

# Integrative Medicine

Evidence-based summaries and critical reviews on  
the latest developments in integrative therapies [ALERT]

## DIABETES

### ABSTRACT & COMMENTARY

# Loneliness and Type 2 Diabetes Incidence

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**SYNOPSIS:** Loneliness appears to be an independent risk factor for type 2 diabetes, although further research to identify the causal relationship between loneliness and type 2 diabetes development is needed.

**SOURCE:** Hackett RA, Hudson JL, Chilcot J. Loneliness and type 2 diabetes incidence: Findings from the English Longitudinal Study of Ageing. *Diabetologia* 2020;63:2329-2338.

**L**oneliness, or the perception of unmet social needs and dissatisfying social relationships, is a common experience. Forty percent of adults older than 65 years of age report feelings of loneliness, and studies show that loneliness tends to increase with advancing age.<sup>1</sup>

In addition to being a persistent negative emotional experience, loneliness appears to affect physical and mental health. Various studies have established that loneliness can be a predictor for all-cause mortality and has associations with chronic diseases, such as coronary heart disease, hypertension, metabolic syndrome, cognitive decline, and dementia.<sup>1,2</sup>

Despite the growing body of literature reporting the associations between loneliness and chronic inflammatory diseases, the relationship between loneliness and type 2 diabetes remains understudied, particularly examinations of loneliness as a potential risk factor for type 2 diabetes. With estimates showing 462 million individuals affected by type 2 diabetes globally, diabetes is ranked as the ninth leading cause of mortality.<sup>3,4</sup> At the same time, there is growing global concern over a “loneliness epidemic” that is infiltrating society. Studies have showed that social networks and household size are shrinking, one-third of adults in the United States older than 45 years of age have reported being lonely, and the prevalence of loneliness can be expected to increase

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## Summary Points

- This prospective, longitudinal population study attempted to assess loneliness as an independent risk factor for type 2 diabetes by analyzing data from 4,112 diabetes-free participants from the English Longitudinal Study of Ageing.
- Participant loneliness was assessed from 2004-2005 with a follow-up period to assess for diabetes development from 2006-2017. A total of 264 (6.42%) participants developed type 2 diabetes.
- Cox proportional hazards regression showed loneliness as a significant predictor for incidence of type 2 diabetes (hazard ratio, 1.46; 95% confidence interval, 1.15, 1.84;  $P = 0.027$ ), independent of covariates, including age, sex, ethnicity, wealth, smoking status, physical activity, alcohol consumption, depressive symptoms, living alone, and social isolation.

as the population ages.<sup>5</sup> Additionally, given that loneliness has been previously linked to several risk factors for type 2 diabetes, such as aging, obesity, and metabolic syndrome, identifying the prospective association between loneliness and type 2 diabetes is of great importance.

The 2020 study by Hackett et al used data from the English Longitudinal Study of Ageing (ELSA) to conduct a prospective, longitudinal, observational study focused on assessing loneliness as an independent risk factor for type 2 diabetes. Started in 2002, ELSA collects data on people older than 50 years of age living in England with the goal of understanding all aspects of aging. Every two years, data are collected on the same set of ELSA participants — with more than 18,000 individuals having taken part in ELSA as of 2020.<sup>6</sup> Participants were selected from the ELSA database, and the authors followed the same study design as ELSA by collecting questionnaire data from participants in “waves” occurring every two years.

Overall, there were eight waves of data collection spanning 15 years. Wave 1 data collection began in 2002-2003 to identify potential participants, with wave 2 (2004-2005) used to collect data on participant loneliness, diabetes diagnosis status at baseline, as well as covariate data on age, sex, ethnicity, smoking status, alcohol consumption, frequency of physical activity, body mass index (BMI), hypertension diagnosis, and household non-pension wealth (indicator of socioeconomic status.) Participants in wave 2 also completed a nurse visit where covariate data were confirmed, blood pressure readings were taken, and HbA1c was

measured. Participants who indicated a previous diagnosis of type 2 diabetes or who had an HbA1c in the diabetic range of  $\geq 6.5\%$  were excluded from the study. During the follow-up period of wave 3 (2006-2007) through wave 8 (2016-2017), self-reported information on participant incidence of type 2 diabetes was collected. Participants who were able to provide a complete data set on loneliness in wave 2 and type 2 diabetes status in the follow-up period were included in the final analysis.

Loneliness, the primary predictor variable, was assessed using the University of California Los Angeles Loneliness Scale, a 20-item scale presenting various feelings of loneliness and isolation that participants could rate according to frequency.<sup>6</sup> Participants were given three numerical options for rating each item: 1 — hardly ever/never, 2 — some of the time, and 3 — often. Participant ratings were averaged, with higher values associated with greater loneliness. Conbrach's alpha of 0.82 was reported in the study sample. Secondary predictor variables included social isolation, living alone, and depressive symptoms. Social isolation was measured based on frequency of contact with children, family, and friends. Participants were given a social isolation score from 0-4, with higher scores indicating greater isolation. Living alone was based on a self-reported yes/no question. Depressive symptoms were measured using an eight-item Centre for Epidemiological Studies Depression Scale, where participants could score 0-7, with scores  $\geq 6$  being considered signs of severe depression.

Cox proportional hazards regression was used to test the association between

loneliness and type 2 diabetes after controlling for age, sex, wealth, ethnicity, smoking, physical activity, alcohol consumption, BMI, hypertension, cardiovascular disease, and HbA1c. Loneliness was inserted as a continuous variable where the hazard ratio (HR) and 95% confidence intervals (CI) represented a 1 U increase. The secondary analysis consisted of adding covariates and secondary predictor variables to the statistical model to test the independent effect of loneliness on diabetes incidence. Ultimately, five models were created, with covariate data added in Model 1, depression added in Model 2, living alone added in Model 3, and social isolation score indexes added in Model 4. Model 5 was the final model and included loneliness, all covariates, depression, living alone, and social isolation as type 2 diabetes predictors.

Results showed 8,780 participants identified as eligible at the conclusion of wave 2, with 4,112 participants providing a complete data set that could be used in the final analysis. In the follow-up period, 262 (6.42%) participants reported developing type 2 diabetes. Cox regression modeling showed loneliness to be a significant predictor of type 2 diabetes incidence (HR, 1.46; 95% CI, 1.15, 1.84;  $P = 0.027$ ) independent of covariates, including age, sex, ethnicity, wealth, smoking, physical activity, alcohol consumption, BMI, HbA1c, hypertension, and cardiovascular disease. Additionally, Model 2 through Model 4 showed loneliness as an independent predictor, with depressive symptoms, living alone, and social isolation not being significant predictors of type 2 diabetes incidence. Model 5 (final results) also continued to show loneliness to be an independent predictor of type 2 diabetes (HR, 1.41; 95% CI, 1.04, 1.90;  $P = 0.027$ ). Additional analysis also showed that loneliness was associated with a greater likelihood of smoking and physical inactivity, and a reduced likelihood of regular alcohol consumption.

#### ■ COMMENTARY

Hackett et al present a first-of-its-kind study that prospectively examines loneliness as a risk factor for type 2 diabetes. To date, previous studies have conducted cross-sectional analyses demonstrating a relationship between loneliness and type 2 diabetes. However, these studies are limited in their ability to determine whether loneliness stimulates the development of type 2 diabetes or if type 2 diabetes onset and management lead to a strain on the quality of social relationships, ultimately resulting in loneliness.<sup>7,8</sup> Based on the study results, the authors concluded that loneliness can be considered a predictor of type 2 diabetes independent of other social and mental health variables, such as depressive symptoms, living alone, and social isolation.

Potential limitations in the study design include selection bias and the inability to generalize findings to non-white populations (the authors noted that the ELSA database, from which participants were selected, contains few

ethnic minority participants). An analysis of the baseline covariate data of participants lost to follow-up showed poorer health, lower financial status, and higher rates of loneliness when compared to participants who completed the study. Thus, selection bias due to non-random exclusion may have occurred.

Patients identified as experiencing loneliness may benefit from interventions that address improving the quality of social relationships and treating maladaptive thought processes. Literature reviews identify a key characteristic of loneliness as being an individual's hypervigilance to perceived social threats and negative social information. Interventions focused on providing patients with therapy to recognize the internal cognitive biases caused by loneliness, along with strategies to improve perceptions of social interactions, may have greater effects than interventions aimed at improving social skills or simply increasing opportunities for social interaction.<sup>1,2</sup>

Additionally, a recent study found that internet-administered cognitive behavioral therapy for individuals experiencing loneliness showed a decrease in loneliness and anxiety and an increase in quality of life, with benefits sustained at a two-year follow-up.<sup>9</sup> While further research is needed to determine the physiological mechanisms by which loneliness may lead to the development of type 2 diabetes, physicians now have evidence to consider loneliness as an independent risk factor for type 2 diabetes, adding to the knowledge of the effects loneliness can have on the development of chronic inflammatory diseases. Hackett et al provide strong evidence for clinicians taking time to ask patients about their sense of social support, loneliness, and feelings of isolation, as well as considering referrals to psychologists for appropriate therapy to help alleviate loneliness. ■

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## ABSTRACT &amp; COMMENTARY

# Transdiagnostic Cognitive Behavioral Therapy in Young Patients

By Ellen Feldman, MD

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**SYNOPSIS:** This Danish randomized clinical trial compares a new form of cognitive behavioral therapy delivered in a community setting to “treatment as usual” for children and teens with emotional problems and shows advantages in multiple arenas, including parent-reported changes in child distress and impairment.

**SOURCE:** Jeppesen P, Wolf RT, Nielsen SM. Effectiveness of transdiagnostic cognitive behavioral psychotherapy compared with management as usual for youth with common mental health problems: A randomized clinical trial. *JAMA Psychiatry* 2021;78:250-260.

One in five Americans will have a diagnosable mental illness at some point in their lifetime. One-half of this group will have onset of symptoms before 14 years of age, and three-quarters will experience onset before 24 years of age. Accordingly, evidence-based studies have looked at early intervention in the treatment of mental illness.<sup>1,2</sup>

Demonstrating efficacy across a range of childhood emotional and behavioral disorders, cognitive behavioral therapy (CBT), a talk therapy delivered in a structured form and based on exercises to change dysfunctional thinking patterns, is increasingly seen as the “gold standard” in prevention and treatment efforts. However, access to this type of therapy and the availability of specialist care remain as barriers to effective and timely treatment worldwide.<sup>3</sup>

The problem with access to mental health care, and studies indicating that prevention during childhood can change the trajectory of mental illness in adults, spurred this study. Jeppesen et al designed a transdiagnostic CBT for use in a community setting with emotionally disturbed youth, with problems or symptoms not severe enough to require specialist care. “Transdiagnostic” refers to applicability across diagnostic categories, rather than specific for any one diagnosis. This characteristic provides flexibility to this intervention in addressing the needs of different communities.

Participants aged to 6 to 16 years were recruited from four diverse areas of Denmark. Referral sources included teachers, parents, and primary care providers (PCPs). Parents of referred children completed the Strengths and Difficulties Questionnaire (SDQ), including the related impact score — a brief screening tool for emotional disturbance in children that provides an estimate of impact on overall functioning.<sup>4</sup>

Inclusion criteria included age, a cut-off score on the SDQ, and a parent and child identified “top problem” of depressive and/or anxiety symptoms and/or behavioral problems. Exclusions from the study included children with a prior clinical diagnosis of mental illness or developmental disorder and families unable to commit to participation in weekly therapy sessions.

A total of 396 participants were randomized to receive either management as usual (MAU), which was enhanced by offering two care coordination sessions in addition to usual management, or Mind My Mind (MMM), the CBT program designed by Jeppesen et al. MMM consisted of nine to 13 weekly CBT sessions led by community-based psychologists and conducted at school or in a nearby office setting. Only 12.5% of these psychologists reported formal training in CBT prior to participating in this program. Training to administer MMM was accomplished within one week, with ongoing supervision throughout the treatment period. Notably, parents of children involved in the MMM arm were engaged in sessions, with specific parenting training being an integral part of the program for youth younger than 13 years of age. The MAU arm interventions varied, ranging from “no intervention” to educational support to psychological treatments.

All outcomes were measured at the conclusion of all sessions (week 18) and again eight weeks later (week 26) to determine maintenance of impact. The primary outcome was parent-reported SDQ impact score (five items; range 0-10, with higher scores reflecting more severe impacts of behaviors), while the secondary outcome measures included parent-reported changes in child anxiety levels, changes in depressive symptoms, school attendance, and child-reported well-being score. Potential harms, including suicidal thinking and poor quality of relationships (family and friends), were assessed at these same times.

## Summary Points

- Seeking an early intervention for common mental health problems in children, before severity requires referral to specialist care, Jeppesen et al developed Mind My Mind (MMM), a form of cognitive behavioral therapy (CBT) designed to be used across diagnoses and in a community setting.
- Three hundred ninety-six youths ages 6 to 16 years participated in this multi-site Danish randomized clinical trial over a period of 18 weeks, with assessment at baseline, 18 weeks, and 26 weeks.
- Children and parents were randomized to nine to 13 weeks of weekly MMM with an additional “booster” session four weeks after completion of the main groups, or management as usual (MAU), which varied according to provider but included at least two care coordination visits.
- The main outcome (Strengths and Difficulties Questionnaire impact score) and multiple secondary outcomes (including anxiety and depressive symptoms) showed significant advantages for the MMM arm vs. MAU at the 18-week conclusion of the intervention, with maintenance of most gains at 26 weeks as well.

### RESULTS

In the baseline group (n = 396 children), the mean age was 10.3 years and there was a slight preponderance of boys (52%) vs. girls (48%). Parents identified anxiety as the top problem of concern in 58.3% of the participants, followed by “behavioral problem” in 25.5% and depression in 16.2%. The mean SDQ impact score was 4.16 (moderate impact); 80% of the children met criteria for a *Diagnostic and Statistical Manual of Mental Disorders, 5th Edition*, diagnosis. At the study’s end, 88.8% of the MMM group had attended nine to 13 sessions (mean of 11.0 therapy groups attended). More than 80% of participants in both arms completed outcome assessments. Results are summarized in Table 1.

### ■ COMMENTARY

CBT is a known, effective treatment for children with disorders of mental health, but access to trained providers prevents implementation in many communities worldwide.<sup>3</sup> Jeppesen et al present a unique solution to this dilemma, with significant promise for public health adaptation. A CBT program for use across a spectrum of mental health diagnoses, administered without onerous requirements for training and appropriate for children whose symptoms are under the threshold for specialist referral, has the potential to break barriers and reach a wide range of children in a variety of settings.

Before widespread implementation, several limitations of this study are important to examine and understand. Most of the outcome measures were fairly subjective, being contingent on parent-reported evaluation. However, parents played a role in the MMM therapy and, as such, may not have been objective observers of behavior. More concrete measures of behavioral impact and functioning (such as grades at school, number of disciplinary citations or corrections, numbers of hours of sleep) or an impartial observer of behavior blinded to the study intervention, could help in this regard. Of interest, school attendance — one objective outcome measure — did not continue to

show significant difference between groups by week 26. This also bears further investigation.

Additionally, it is interesting to consider which aspects of MMM, as designed by Jeppesen et al, were the most significant in achieving outcome measure improvement. Parent involvement was noted to be an integral part of the program, with parents of younger children receiving regular parenting training. It will be important for future studies to identify whether this component alone is effective, or if other components of the intervention are necessary for full efficacy. It also is important to note that sessions were conducted at or near schools, that supervision was provided to psychotherapists, and that follow-up stopped at 26 weeks. These first two conditions may or may not be possible to meet in all communities and may not be fully generalizable.

A longer follow-up period in future studies will be helpful in assessing whether gains are maintained over time. Finally, the cost of MMM or a similar program must be weighed and evaluated. Cost may differ region by region, depending on a multitude of factors and conditions, including the cost of healthcare, space availability, and parent accessibility. One lesson of the COVID-19 pandemic has been that it may be prudent to evaluate the practicality of delivering interventions virtually. There are many promising studies regarding the efficacy of virtual delivery of psychotherapy, but a head-to-head comparison of specific therapies (virtual vs. in-person) is necessary for firm conclusions.

All in all, however, the Jeppesen et al study has the potential for widespread implementation in the future. For now, this investigation serves as a reminder to the primary care provider (PCP) of the importance of early intervention with children demonstrating a wide range of behavioral and/or emotional problems, even if symptoms are not severe enough to require specialist referral. Additionally, this study emphasizes the important role

**Table 1. Outcomes of Transdiagnostic Cognitive Behavioral Therapy in Young Patients**

Outcomes and Possible Side Effects	18 Weeks	26 Weeks
Primary outcome (SDQ impact score in a range of 0-10)*	<ul style="list-style-type: none"><li>An improvement of 2.34 points in the MMM arm compared to an improvement of 1.23 in the MAU group</li><li>The between-group difference is 1.10; 95% CI, 0.75-1.45; <math>P &lt; 0.01</math>.</li></ul>	<ul style="list-style-type: none"><li>An improvement of 2.54 in the MMM arm compared to an improvement of 1.34 in the MAU group</li><li>The between-group difference is 1.20; 95% CI, 0.66-1.74; <math>P &lt; 0.01</math>.</li></ul>
Secondary outcome (parent-reported level of child anxiety, depressive symptoms, school attendance, and child-reported well-being score)	<ul style="list-style-type: none"><li>Significant improvement in child levels of anxiety and depressive symptoms noted by parents, with <math>P &lt; 0.001</math></li><li>There was a significant difference in school attendance between the groups (<math>P = 0.009</math>). There was no significant difference in child-reported physical well-being (<math>P = 0.51</math>).</li></ul>	<ul style="list-style-type: none"><li>Significant improvement in child levels of anxiety and depressive symptoms noted by parents, with <math>P &lt; 0.001</math> continues</li><li>There is no longer a detectable significant difference in school attendance between the groups; difference in child-reported physical well-being remains insignificant.</li></ul>
Possible side effects/potential harm**	<ul style="list-style-type: none"><li>No significant between-group difference in suicidal ideations reported by participants (13.2% in MMM vs. 18.2% in MAU; <math>P = 0.26</math>)</li></ul>	<ul style="list-style-type: none"><li>Significant between-group difference in suicidal ideations reported by participants (4.7% in MMM vs. 16.7% in MAU; <math>P = 0.03</math>)</li></ul>

SDQ: Strengths and Difficulties Questionnaire; MMM: Mind My Mind; MAU: management as usual; CI: confidence interval  
\*The SDQ impact score reflects the parent-reported functional impact of the child's emotional problems in many areas, including home, school, and general relationships.  
\*\*About 10% of the participating youth in each arm reported deteriorating relationships within the family and/or with friends at weeks 18 and 26 (no significant between-group difference).

of parent involvement in such an intervention. Although this study leaves us with no specific findings for the PCP currently working with MAU, strengthening a parent component to an early intervention piece may be the most practical implementation of this work available at this time. ■

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**ASTHMA**

**ABSTRACT & COMMENTARY**

# Air Filters and Asthma

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**SYNOPSIS:** Asthmatic children showed improved small airway mechanics following indoor filtration of particulates (2.5  $\mu\text{m}$  and greater) using high-efficiency particulate air filtration devices.

**SOURCE:** Xiaoxing C, Li Z, Teng Y, et al. Association between bedroom particulate matter filtration and changes in airway pathophysiology in children with asthma. *JAMA Pediatr* 2020;174:533-542.

In many environments, from industrial settings to indoor homes, pollution has an elevated amount of particulate matter 2.5  $\mu\text{m}$  or smaller (PM<sub>2.5</sub>). It is widely believed

that PM<sub>2.5</sub> deposits in smaller pulmonary airways leads to asthma exacerbation. Specifically, PM<sub>2.5</sub> has been associated with increased oxidative stress and pulmonary

inflammation. Prior to this study, there has been little conclusive information on whether the reduction of  $PM_{2.5}$  exposure improves small airway function in children with asthma.

This randomized, double-blind, cross-over study of 43 children with mild to moderate asthma and ages ranging from 5 to 13 years took place over the course of 70 days in Shanghai, China, where the  $PM_{2.5}$  used ranged from less than the U.S. National Ambient Air Quality standard ( $35 \mu\text{g}/\text{m}^3$ ) to nearly double this level.  $PM_{2.5}$  was measured indoors and outdoors, and filtration of  $PM_{2.5}$  occurred in the children's indoor bedrooms with high-efficiency particulate air (HEPA) filtration and activated carbon.

The primary outcome of the study examined fractional exhaled nitric oxide (FeNO), while also examining the effects of  $PM_{2.5}$  on airway mechanics and function using impulse oscillometry (IOS) and spirometry, respectively. The study also examined  $PM_{2.5}$  filtration on children with various baseline FeNO and eosinophil levels and its subsequent impact on airway physiology.

## RESULTS

In comparison to no filtration, true filtration led to a reduction of  $PM_{2.5}$  by 79.6% and 63.4% in outdoor and bedroom concentrations, respectively. Furthermore, true filtration showed improved respiratory inflammation (FeNO 24.4% [95% confidence interval (CI), 11.8% to 37.1%]), mean peaked expiratory flow (PEF) (1.6% [95% CI, 0.8% to 2.5%]), and airway mechanics (reduction in resistance at 5 Hz [R5] and resistance at 5 Hz to 20 Hz [R5-R20] by 43.5% and 73.1%, respectively). Further analysis showed that for every  $10 \mu\text{g}/\text{m}^3$  reduction in bedroom  $PM_{2.5}$  concentration, there was a significant improvement in airway mechanics (reduction in R5 and R5-R20 by 4.6% and 7.6%, respectively), small airway airflow, and inflammation (6.8% reduction in FeNO). Children with lower baseline FeNO or eosinophil count showed significant improvement in airway mechanics vs. children with higher baseline values. However, airway function did not show significant improvement, since overall small airway function (forced expiratory flow), forced expiratory volume in one second (FEV1), forced vital capacity (FVC), and FEV1/FVC were not significant.

## COMMENTARY

This study reinforces the negative impact air pollution has on the respiratory system. Prior studies have shown that air particulates found in air pollution result in increased oxidative stress and airway inflammation in children with asthma.<sup>1-4</sup> A study conducted in 2015 revealed that for every  $10 \mu\text{g}/\text{m}^3$  increase in  $PM_{2.5}$ , there was an increased relative risk of 1.021 for asthma-related hospital admission.<sup>5</sup>

The filtration of  $PM_{2.5}$  in this study revealed improved airway mechanics and reduction in small airway inflammation. Similar results were seen in other studies.<sup>2,3,6</sup> However, no significant improvement was seen in airway function. This contrasts with a 2008 study that found a significant inverse association between  $PM_{2.5}$  and FEV1 and FVC in children with and without asthma.<sup>2</sup> The discrepancy may be due to the duration of the study/sample size or other risk factors that were not accounted for, such as other air pollutants like sulfur dioxide ( $\text{SO}_2$ ) or nitrogen dioxide ( $\text{NO}_2$ ).<sup>4,7,8</sup> A study that examined children with asthma in inner U.S. cities found that higher five-day average concentrations of  $\text{NO}_2$ ,  $\text{SO}_2$ , and  $PM_{2.5}$  were associated with significantly lower pulmonary function and increased asthma-related missed school days.<sup>4</sup> Other factors that could influence airway mechanics and airway function include urbanization, age of the child, and social economics.<sup>1,6,7</sup> Studies have shown that exposure to an increase in air pollution in minority children in the first year of life was associated with an odds ratio of 1.17 for physician-diagnosed asthma.<sup>7</sup>

Based on the study, I would agree that additional clinical trials are needed to evaluate whether filtering  $PM_{2.5}$  is an effective tool to improve airway mechanics and prevent/reduce asthma symptoms. However, if financial costs are not an issue, I would suggest that households include a HEPA filter to reduce  $PM_{2.5}$  levels, since the study reveals significant improvement in airway mechanics and reduction in small airway inflammation. ■

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## Summary Points

- A randomized, double-blind, cross-over study of 43 children illustrated that filtration of particulate had significant improvement in small airway physiology (increased peak expiratory flow) and pulmonary inflammation.
- With indoor filtration showing positive results on small airway mechanics, it may serve as a preventative measure in asthma management.

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## CME OBJECTIVES

Upon completion of this educational activity, participants should be able to:

- present evidence-based clinical analyses of commonly used alternative therapies;
- make informed, evidence-based recommendations to clinicians about whether to consider using such therapies in practice; and
- describe and critique the objectives, methods, results, and conclusions of useful, current, peer-reviewed, clinical studies in alternative medicine as published in the scientific literature.

## CME INSTRUCTIONS

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## CME QUESTIONS

- In the Jeppesen et al study, a course of transdiagnostic cognitive behavioral therapy:**
  - was shown to be effective in preventing psychiatric hospitalizations and in reducing psychotropic medication use in seriously mentally ill children.
  - was shown to be associated with improvement in parent-assessed functioning of children with behavior/emotional problems not severe enough to require referral to a mental health specialist.
  - was shown to be very effective with or without parental input or involvement.
  - was shown to have promise in treating children with behavioral and mental health disorders, but the intensity of staff training makes this technique impractical and too expensive for widespread use.
- Based on the study published in by Hackett et al, which of the following statements about loneliness is true?**
  - Both loneliness and living alone can be considered significant risk factors for type 2 diabetes development.
  - Loneliness is best defined as low quantity of social interactions in an individual's environment.
  - The mechanism by which loneliness may contribute to inflammatory disease development is known to be via dysregulation of glucocorticoid pathways.
  - Loneliness can be considered a risk factor for type 2 diabetes independent of a patient's HbA1c.
- Which of the following was the primary outcome when determining the effect of air filters on young asthma patients?**
  - Nitric oxide (FeNO)
  - Peaked expiratory flow (PEF)
  - Reduction in resistance at 5 Hz (R5)
  - Resistance at 5 Hz-20 Hz (R5-R20)

## [IN FUTURE ISSUES]

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Vitamin D and Mental Health

Rheumatoid Arthritis and Diet

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