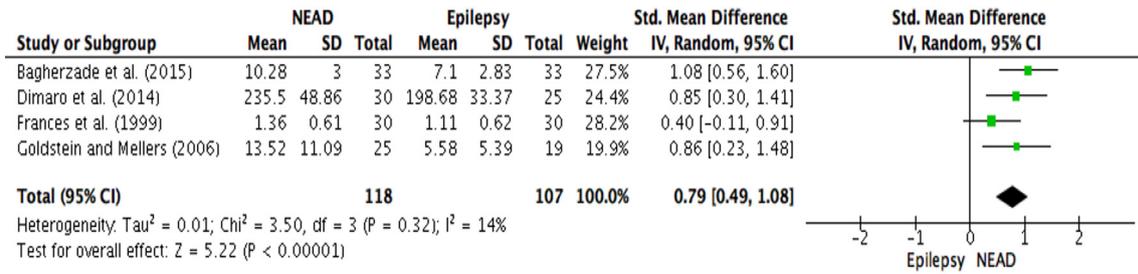


Fig. 4. Forest plot for NEAD compared to EC group.

groups of individuals with NEAD. Myers, Trobliger, Bortnik, and Lancman [47] who compared female with male patients with NEAD found that males had higher levels of avoidance ($p = .001$). Baslet, Tolchin, and Dworetzky [40] found participants with diminished responsiveness during an NEA had significantly higher levels of avoidance ($p = .04$) than individuals who remained responsive during an NEA.

Finally, Myers, Fleming, Perrine, and Lancman [46], the only study that did not use a comparison group, found that 15.9% of participants with NEAD endorsed high levels of avoidant coping (high levels identified as being 1.5 SDs above normative data) as measured on the CISS.

Testa, Krauss, Lesser, and Brandt [49] considered bivariate correlations between participants' experiences of distress and coping style and identified that high levels of distress were positively correlated with higher scores on the denial subscale within the group with NEAD ($r = 0.36$, $p < .001$). This relationship was only present in the group with NEAD, and no significant relationship between coping styles and levels of distress were identified for the HC or EC groups. To further understand the role that coping styles have in the distress of the participants with NEAD, Testa, Krauss, Lesser, and Brandt [49] performed a median split, comparing coping styles of participants with high distress NEAD to participants with low distress NEAD. Participants with high distress NEAD experienced higher levels in two areas of avoidance: more mental disengagement ($p = .04$) and more denial ($p = .03$).

4. Discussion

The primary aim of this review was to provide a narrative synthesis of the empirical evidence, which explores avoidance (inclusive of EA, behavioral avoidance, and cognitive avoidance) in adults affected by NEAD. A secondary aim of this review was to quantify avoidance within the population with NEAD and compare it with that observed in control groups. Two random effect meta-analyses were conducted; the first explored the amount of avoidance in NEAD when compared to HC and the second compared individuals with NEAD to an EC group. Large effect

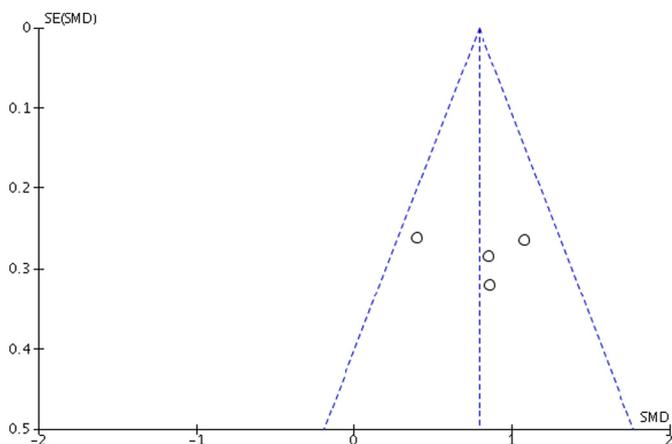


Fig. 5. Funnel plot for NEAD compared to EC groups meta-analysis.

sizes were found for both meta-analyses indicating that groups with NEAD reported higher levels of avoidance than HC and EC groups. These findings are consistent with studies that did not meet criteria for inclusion in this review. The broader literature identifies that related concepts such as dissociation and alexithymia are found in high proportion within the population with NEAD [5].

Elements of the results should be discussed further. Testa, Krauss, Lesser, and Brandt [49], which was excluded from both meta-analyses as the required data were not available, was the only study that did not report a significant difference between the HC group and the group with NEAD. It is important to consider possible reasons for this finding. Although the overall quality of the Testa, Krauss, Lesser, and Brandt [49] study was considered moderate, the EPHPP [30] does not consider power, or the appropriateness of the statistics used, within its overall quality assessment rating. To account for group differences Testa, Krauss, Lesser, and Brandt [49] used ANCOVAs with gender, intelligence quotient (IQ), and education as covariates. Although a technique that is commonly used, there is controversy around the appropriateness of using covariates to adjust for group differences [61]. When used in a randomized design, this can be highly effective to remove a confounding variable, reducing the error term and thus increase statistical power. However, within nonrandomized designs, when the groups differ on the covariate, it reduces the group effect, and instead of increasing power, decreases power and increases the chances of committing a type two error. Considering the limitation of the statistical analysis used, it is important to note that although the authors did not identify a significant difference, the groups with NEAD did have higher means than the HC group across all subscales that measure avoidance. The use of avoidant style coping such as denial and mental disengagement were found to differentiate high distress from participants with low distress NEAD, but not HC or EC groups [49]. Highly distressed individuals with NEAD were more likely to engage in avoidant styles of coping, whereas distress was not directly linked with coping style in the HC or EC groups. This provides some evidence that avoidance in NEAD is not simply a measure of psychological distress, but something about the way in which this group experiences and manages distress. This could be linked to NEAs or this could be attributable to the presences of possible comorbid conditions. Individuals with NEAD often have additional diagnoses, such as personality disorders, anxiety, and depression [2]; all of which have been found to utilize EA more than HC [21].

The second meta-analysis found the group with NEAD utilized more EA than the EC group. The narrative results are predominantly consistent with this finding. For the meta-analysis only one scale per study was included as recommend by Littell, Corcoran, and Pillai [62] to ensure that the assumption of independence was not violated. Three of the five studies identified that the group with NEAD utilized at least one component of avoidance significantly more than the EC group [26, 39,42]. Goldstein and Mellers [26] only found agoraphobic avoidance behaviors to be significantly higher in the group with NEAD than the EC group. Goldstein and Mellers [26] had limited power, and therefore, it is important to note that although not significantly different, the group with NEAD had higher means in both blood and injury and socially avoidant behaviors than the EC group. Bagherzade [39] found

that the group with NEAD was significantly higher on the escape-avoidance subscale but not on the distancing subscale. Again, this is possibly attributable to the posthoc analysis being underpowered. Frances, Baker, and Appleton [43] did not identify a significant difference between EC group and group with NEAD on the escape-avoidance subscale of the WCQ [63]. The difference in the findings of these two studies may be attributed to how data were reported. Frances, Baker, and Appleton [43] used raw scores on the WCQ, whereas Bagherzade [39] used relative scores. Relative scores provide a weighted score based upon how much a person utilized one coping strategy compared to others measured on the WCQ. Raw scores do not consider the individual's reliance on a specific strategy. The use of relative scores is recommended for the WCQ [64]; all other included studies [39,41,44] that used the WCQ reported the relative scores. Testa, Krauss, Lesser, and Brandt [49] did not identify any significant difference on EA between the group with NEAD and the EC group. Again, this finding is possibly attributable to the methodological issues discussed above. Therefore, it is again likely that when compared to a group with epilepsy, individuals with NEAD employ heightened levels of EA strategies. Although individuals with NEAD had higher levels of EA than the EC, it is important to note that this finding was not consistent across all studies. Furthermore, the effect size was smaller than that of comparing NEAD to HC. This is consistent with previous literature, which indicates that avoidance is correlated with distress as individuals with a diagnosis of epilepsy often have higher rates of comorbid mental health conditions than HC [65] but less mental health comorbidity than individuals with NEAD [66]. Additionally, it is possible that the experience of NEAs and epileptic seizures alike may lead to heightened avoidance. This may be particularly true when we think about behavioral avoidance and consider the nature of the attacks. The NEAs or epileptic seizures can cause physical injury and may impact an individual's ability to engage in activities outside of the home. However, it is important to consider that Goldstein and Mellers [26] found that individuals with NEAD had higher levels of agoraphobic behavior than the EC group. This indicates that seizure like activity alone does not explain behavioral avoidance, suggesting that avoidance is clinically relevant for individuals with a diagnosis of NEAD.

4.1. Construct validity of EA

As a construct, EA contains both behavioral and cognitive strategies of avoidance and is a psychological process utilized with the population with NEAD. However, questions arise as to the conceptualization and measurement of EA including both behavioral and cognitive avoidance. Behavioral avoidance is the act of disengaging or avoiding a person, place, or thing to attempt to limit the distress that such situations are perceived to cause. Cognitive avoidance focuses on the cognitive strategies, which individuals engage in to try and evade distressing thoughts, feelings, and sensations such as trying to switch their attention or suppress experiences that are distressing [67]. Experiential avoidance is thought to be the overarching strategy of not wanting to remain in contact with experiences that are perceived as distressing. Most of the included measures seem to measure EA as they considered both cognitive and behavioral components of avoidance. One exception was the Fear Questionnaire [55] that exclusively looked at behavioral avoidance and examined behavioral avoidance in relationship to specific fears. Therefore, given the measures used in the reviewed studies, it is not possible to consider the different components of avoidance within the population with NEAD in a reliable and useful manner.

Future research should consider a measure of EA that clearly taps into behavioral and cognitive components of avoidance. One such measure recommended by Lewis and Naugle [68] is the MEAQ [69], which was used by Dimaro, Dawson, Roberts, Brown, Moghaddam, and Reuber [42]. The MEAQ is a highly reliable measure of EA, which has a total EA scale as well as subscales focusing on cognitive and behavioral strategies

of avoidance. Using such a measure would help explore individual strategies of avoidance as well as the broader construct of EA.

This review focused on avoidance and did not consider dissociation. The operationalization and measurement of both EA and dissociation is not uniform and requires attention. Currently the understanding of the relationship between avoidance and dissociation is limited. It is clear that both areas play an important role within NEAD and trauma-related psychopathologies. Future research would benefit from considering both avoidance and dissociation within NEAD, to tease apart the relationship between such constructs within this population.

4.2. Limitations

A limitation of this review is the reliance on published data. Significant findings are more likely to be published than null findings. This limitation needs to be considered with regard to the effect sizes identified by the meta-analyses. It is possible that the large overall effect size results from publication bias. In addition, the meta-analytic data were based upon a small number of studies, and therefore, the results should be interpreted with caution. However, based on the funnel plots it was identified that publication bias was not a significant concern. Focusing on peer reviewed published studies was to ensure quality.

Included papers used reliable and valid self-report measures. However, there are still limitations with the use of self-report data that require a level of insight and emotional awareness. Individuals with NEAD have high levels of alexithymia and often struggle to identify internal thoughts and feelings [46]. Therefore, more research which uses experimental or observational paradigms and clinician reports in addition to self-report measures of avoidance would be beneficial. In addition, many of the participants in the study were female. Although this reflects the higher proportion of women with a diagnosis of NEAD than men [6], this is still considered a limitation. This becomes particularly clear when considering the results of Myers, Troblicher, Bortnik, and Lancman [47] who found that men and women have different levels of avoidance and possibly utilize avoidance in different ways.

4.3. Clinical implications

This review provides evidence for a commonly held clinical opinion that avoidance should be considered within interventions when working with individuals with NEAD [70,71]. Many professionals describe difficulties working with patients with NEAD [72]. This may be in part due to some of the clinical manifestations of avoidant behavior. The manner in which individuals with NEAD discuss their difficulties is often nondescript and can therefore be difficult for clinicians to follow [73]. It is important to consider that these features of "difficult" patients could all be considered behavioral indicators of EA and may in fact be a core difficulty that this group faces.

4.4. Future research

The findings of this review are consistent with previous studies of NEAD. Previous systematic reviews have identified that methodological limitations and limited comparison groups make it hard to draw conclusions about the etiology and roles that specific psychological mechanisms may have in NEAD [5]. Therefore, more research is needed to understand the role of avoidance (cognitive, behavioral, and EA) in NEAD. The extant literature does not provide insight into the way in which avoidance may contribute to the development and maintenance of NEAD. Two of the included studies [40,47] found that avoidance was utilized to varying degrees within different NEAD subgroups. This suggests that to understand the role(s) of avoidance, close attention should be paid to the heterogeneous nature of NEAD [74].

All included studies were cross-sectional in nature, and therefore it is impossible to ascertain directionality and causality of the relationship between NEAD and EA. Although it seems likely that high levels of EA

and behavioral avoidance are utilized, it is unclear if this differs from other populations of individuals experiencing psychological disorders; EA has been identified as being a component of psychological distress across diagnosis and trauma histories [21,68]. Individuals with NEAD often have high levels of psychological comorbidity and often identify as being highly distressed [2]. Based on the studies reviewed it is impossible to say whether the high levels of EA observed in NEAD are related to NEAs specifically or if they are more indicative of general psychological distress. There were no studies that compared EA in NEAD to clinical groups other than epilepsy. To further understand the role of EA within the population with NEAD, it is important that future studies explore the relationships between EA and NEAD compared to a clinical population experiencing emotional distress. Comparisons groups comprised of people who have been given a diagnosis of anxiety, depression, or personality disorders may help to further understand this relationship. It is important to consider that only one study [24] controlled for anxiety levels. Even when controlling for anxiety, participants with NEAD still displayed higher levels of avoidance behavior compared to HC, indicating that avoidance, regardless of additional expression of psychological distress, such as anxiety, is likely to be an important component of NEAD.

4.5. Conclusions

Experiential avoidance may be a key therapeutic target in the treatment of NEAD. This review found that avoidance is likely a difficulty that many people with NEAD experience. Reducing levels of avoidance has been linked with higher quality of life and reduced distress [75]. Therefore, it appears relevant for clinicians to consider avoidance and the impact this may have on people's lives when supporting individuals who struggle with NEAD.

Acknowledgments

We would like to thank the charities that contributed to the development of this project: Friends in NEAD and NEAD UK.

Appendix 1-A. Data extraction form

Paper
Location
Design
Control group n =
Description
Age
% female
Education
Ethnicity
Employment
Social Economic Status
Comparison group n =
Description
Age
% female
Education
Ethnicity
Employment
Social Economic Status
NEAD group n =
Description
NEAD diagnosis confirmed by
Age
% female
Education
Ethnicity
Employment
Social Economic Status
Groups the same Y/N

Measure of Avoidance
Subscales
Types of avoidance
Statistics used
Description
Power
Effect size
Specified p value
Conclusions
Additional comments

Appendix 1-B. A priori selection of measures

1. If a full scale of an avoidance measure was provided than that will be used.
2. If there is no full scale available than subscales which consider the broadest definition of avoidance will be selected. Therefore, subscales which focus on both behavioural and cognitive elements of avoidance will be given highest priority
3. If multiple subscales consider both cognitive and behavioural measure of avoidance then correlation with other EA measures will be used and those scales with the highest correlations will be used.
4. If a measure only focuses on behavioural or cognitive avoidance then the scale which is the most general or applies to the largest breadth of situations will be used.

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