Appendix 1: CINAHL and PubMed Search Strategy

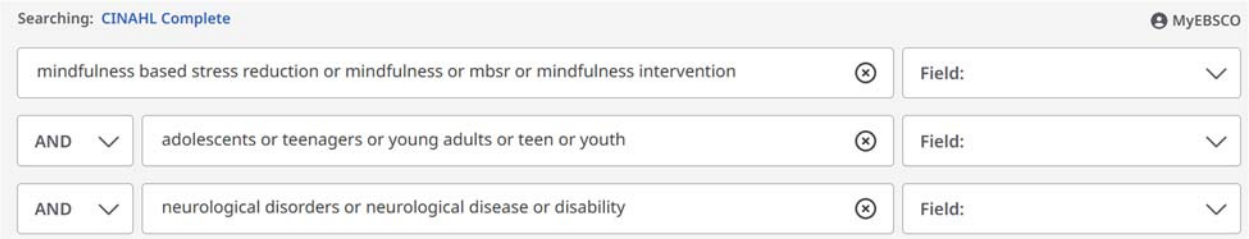
Database: CINAHL and PubMed

Search date: December 2023

Limits applied:

- English language
- Publication years: 2013-2023

CINAHL search string:



PubMed search string:

Search: **((mindfulness) AND (adolescent)) AND (neurological disorder)**
Filters: **English, from 2013 - 2023**

(("mind s"[All Fields] OR "minded"[All Fields] OR "mindful"[All Fields] OR "mindfulness"[MeSH Terms] OR "mindfulness"[All Fields] OR "minding"[All Fields] OR "minds"[All Fields]) AND ("adolescences"[All Fields] OR "adolescency"[All Fields] OR "adolescent"[MeSH Terms] OR "adolescent"[All Fields] OR "adolescence"[All Fields] OR "adolescents"[All Fields] OR "adolescent s"[All Fields]) AND ("nervous system diseases"[MeSH Terms] OR ("nervous"[All Fields] AND "system"[All Fields] AND "diseases"[All Fields]) OR "nervous system diseases"[All Fields] OR ("neurological"[All Fields] AND "disorder"[All Fields]) OR "neurological disorder"[All Fields])) AND ((english[Filter]) AND (2013:2023[pdat]))

Appendix 2:

Article Number/Code	Author and Year	Design & Setting	Sample, Sample Size, Sampling Method	Intervention	Outcomes: Statistical & Narrative	Limitations	Implications for Nursing
Article 1 DOI: 10.1111/dmcn.13923	Mak et al., 2018	A Pilot, waitlist RCT MiYoga group and assessment location (Brisbane, Gold Coast, and Sunshine Coast) in Queensland, Australia	Children diagnosed with unilateral or bilateral cerebral palsy (CP) (ages 6-16 years; n= 42) and one of their parents or caregivers Participants were recruited from the databases of the Queensland Cerebral Palsy Rehabilitation Research Centre, the Queensland Cerebral Palsy Register (convenience sampling) Participants were randomly allocated to either the Miyoga or waitlist	The intervention consisted of an eight-week MiYoga intervention program consisting of six 90-minute sessions over the first six weeks and two telephone or skype consultations the last two weeks of the program assisting participants in MiYoga practice at home integration The child-parent dyads participated in daily home practices (i.e., MiYoga DVD and MiYoga poster) over the eight-week program	The MiYoga group was more attentive and consistent ($p = .04$) and less impulsive ($p = .04$) in their performance on Conners' Continuous Performance Test (CPPT) compared with the waitlist group Secondary outcomes of executive function abilities, physical, psychological (depression and anxiety), and behavioral measures were not significant among groups Parents in the MiYoga group had significantly lower mindfulness scores ($p = .003$)	The Cerebral Palsy Quality of Life Questionnaires were not analyzed post intervention limiting result findings The ceiling effect may have attributed to the insignificant findings of many of the secondary outcome measures The lower mindfulness scores of the MiYoga group parents may be attributed to the parent(s) having a better understanding of their own mindfulness after receiving the training Limited reporting of home practice limits the study's internal validity	Future studies can offer separate sessions for the parents to accurately assess the effects of a mindfulness program on them individually Further studies can evaluate MiYoga in adolescents with CP in addition to a diagnosis of anxiety or depression. Findings can focus on the effects of MiYoga practices on depression and anxiety ratings among this population

			comparison group				
Article 2 DOI: 10.3390/ijerph182211739	Grazzi et al., 2021	Quasi-experimental, single-arm open-label study The Headache Center of the IRCCS Foundation Carlo Besta Neurological Institute in Milan (Italy)	Adolescents with chronic migraine (CM) or high frequency episodic migraine (HFEM) without aura at high frequency (ages 12-18 years; n= 37) Convenience sampling was performed between November 2017 and November 2019 through the IRCCS Foundation Carlo Besta Neurological Institute	The intervention consisted of a one-hour behavioral group session over six weeks, one booster session after 15 days following the six weeks, and a 10-minute home self-practice MBI taught by the researchers for the 12 months' study duration	Patients reported headache days per month dropped significantly with a mean reduction of 11.7 (95% CI: 7.3; 16.1) at the 12-month period ($p < .001$) 23 out of 35 participants achieved a reduction of headache frequency higher or equal to 50% at the 12-month mark Medication intake ($p < .001$), disability ($p = .027$), trait anxiety ($p = .009$, symptoms of depression ($p < .001$), and catastrophizing ($p < .001$) significantly improved	The majority of enrolled participants had CM. This was not representative of the Italian population of adolescents with HFEM and CM; therefore, there is limited generalization of the results The sample consisted of mostly female participants—consequently affecting the external validity of the study. There was no formal investigation of patients' adherence to daily home practice	Future studies can evaluate the impact of continued mindful practices on clinical outcomes (i.e., mindful practice adherence) RCT's including a control condition concerning mindful practices among this population are needed as they would provide the highest level of evidence
Article 3 DOI: 10.1177/13623613211061936	Beck et al., 2022	Mixed Methods Iterative study involving pilot experimenta	(Phase 1) manual creation: family panel of caregivers of autistic	(Phase 1) manual creation: Panels conducted with stakeholder groups (Phase 2) Pilot trial: participants	(Phase 1) The researchers decided upon a combined approach (caregiver presence/non-	The sample size was small as expected for pilot trials; however, this limits the generalizability	The Enhancement team-based program can be implemented and may be appropriate among other populations with

		l studies In person and online (zoom) platforms	individuals and an advisory expert panel of clinicians, researchers, and allies (Phase 2) Pilot trial: adolescents with autism spectrum disorder-Intellectual Disability (ASD-ID) (ages 13-25 years; n= 6) (convenience sampling) (Phase 3) Feasibility pilot trial: six participants (convenience sampling)	completed weekly individual therapy sessions over a 16-week period with sessions lasting 45-50 minutes each (Phase 3) Feasibility pilot trial: In-person and virtual sessions (via zoom). Sessions were redesigned to 25 minutes of learning and practicing content and 10-15 minutes of personalized time with interventionists lasting over a 16-week period	presence) (Phase 2) Need for: 1) more caregiver support in and out of therapy sessions and 2) simplification of session content (Phase 3) The following themes emerged: 1) participant is now able to engage in enjoyable activities more, 2) participant now completes life tasks more easily, 3) increased awareness of emotions and emotion intensity, and 4) has multiple tools that help the participant in remaining calm Caregiver reported significant improvement in participant irritability (p = .01), anxiety (p = .01), and depression (p	of the result finding (i.e., external validity) COVID-19 impacted the phase 2 pilot trial which resulted in an unplanned phase 3 trial COVID-19 impacted the caregiver and participant experience as masks, social distancing, and virtual sessions were introduced. These factors could have influenced the study findings The setting of the study was not discussed within the article	similar developmental and cognitive needs Future studies can evaluate the optimal treatment length for the most success while considering timely and monetary restraints Future studies can revise this study by obtaining larger sample sizes and implementing a randomization of participants and adding a control group

					= .007)		
Article 4 DOI: 10.1002/ajmg.a.37623	Martin et al., 2016	Pilot, quasi-experimental (pre-test, post-test) study Setting not specifically stated	Adolescents and young adults with NF1 and chronic pain (12-21 years old) and their parents (n = 12 pairs) The participant must have been enrolled on an NF1 natural history or treatment study at a government research institute Adult patients or parents of patients less than 18 years of age were contacted if they had indicated chronic pain at their most recent physical examination (convenience sampling)	ACT 2-day workshop focused to help in coping with the patient's pain Patient workshop session consisted of ACT-specific techniques and discussion. Mindfulness overview and mindful breathing followed by discussion. Goals were outlined consistent with patient values Parent workshops focused on ACT techniques they can employ to support their child in living more in line with their values, and to also help themselves cope Both patients and parents were instructed to practice ACT exercises at home	6 males and 6 females completed the intervention, but two did not complete the 3-month questionnaire Mean age of the 10 patients who completed the study was 16.9 years (SD = 2.9, range 12-20 years). No pre-post changes were clear nor significant concerning functional ability, anxiety, depression, or quality of life by patient or parent report	Small sample size therefore, findings of the study should be interpreted carefully Placebo effect is possible because there was no control group Recruitment may have increased and attrition rates may have decreased had the intervention been provided more locally	Larger studies are needed (with comparison groups) to confirm these study's findings Baseline anxiety and depression should be evaluated prior to these future studies to expand on results Future studies can examine whether maternal versus paternal participation varies (similarly, to differing ages of participants and differing pain levels of participants)
Article 5	Wei et	Systematic	Inclusion	Two reviewers	10 articles in	Some of the	Future studies are

DOI: 10.1111/dth.14613	al., 2021	Review and meta-analysis (PRISMA utilized)	criteria: experimental RCTS, observational cohort, case-control, and cross-sectional studies, descriptive cross-sectional surveys, case reports, and case series Study population for inclusion criteria: patients of any age and sex with a diagnosis of NF1, NF2, or Schwannomatosis with difficulty coping or other QOL challenges related to NF	screened and extracted data from included studies (tables provided similar to ours) Primary outcome of interest was QOL and secondary measures were related to psychological health (e.g., mindfulness, resiliency, depression and anxiety) and pain Risk of bias of each study was also determined Meta-analyses for outcomes were also conducted	final analysis (3 were RCTs, 5 were related sub-analyses, and 2 were pre-post studies with no control group.) Overall, QOL measures among studies improved among NF patients following mind-body therapy strategies One of the studies demonstrated significant improvements in depression symptoms and anxiety. Meta-analysis showed mind body therapy significantly correlated with improved physical, psychological, social, and environmental QOL. These correlations were maintained at 6-months post treatment for all of the QOL indicators besides social	studies included had small sample size, and varied in risk of bias and study quality so meta-analyses must be interpreted carefully	needed to examine whether the provision of routine reminders and self-guided mind body therapy materials can effectively improve and sustain QOL outcomes in all NF populations Future studies are needed to examine whether mind-body therapy can be effectively delivered using mobile health delivery as it likely is a convenient way for NF patients to obtain psychosocial health assistance Need studies with larger sample sizes of more rigorous quality

					QOL		
Article 6 DOI: 10.1007/s10826-013-9868-1	Milligan et al., 2015	Exploratory qualitative study	Post-treatment (Mindfulness martial arts-MMA) questionnaire results completed by 29 youth (aged 12-17) and 17 parents. In-depth interviews with 7 youth and 5 parents. The participants had to have been diagnosed by a psychologist as having a learning disorder and had self-regulation challenges (e.g., anxiety, behavior problems, ADHD, etc.)	MMA progresses over 20 weekly sessions (1.5 hours each). Each group has 8-10 youth. 2 separate levels= beginner and advanced MMA includes mindfulness, cognitive therapy, and behavior modification and activation within a martial arts training program Two mindfulness approaches within MMA: 1) meditation (e.g., sitting, body scan, and Kinhin/walking) and 2) the mindful moment (3-minute breathing space) Each MMA session includes 5 phases: brief sitting meditation, the skill, the case or the application, yoga warm-up, and martial arts	Majority of youth reported somewhat to very successful in meeting their goals Most youth rated the martial arts training component of the class the highest followed by mindful self-talk and meditation Qualitative interview findings: 1) improving still and mastery in martial arts and 2) improving emotional well-being and relationship with peers. A participants father reported his son wanted to participate because he was, “unhappy, depressed about his life. He really felt sad and anxious and	Possible bias of results as parents and youth were conveniently sampled and were small in number Both quantitative and qualitative components were drawn from, but a larger sample (including female) and advanced participants is needed to highlight key outcomes and determine characteristics that may moderate the outcomes	Future research should explore the relationship between home practice and outcomes More research addressing client and treatment characteristics in the development of acceptance in mindfulness programs for adolescents are needed Involvement of parents in this program was not extensively examined

					he wanted a way of feeling less sad, less anxious, and less bullied." Mindfulness resulted in four main outcomes: 1) increasing calmness, 2) thinking before acting 3) increased self-understanding and communication, and 4) tolerating and accepting discomfort		
Article 7 DOI: 10.1177/13623613221117931	Linden et al., 2023	Systematic review and network meta-analysis of randomized controlled trials	RCTs included where anxiety or depression was assessed in autistic people irrespective of whether this was the primary outcome. Separate meta-analyses planned for children and adolescents without ID,	13,794 records identified through electronic searches with a total of 71 trials (3630 participants) included in this review. Types of interventions included for comparison: a) Anti-anxiety/anti-depression medications, b) psychological therapies, c) Behavioral therapies, d) Miscellaneous interventions Wait-list (i.e. no additional intervention or	Uncertainty about effects of interventions for mental health conditions in autistic people Anxiety: 1) children - lower in participants whose parents received psychoeducation, 2) adults - some indication Depression: 1) children - some indication, 2) adults - some evidence Quality of life: 1)	Mental health outcomes not reported in many trials Several trials with low certainty evidence Overall low study quality with small sample sizes resulting in insufficient statistical power, lack of blinding participants/researchers, few RCTs comparing interventions, and potential conflicts of interest based on source of funding.	Some studies included in the review have high risk of bias due to financial conflict of interest Most studies reviewed did not include participants with autism and concurrent intellectual disability. The findings may only be true about those without intellectual disability It is difficult to know whether the tools being used to assess mental health before and after intervention were accurate measures of what

			children and adolescents with ID, adults with ID, and adults without ID	placebo intervention until measurement of the outcomes)	children - no evidence, 2) adults - low certainty evidence	Selection bias with most studies only choosing autistic patients without ID	patients experienced clinically
Article 8 DOI: 10.3390/ijerph17186916	Santonastaso et al., 2020	Case-control Bambino Gesu Children's Hospital in Rome, Italy	Twenty-five children with ADHD aged 7-11 years Recruited from waiting list (convenience sampling) at Child and Adolescent Neuropsychiatry Unit of Bambino Gesu Children's Hospital in Rome, Italy Participants randomized into one of two arms Parent- and self-report questionnaires administered at baseline	Mindfulness-oriented meditation (MOM) compared with active control condition of emotion education program over 8 weeks, three times weekly	MOM led to positive effects on neuropsychological measures with significant mean improvement in all outcome measures after training. Positive effects were found only with intervention (not in active control group) Depressive and anxiety symptoms were not significantly improved post intervention. MOM group mean neuropsychological measure (e.g., working memory) scores significantly improved from T0 to T1 ($p = 0.0028$) while the	Small number of participants Majority of participants male Parents not blinded to which treatment arm the participant was in and provided survey responses Lack of follow up to determine duration of effect	Future studies are needed to understand why some measures significantly improved and others did not post-intervention. This can be used to guide adjustments in the MOM program, including length of time, frequency of sessions, etc.

			and after completing treatment course		emotion education program group mean scores did not change from T0 to T1 (p = 0.99)		
Article 9 DOI: 10.1016/j.ctim.2019.01.006	Stephens, 2019	Case Presentation + Discussion	14-year-old female referred to Pediatric Medical Yoga and Integrative Health Clinic from the Pediatric Neurology service for migraines w/ TIAs, GAD (purposive sampling)	Patient and parent were prescribed medical yoga and dietary supplements for anxiety and depression Included mindful movement poses (asanas) as well as breathing exercises. Guided through self-reflection and study to recognize emotions Dietary/supplement recommendations Magnesium + Riboflavin recommended for the migraine headaches	Parents did mindfulness exercises with her Did asana practice 4x/week during school, daily in summer; says it makes her feel more relaxed Reports feeling more stressed with school starting, follow-up intervention scheduled: a) five additional asanas (poses) to be done 3-4x/week, b) additional breathing exercises, c) mindfulness exercises reviewed Sixteen-week follow-up appointment - Reports being able to acknowledge when anxiety	Case report (n=1) Medical yoga is not widely available/accessible Note: reported to be an adjunctive therapy and not a substitute for psychotherapy or medication	Can consider mindfulness-based practice in treatment in addition to traditional psychotherapy/pharmaceuticals for anxiety and associated conditions/physical manifestations

					is coming and controls it with deep breathing.		
Article 10 DOI: 10.1007/s10072-022-06225-2	Grazzi et al., 2022	Single-arm quasi-experimental pilot study Neurological Institute C. Besta of Milan, Italy	12 adolescents (9 females) age 12-18 years with either chronic migraine (CM) or high-frequency episodic migraine (HFEM) (convenience sampling)	Education on the correct use of drugs and lifestyle issues and attendance to six sessions of a mindfulness-based behavioral approach	Significant improvement observed up to 6 months for headache frequency, symptoms of depression, and catastrophizing No change to patients' anxiety level	Small sample size Short-term of follow-up Absence of control condition	The online modality of intervention showed feasibility, given none of the participants were lost to follow-up. The findings of the study support the intervention as a valid alternative to pharmacologic prophylaxis, which supports findings that were previously reported in the literature.