

# The Efficacy of Light Therapy in the Treatment of Seasonal Affective Disorder: A Meta-Analysis of Randomized Controlled Trials

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## Abstract

**Background:** Bright light therapy (BLT) has been used as a treatment for seasonal affective disorder (SAD) for over 30 years. This meta-analysis was aimed to assess the efficacy of BLT in the treatment of SAD in adults. **Method:** We performed a systematic literature search including randomized, single- or double-blind clinical trials investigating BLT ( $\geq 1,000$  lx, light box or light visor) against dim light ( $\leq 400$  lx) or sham/low-density negative ion generators as placebo. Only first-period data were used from crossover trials. The primary outcome was the post-treatment depression score measured by validated scales, and the secondary outcome was the rate of response to treatment. **Results:** A total of 19 studies finally met our predefined inclusion criteria. BLT was superior over placebo with a standardized mean difference of  $-0.37$  (95% CI:  $-0.63$  to  $-0.12$ ) for depression ratings (18 studies, 610 patients) and a risk ratio of 1.42 (95% CI: 1.08–1.85) for response to active treatment (16 studies, 559 patients). We found no evidence for a publication bias, but moderate heterogeneity of the studies and a moderate-to-high risk of bias. **Conclusions:** BLT can be regarded as an effective treatment for SAD, but the available evidence

stems from methodologically heterogeneous studies with small-to-medium sample sizes, necessitating larger high-quality clinical trials.

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## References

1. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5th ed. Washington (DC): American Psychiatric Publishing; 2013.
2. Rosenthal NE, Sack DA, Gillin JC, Lewy AJ, Goodwin FK, Davenport Y, et al. Seasonal affective disorder. A description of the syndrome and preliminary findings with light therapy. *Arch Gen Psychiatry*. 1984 Jan;41(1):72–80.

### External Resources

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 3. Levitan RD. The chronobiology and neurobiology of winter seasonal affective disorder. *Dialogues Clin Neurosci*. 2007;9(3):315–24.

### External Resources

- [Pubmed/Medline \(NLM\)](#)
- 4. Terman M, Terman JS, Quitkin FM, McGrath PJ, Stewart JW, Rafferty B. Light therapy for seasonal affective disorder. A review of efficacy. *Neuropsychopharmacology*. 1989 Mar;2(1):1–22.

### External Resources

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 5. Winkler D, Pjrek E, Konstantinidis A, Kasper S. Drug treatment of seasonal affective disorder. In: Partonen T, Pandi-Perumal SR, editors. *Seasonal affective disorder: practice and research*. Oxford: Oxford University Press; 2009. pp. 281–95.

### External Resources

- [Crossref \(DOI\)](#)
- 6. Pjrek E, Winkler D, Stastny J, Konstantinidis A, Heiden A, Kasper S. Bright light therapy in seasonal affective disorder – does it suffice? *Eur Neuropsychopharmacol*. 2004 Aug;14(4):347–51.

### External Resources

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 7. Terman M, Terman JS. Light therapy for seasonal and nonseasonal depression: efficacy, protocol, safety, and side effects. *CNS Spectr*. 2005 Aug;10(8):647–63; quiz 672.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 8. Berson DM, Dunn FA, Takao M. Phototransduction by retinal ganglion cells that set the circadian clock. *Science*. 2002 Feb;295(5557):1070–3.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 9. Hattar S, Liao HW, Takao M, Berson DM, Yau KW. Melanopsin-containing retinal ganglion cells: architecture, projections, and intrinsic photosensitivity. *Science*. 2002 Feb;295(5557):1065–70.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 10. Roecklein KA, Wong PM, Miller MA, Donofry SD, Kamarck ML, Brainard GC. Melanopsin, photosensitive ganglion cells, and seasonal affective disorder. *Neurosci Biobehav Rev*. 2013 Mar;37(3):229–39.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 11. Michel S, Itri J, Colwell CS. Excitatory mechanisms in the suprachiasmatic nucleus: the role of AMPA/KA glutamate receptors. *J Neurophysiol*. 2002 Aug;88(2):817–28.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 12. Wirz-Justice A. From the basic neuroscience of circadian clock function to light therapy for depression: on the emergence of chronotherapeutics. *J Affect Disord*. 2009 Aug;116(3):159–60.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)

- [Crossref \(DOI\)](#)
- 13. Lewy AJ, Rough JN, Songer JB, Mishra N, Yuhas K, Emens JS. The phase shift hypothesis for the circadian component of winter depression. *Dialogues Clin Neurosci*. 2007;9(3):291–300.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- 14. Partonen T, Vakkuri O, Lönnqvist J. Suppression of melatonin secretion by bright light in seasonal affective disorder. *Biol Psychiatry*. 1997 Sep;42(6):509–13.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 15. Pereira JC Jr, Pradella Hallinan M, Alves RC. Secondary to excessive melatonin synthesis, the consumption of tryptophan from outside the blood-brain barrier and melatonin over-signaling in the pars tuberalis may be central to the pathophysiology of winter depression. *Med Hypotheses*. 2017 Jan;98:69–75.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 16. Yatham LN, Lam RW, Zis AP. Growth hormone response to sumatriptan (5-HT<sub>1D</sub> agonist) challenge in seasonal affective disorder: effects of light therapy. *Biol Psychiatry*. 1997 Jul;42(1):24–9.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 17. Neumeister A, Turner EH, Matthews JR, Postolache TT, Barnett RL, Rauh M, et al. Effects of tryptophan depletion vs catecholamine depletion in patients with seasonal affective disorder in remission with light therapy. *Arch Gen Psychiatry*. 1998 Jun;55(6):524–30.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 18. Neumeister A, Konstantinidis A, Praschak-Rieder N, Willeit M, Hilger E, Stastny J, et al. Monoaminergic function in the pathogenesis of seasonal affective disorder. *Int J Neuropsychopharmacol*. 2001 Dec;4(4):409–20.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
19. Harrison SJ, Tyrer AE, Levitan RD, Xu X, Houle S, Wilson AA, et al. Light therapy and serotonin transporter binding in the anterior cingulate and prefrontal cortex. *Acta Psychiatr Scand*. 2015 Nov;132(5):379–88.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
20. Tyrer AE, Levitan RD, Houle S, Wilson AA, Nobrega JN, Rusjan PM, et al. Serotonin transporter binding is reduced in seasonal affective disorder following light therapy. *Acta Psychiatr Scand*. 2016 Nov;134(5):410–9.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
21. Spies M, James GM, Vracka C, Philippe C, Hienert M, Gryglewski G, et al. Brain monoamine oxidase A in seasonal affective disorder and treatment with bright light therapy. *Transl Psychiatry*. 2018 Sep;8(1):198.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
22. Leu SJ, Shiah IS, Yatham LN, Cheu YM, Lam RW. Immune-inflammatory markers in patients with seasonal affective disorder: effects of light therapy. *J Affect Disord*. 2001 Mar;63(1-3):27–34.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
23. Stastny J, Konstantinidis A, Schwarz MJ, Rosenthal NE, Vitouch O, Kasper S, et al. Effects of tryptophan depletion and catecholamine depletion on immune parameters in patients with seasonal affective disorder in remission with light therapy. *Biol Psychiatry*. 2003 Feb;53(4):332–7.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
24. Golden RN, Gaynes BN, Ekstrom RD, Hamer RM, Jacobsen FM, Suppes T, et al. The efficacy of light therapy in the treatment of mood disorders: a review and meta-analysis of the evidence. *Am J Psychiatry*. 2005 Apr;162(4):656–62.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 25. Mårtensson B, Pettersson A, Berglund L, Ekselius L. Bright white light therapy in depression: a critical review of the evidence. *J Affect Disord.* 2015 Aug;182:1–7.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 26. Lewy AJ, Wehr TA, Goodwin FK, Newsome DA, Markey SP. Light suppresses melatonin secretion in humans. *Science.* 1980 Dec;210(4475):1267–9.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 27. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorder.* 3rd edition, revision (DSM-III-R). Washington, DC: American Psychiatric Press; 1987.
- 28. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorder.* 4th edition, text revision (DSM-IV-TR). Washington, DC, American Psychiatric Press, 2000.
- 29. Kasper S, Rogers SL, Yancey A, Schulz PM, Skwerer RG, Rosenthal NE. Phototherapy in individuals with and without subsyndromal seasonal affective disorder. *Arch Gen Psychiatry.* 1989 Sep;46(9):837–44.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 30. Vieta E, Suppes T. Bipolar II disorder: arguments for and against a distinct diagnostic entity. *Bipolar Disord.* 2008 Feb;10(1 Pt 2):163–78.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 31. Roecklein KA, Rohan KJ, Postolache TT. Is seasonal affective disorder a bipolar variant? *Curr Psychiatr.* 2010 Feb;9(2):42–54.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- 32. Sohn CH, Lam RW. Treatment of seasonal affective disorder: unipolar versus bipolar differences. *Curr Psychiatry Rep.* 2004 Dec;6(6):478–85.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 33. Pail G, Huf W, Pjrek E, Winkler D, Willeit M, Praschak-Rieder N, et al. Bright-light therapy in the treatment of mood disorders. *Neuropsychobiology*. 2011;64(3):152–62.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 34. Schardt C, Adams MB, Owens T, Keitz S, Fontelo P. Utilization of the PICO framework to improve searching PubMed for clinical questions. *BMC Med Inform Decis Mak*. 2007 Jun;7(1):16.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 35. R Core Team. R: a language and environment for statistical computing. Vienna, Austria: R Foundation for Statistical Computing; 2018. Available from: <https://www.R-project.org/>.
- 36. Schwarzer G. meta: an R package for meta-analysis. *R News*. 2007;7:40–5.
- 37. Viechtbauer W. Conducting meta-analyses in R with the metafor package. *J Stat Softw*. 2010;36(3):1–48.

### **External Resources**

- [Crossref \(DOI\)](#)
- 38. DerSimonian R, Laird N. Meta-analysis in clinical trials revisited. *Contemp Clin Trials*. 2015 Nov;45 Pt A:139–45.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 39. Ades AE, Lu G, Higgins JP. The interpretation of random-effects meta-analysis in decision models. *Med Decis Making*. 2005 Nov-Dec;25(6):646–54.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 40. Hedges LV. Estimation of effect size from a series of independent experiments. *Psychol Bull*. 1982;92(2):490–9.

### **External Resources**

- [Crossref \(DOI\)](#)
- 41. Mantel N, Haenszel W. Statistical aspects of the analysis of data from retrospective studies of disease. *J Natl Cancer Inst.* 1959 Apr;22(4):719–48.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- 42. Higgins JP, Sterne JA, Savović J, Page MJ, Hróbjartsson A, Boutron I, et al. A revised tool for assessing risk of bias in randomized trials. In: Chandler J, McKenzie J, Boutron I, Welch V, editors. *Cochrane methods*. *Cochrane Database Syst Rev* 2016;10 (Suppl 1).
- 43. Higgins JP, Thompson SG, Deeks JJ, Altman DG. Measuring inconsistency in meta-analyses. *BMJ.* 2003 Sep;327(7414):557–60.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 44. Begg CB, Mazumdar M. Operating characteristics of a rank correlation test for publication bias. *Biometrics.* 1994 Dec;50(4):1088–101.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 45. Egger M, Davey Smith G, Schneider M, Minder C. Bias in meta-analysis detected by a simple, graphical test. *BMJ.* 1997 Sep;315(7109):629–34.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 46. Bown MJ, Sutton AJ. Quality control in systematic reviews and meta-analyses. *Eur J Vasc Endovasc Surg.* 2010 Nov;40(5):669–77.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 47. James SP, Wehr TA, Sack DA, Parry BL, Rosenthal NE. Treatment of seasonal affective disorder with light in the evening. *Br J Psychiatry.* 1985 Oct;147(4):424–8.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)



- [Crossref \(DOI\)](#)
- 48. Nagayama H, Daimon K, Mishima K, Yamazaki J, Mizuma H, Ohta T, et al. Bright versus dim light therapy for seasonal affective disorder: a collaborative study. *Jpn J Psychiatry Neurol.* 1994;48:488–9.
- 49. Winton F, Corn T, Huson LW, Franey C, Arendt J, Checkley SA. Effects of light treatment upon mood and melatonin in patients with seasonal affective disorder. *Psychol Med.* 1989 Aug;19(3):585–90.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 50. Schwartz PJ, Murphy DL, Wehr TA, Garcia-Borreguero D, Oren DA, Moul DE, et al. Effects of meta-chlorophenylpiperazine infusions in patients with seasonal affective disorder and healthy control subjects. Diurnal responses and nocturnal regulatory mechanisms. *Arch Gen Psychiatry.* 1997 Apr;54(4):375–85.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 51. Rosenthal NE, Skwerer RG, Sack DA, Duncan CC, Jacobsen FM, Tamarkin L, et al. Biological effects of morning-plus-evening bright light treatment of seasonal affective disorder. *Psychopharmacol Bull.* 1987;23(3):364–9.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- 52. Lam RW, Buchanan A, Clark CM, Remick RA. Ultraviolet versus non-ultraviolet light therapy for seasonal affective disorder. *J Clin Psychiatry.* 1991 May;52(5):213–6.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- 53. Levitt AJ, Joffe RT, King E. Dim versus bright red (light-emitting diode) light in the treatment of seasonal affective disorder. *Acta Psychiatr Scand.* 1994 May;89(5):341–5.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 54. Desan PH, Weinstein AJ, Michalak EE, Tam EM, Meesters Y, Ruiters MJ, et al. A controlled trial of the Litebook light-emitting diode (LED) light therapy device for treatment of Seasonal Affective Disorder (SAD). *BMC Psychiatry.* 2007 Aug;7(1):38.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
55. Eastman CI, Lahmeyer HW, Watell LG, Good GD, Young MA. A placebo-controlled trial of light treatment for winter depression. *J Affect Disord.* 1992 Dec;26(4):211–21.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
56. Eastman CI, Young MA, Fogg LF, Liu L, Meaden PM. Bright light treatment of winter depression: a placebo-controlled trial. *Arch Gen Psychiatry.* 1998 Oct;55(10):883–9.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
57. Terman M, Terman JS. Controlled trial of naturalistic dawn simulation and negative air ionization for seasonal affective disorder. *Am J Psychiatry.* 2006 Dec;163(12):2126–33.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
58. Terman M, Terman JS, Ross DC. A controlled trial of timed bright light and negative air ionization for treatment of winter depression. *Arch Gen Psychiatry.* 1998 Oct;55(10):875–82.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
59. Flory R, Ametepe J, Bowers B. A randomized, placebo-controlled trial of bright light and high-density negative air ions for treatment of Seasonal Affective Disorder. *Psychiatry Res.* 2010 May;177(1-2):101–8.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
60. Wileman SM, Eagles JM, Andrew JE, Howie FL, Cameron IM, McCormack K, et al. Light therapy for seasonal affective disorder in primary care: randomised controlled trial. *Br J Psychiatry.* 2001 Apr;178(4):311–6.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)

- [Crossref \(DOI\)](#)
- 61. Magnusson A, Kristbjarnarson H. Treatment of seasonal affective disorder with high-intensity light. A phototherapy study with an Icelandic group of patients. *J Affect Disord.* 1991 Feb;21(2):141–7.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 62. Reeves GM, Nijjar GV, Langenberg P, Johnson MA, Khabazghazvini B, Sleemi A, et al. Improvement in depression scores after 1 hour of light therapy treatment in patients with seasonal affective disorder. *J Nerv Ment Dis.* 2012 Jan;200(1):51–5.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 63. Grota LJ, Yerevanian BI, Gupta K, Kruse J, Zborowski L. Phototherapy for seasonal major depressive disorder: effectiveness of bright light of high or low intensity. *Psychiatry Res.* 1989 Jul;29(1):29–35.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 64. Wirz-Justice A, Bucheli C, Graw P, Kielholz P, Fisch HU, Woggon B. Light treatment of seasonal affective disorder in Switzerland. *Acta Psychiatr Scand.* 1986 Aug;74(2):193–204.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 65. Hamilton M. A rating scale for depression. *J Neurol Neurosurg Psychiatry.* 1960 Feb;23(1):56–62.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 66. Williams JB, Link MJ, Rosenthal NE, Amira L, Terman M. Structured Interview Guide for the Hamilton Depression Rating Scale – Seasonal Affective Disorder Version, 2002 rev. New York (NY): New York State Psychiatric Institute; 2002.
- 67. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. *Arch Gen Psychiatry.* 1961 Jun;4(6):561–71.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 68. Beck AT, Steer RA, Brown GK. Manual for the Beck Depression Inventory-II. San Antonio (TX): Psychological Corporation; 1996.
- 69. Terman M, Williams JB. Assessment instruments. In: Partonen T, Magnusson A, editors. Seasonal affective disorder: practice and research. New York: Oxford University Press; 2001.
- 70. Levitt AJ, Wesson VA, Joffe RT, Maunder RG, King EF. A controlled comparison of light box and head-mounted units in the treatment of seasonal depression. *J Clin Psychiatry*. 1996 Mar;57(3):105–10.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- 71. Martinez B, Kasper S, Ruhrmann S, Möller HJ. Hypericum in the treatment of seasonal affective disorders. *J Geriatr Psychiatry Neurol*. 1994 Oct;7 Suppl 1:S29–33.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 72. Michalon M, Eskes GA, Mate-Kole CC. Effects of light therapy on neuropsychological function and mood in seasonal affective disorder. *J Psychiatry Neurosci*. 1997 Jan;22(1):19–28.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- 73. Avery DH, Eder DN, Bolte MA, Hellekson CJ, Dunner DL, Vitiello MV, et al. Dawn simulation and bright light in the treatment of SAD: a controlled study. *Biol Psychiatry*. 2001 Aug;50(3):205–16.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)
- 74. Hedges LV, Pigott TD. The power of statistical tests for moderators in meta-analysis. *Psychol Methods*. 2004 Dec;9(4):426–45.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)

75. American Psychiatric Association. Practice guideline for the treatment of patients with major depressive disorder. 3rd ed. American Psychiatric Association; 2010.
76. Deutsche Gesellschaft für Psychiatrie und Psychotherapie (DGPPN). Leitlinie/Nationale Versorgungsleitlinie Unipolare Depression. DGPPN; 2015.
77. Cohen J. Statistical power analysis for the behavioral sciences. 2nd ed. Hillsdale, NJ, USA: Erlbaum; 1988.
78. Arroll B, Elley CR, Fishman T, Goodyear-Smith FA, Kenealy T, Blashki G, et al. Antidepressants versus placebo for depression in primary care. Cochrane Database Syst Rev. 2009 Jul;(3):CD007954.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
79. Gibbons RD, Hur K, Brown CH, Davis JM, Mann JJ. Benefits from antidepressants: synthesis of 6-week patient-level outcomes from double-blind placebo-controlled randomized trials of fluoxetine and venlafaxine. Arch Gen Psychiatry. 2012 Jun;69(6):572–9.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
80. Al-Karawi D, Jubair L. Bright light therapy for nonseasonal depression: meta-analysis of clinical trials. J Affect Disord. 2016 Jul;198:64–71.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
81. Even C, Schröder CM, Friedman S, Rouillon F. Efficacy of light therapy in nonseasonal depression: a systematic review. J Affect Disord. 2008 May;108(1-2):11–23.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
82. Jane-wit D, Horwitz RI, Concato J. Variation in results from randomized, controlled trials: stochastic or systematic? J Clin Epidemiol. 2010 Jan;63(1):56–63.

### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)

83. Rosenthal NE, Sack DA, Carpenter CJ, Parry BL, Mendelson WB, Wehr TA. Antidepressant effects of light in seasonal affective disorder. *Am J Psychiatry*. 1985 Feb;142(2):163–70.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
84. Botanov Y, Ilardi SS. The acute side effects of bright light therapy: a placebo-controlled investigation. *PLoS One*. 2013 Sep;8(9):e75893.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
85. Kogan AO, Guilford PM. Side effects of short-term 10,000-lux light therapy. *Am J Psychiatry*. 1998 Feb;155(2):293–4.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
86. Labbate LA, Lafer B, Thibault A, Sachs GS. Side effects induced by bright light treatment for seasonal affective disorder. *J Clin Psychiatry*. 1994 May;55(5):189–91.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
87. Levitt AJ, Joffe RT, Moul DE, Lam RW, Teicher MH, Lebegue B, et al. Side effects of light therapy in seasonal affective disorder. *Am J Psychiatry*. 1993 Apr;150(4):650–2.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
88. Brouwer A, Nguyen HT, Snoek FJ, van Raalte DH, Beekman AT, Moll AC, et al. Light therapy: is it safe for the eyes? *Acta Psychiatr Scand*. 2017 Dec;136(6):534–48.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
89. Gallin PF, Terman M, Remé CE, Rafferty B, Terman JS, Burde RM. Ophthalmologic examination of patients with seasonal affective disorder, before and after bright light therapy. *Am J Ophthalmol*. 1995 Feb;119(2):202–10.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
90. Rosenthal NE, Sack DA, Skwerer RG, Jacobsen FM, Wehr TA. Phototherapy for seasonal affective disorder. *J Biol Rhythms*. 1988;3(2):101–20.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
91. Eastman CI. What the placebo literature can tell us about light therapy for SAD. *Psychopharmacol Bull*. 1990;26(4):495–504.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
92. Fava GA, Guidi J, Rafanelli C, Rickels K. The clinical inadequacy of the placebo model and the development of an alternative conceptual framework. *Psychother Psychosom*. 2017;86(6):332–40.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
93. Westrin A, Lam RW. Long-term and preventative treatment for seasonal affective disorder. *CNS Drugs*. 2007;21(11):901–9.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
94. Nussbaumer-Streit B, Pjrek E, Kien C, Gartlehner G, Bartova L, Friedrich ME, et al. Implementing prevention of seasonal affective disorder from patients' and physicians' perspectives – a qualitative study. *BMC Psychiatry*. 2018 Nov;18(1):372.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
95. Nussbaumer-Streit B, Winkler D, Spies M, Kasper S, Pjrek E. Prevention of seasonal affective disorder in daily clinical practice: results of a survey in German-speaking countries. *BMC Psychiatry*. 2017 Jul;17(1):247.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
- [Crossref \(DOI\)](#)

96. Moher D, Liberati A, Tetzlaff J, Altman DG; PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. PLoS Med. 2009 Jul;6(7):e1000097.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
97. Peters JL, Sutton AJ, Jones DR, Abrams KR, Rushton L. Contour-enhanced meta-analysis funnel plots help distinguish publication bias from other causes of asymmetry. J Clin Epidemiol. 2008 Oct;61(10):991–6.

#### **External Resources**

- [Pubmed/Medline \(NLM\)](#)
  - [Crossref \(DOI\)](#)
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