

## Depression: Detecting the Historical Roots of Research on Depression Prevention with Reference Publication Year Spectroscopy

### Abstract

**Background:** Reference citation analysis and reference publication year can help to demonstrate the historical context of a research field. Therefore, this study aimed to determine the most important historical publications regarding depression prevention. **Methods:** This was a bibliometric study carried out using reference publication year spectroscopy (RPYS) method. Data gathering was carried out using Thomson Reuters Web of Science in the period of 2007–2016. A total of 17,043 records were retrieved which were uploaded as full record and cited references in plain text format. Then modified data were analyzed using RPYS.exe software. **Results:** Distribution of cited references in the area of depression prevention based on publication year revealed nine peaks in the twentieth century in years 1921, 1935, 1944, 1977, 1983, 1990, 1994, 1999, and 2000. Moreover, our analysis showed that some peaks occurred in the 21<sup>st</sup> century in years 2001–2005. **Conclusions:** Researchers have investigated depression prevention with physiological, epidemiological, biological as well as physical approaches. Furthermore, created criteria for measuring depression in different target societies have played an important and vital role in depression prevention.

**Keywords:** *Bibliometrics, depression, preventive medicine, spectrum analysis*

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### Introduction

Mental disorders are the most common type of mental problems in the world.<sup>[1]</sup> Depression is the most common mental disorder that can affect all societies and age groups. Depression is accompanied by symptoms such as depressed mood, loss of interest or pleasure, decreased energy, feelings of guilt or low self-worth, disturbed sleep or appetite, and poor concentration.<sup>[2]</sup> Based on the recent statistics, approximately 350–450 million people worldwide suffer from depression and according to “disability-adjusted life years” criterion, depression is the third or fourth most important cause of diseases and accounts for a large portion of nonlethal diseases.<sup>[1,3–6]</sup> Recent forecasts show that in 2030 and with the increase in prevalence, depression will become the most common disease worldwide and more common than cancer, cardiovascular, and respiratory diseases.<sup>[7]</sup> Therefore, one of the methods used by policymakers to increase awareness of populace toward depression is to select slogans such as “depression: A global crisis” for the year 2012<sup>[8]</sup> and “depression: Let’s talk” for the year 2017.<sup>[9]</sup>

Due to the high prevalence of depression and its costs for patients, society, and health-care system, it is necessary to conduct various studies on prevention, treatment, and management methods for depression. One of the most important challenges for studies on depression worldwide is the lack of necessary financial support for these studies. Due to multidisciplinary and costly nature of such studies, no researcher or organization can alone understand all advances in regard to depression prevention and therapy.<sup>[10]</sup> As a result, identifying important and influential factors, types of knowledge, and historic roots of studies on depression can be helpful for researchers in this field.

One must understand that knowledge does not exist in a vacuum and many researchers have cooperated to reach the current knowledge base. Therefore, citation can be considered as the main link connecting researchers from different times. By citing previous knowledge, researcher attempts to improve on the work of their predecessors which improves dynamism in the field. Since the duty of citations is to connect various scientific works, citation records create

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an opportunity to identify the most influential works in a field of study.<sup>[11]</sup> Citation analysis is carried out based on the works of a researcher, research group, research institute, or journal. The number of citations to these works in a set of studies is analyzed and research performance is determined. Leydesdorff and Cozzens<sup>[12]</sup> believe that citing behavior is more important in context mapping of citation relations in successive years compared to cited behavior because citing behavior represents a current factor while cited behavior refers to science archives. Reference publication year spectroscopy (RPYS) is a novel quantitative method that can help to achieve these research goals.<sup>[13]</sup> Using this method, it is possible to identify the historic roots of a research area and investigate the effects of these roots on current studies using a scientific method.

Analyzing the list of cited sources with emphasis on publication year can help reveal important and historic turning points in a certain field of study during several decades or even several centuries.<sup>[13]</sup> Reviewing previous works indicates that using the new method of RPYS have attracted the attention of researchers in several fields such as Darwin's finches,<sup>[14]</sup> iMetrics,<sup>[15]</sup> Higgs boson<sup>[16]</sup> and global positioning system.<sup>[17]</sup> Therefore, the current study has been conducted to identify and introduce historic and important turning points in prevention research on depression which is one of the most common and most costly mental disorders in the world.

## Methods

This is a bibliographic study using RPYS approach. The data were gathered by searching in Web of Science website using keywords of "depression AND prevent\*" in the topic field and limited to years 2007–2016. Until February 18, 2017, a total of 17,043 records which had 851,309 citations were retrieved and the used references in all documents were uploaded as "full record and cited references" using plain text format. The matched data were analyzed using RPYS. exe software, and outputs were saved into two files called rpy.s.dbf and median.dbf.<sup>[18]</sup> The first file organizes a number of citations for each publication year and can be used to plot the spectra of data. The second file is the median deviation based on publication year in a 5-year period (2 years before and after publication year). Both curves can be plotted in Excel software. In the final step, the leaps in the number of citations in various years are identified and analyzed by experts. It is worth mentioning that the period of the cited records (reference list) is not limited to a certain period and can contain any records up until the data of this study.

## Results

Based on the searches conducted in Web of Science, a total of 17,043 records in the subject of depression

prevention were retrieved which had 851,309 citations. In the following sections, the analysis of these records using RPYS technique in periods of 1900–1950, 1951–2000, and 2001–2015 is presented.

### Peaks in twentieth century

#### *First part: Period of 1900–1950*

Figure 1 shows the frequency distribution of citations in depression prevention based on their publication year. According to this information, in the period of 1900–1950, there have been three major peaks in depression prevention research in years 1921, 1935, and 1944 [Figure 1 and Table 1]. Other peaks in this figure require more detailed analysis. Detailed analysis of citations in various years showed that these peaks are mostly due to accumulation of citations to different articles instead of numerous citations to selected articles. Data analysis showed that the first peak has happened in the year 1921 with 43 citations to articles published in this year. Among these, 18 citations (41.86%) is to the book titled "Manic-depressive insanity and paranoia" by Karepelin. Eysenck's Encyclopedia of Psychology recognizes Emil Karepelin as the founder of Modern scientific psychiatry, Psychopharmacology, and Psychiatric genetics. Karepelin believed that the main source of psychological diseases is genetic and biological disorders.<sup>[19]</sup> He had a physiological approach and his understanding of mental diseases was based on natural scientific concepts. His most important achievement is categorization of disease and their symptoms which is presented in his book. In this book, he categorizes mental diseases, their symptoms, different states of different diseases, and their prognosis and diagnosis. His theories on the reasons for mental diseases and their diagnosis are the basis of all current diagnosis systems, especially the American Psychiatric Association's diagnostic and statistical manual of mental disorders, fourth edition (DSM-IV) and World Health Organization's (WHO) International Classification of Diseases (ICD) system.<sup>[20]</sup>

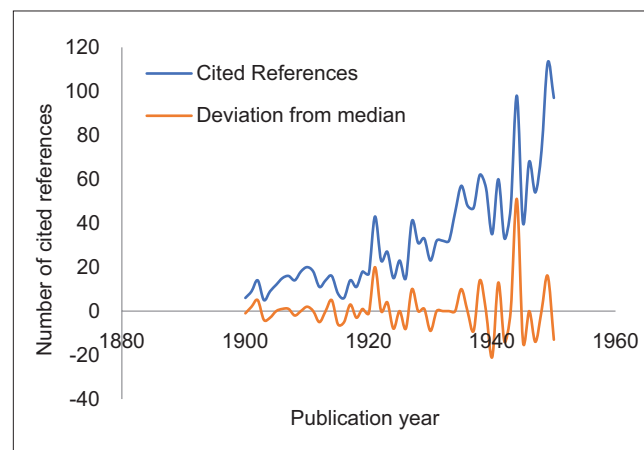


Figure 1: Results of reference publication year spectroscopy analysis in the realm of prevention of depression (period 1900–1950)

**Table 1: Historical mutations in realm of prevention of depression with the most cited works between 1900 and 1950**

Type of document	Number of references per document (%)	Most referred work	Total references	Intervals
Book	18 (41.86)	Karepin E. Manic-Depressive Insanity and Paranoia. Edinburg: Livingstone; 1921.	43	1921
Article	28 (49.12)	Stroop JR. Studies of interference in serial verbal reactions. J Exp Psychol 1935;18:643-62.	57	1935
Article	58 (59.18)	Leao AA. Spreading depression of activity in the cerebral cortex. J Neurophysiol 1944;7:359-90.	98	1944

The second peak happened in the year 1935. There have been a total of 57 citations to publications in this year, the majority of which (28 citations or 49.12%) is belonged to the publication by Stroop JR [Table 1].

This publication investigates the morphophonemic of “inhibition” and “interference”. These words were used by physiologists since 1890 but are now mostly used by psychologists. Using these words in relation to depression and investigating different forms of inhibition and interference has created a special place for this publication in today’s experimental literature.<sup>[21]</sup>

The third peak is in the year 1944 which has received a total of 98 citations. As can be seen in Table 1, 58 citations (59.18%) is allocated to the publication by Leao AA.

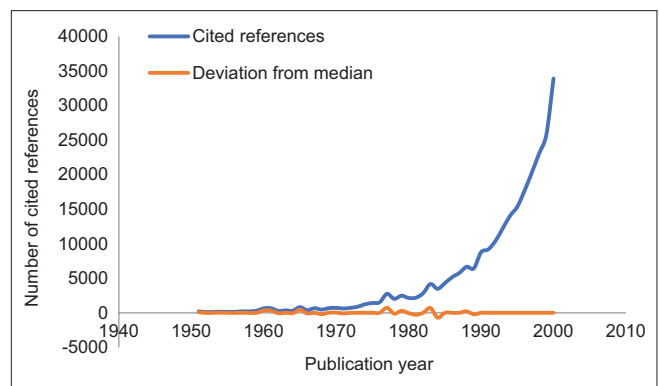
This publication is an article resulted from a PhD thesis on cerebral cortex to electric stimulation and its definition as a specific entity in spreading depression. The author believes that the high number of citations to this article is due to it belonging to the field of brain pathophysiology and also provoked in other neocortical brain centers which has gained the interest of researchers in the fields of clinical and behavioral sciences.

*Part two: Period of 1951–2000*

Figure 2 shows the frequency distribution of citations in records on depression prevention based on their publication year in the period of 1951–2000. These results show six major peaks in the area of depression prevention in this period [Figure 2 and Table 2].

The first peak happened in the year 1977 in which Radolf published “A Self-Report Depression Scale for Research in the General Population”. This scale was used for symptomology investigations in general population. The items in this questionnaire are symptoms related to depression which have been used in previous credible scales, making this scale a useful tool for epidemiological studies of depression.

The second peak is in the year 1983 which is due to creation and testing of different scales for measuring depression and factors affecting it. In this year, hospital anxiety and depression scale (HADS) was first proposed by Zigmond and Snaith which can be used for screening of psychological



**Figure 2: Results of reference publication year spectroscopy analysis in the realm of prevention of depression (period 1951–2000)**

disorders in general clinics and for measuring depression and anxiety in outpatients. This scale is a self-reporting tool which is used for investigating depression, anxiety, and emotional distress. This scale is not designed for clinical diagnosis and is mainly based on hospital situations. Another important publication of this year is the publication by Cohen *et al.* who criticize lack of coordination between advancements in theoretical concepts and creation of scales for measuring perceived stress. The result of their work is a 14-item questionnaire which measured perceived stress. The third important publication of this year is the geriatric depression screening scale proposed by Yesavage *et al.* Before the introduction of this scale, there was no specific method for geriatric depression screening despite numerous scales for measuring depression which led to the need for a scale specific for geriatric depression screening. One of the concerns regarding geriatric depression screening is mistaking dementia with depression. Depression in elderly patients has symptoms such as memory loss and cognitive disorders which are rarely seen in younger patients. On the other hand, somatic symptoms of depression which often play key roles in diagnosis in younger patients are less useful in elderly patients. All of these differences are considered in this scale.

The third peak happened in the year 1990. The book titled “Full Catastrophe Living: Using the Wisdom of Your Body and Mind to Face Stress, Pain, and Illness” by Kabat-Zinn is the most important publication of this year which investigates stress management and using body and mind for coping with stress, pain, and illness. This book

**Table 2: Historical mutations in realm of prevention of depression with the most cited works between 1951 and 2000**

Type of document	Number of references per document (%)	Most referred work	Total references	Intervals
Article	938 (34.21)	Radloff LS. The CES-D scale: A self-report depression scale for research in the general population. <i>Appl Psychol Meas</i> 1977;1:385-401.	2742	1977
Article	507 (12.17)	Zigmond AS, Snaith RP. The hospital anxiety and depression scale. <i>Acta Psychiatr Scand</i> 1983;67:361-70.	4166	1983
Article	168 (4.03)	Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. <i>J Health Soc Behav</i> 1983;24:385-96.		
Article	168 (4.03)	Yesavage JA, Brink TL, Rose TL, Lum O. Development and validation of a geriatric depression screening scale: A preliminary report. <i>J Psychiat Res</i> 1983;17:37-49.		
Book	116 (1.32)	Kabat-Zinn J. <i>Full Catastrophe Living: Using the Wisdom of Your Body and Mind to Face Stress, Pain, and Illness</i> . New York: Delacorte Press; 1990.	8764	1990
Article	71 (0.81)	Bentler PM. Comparative fit indexes in structural models. <i>Psychol Bull</i> 1990;107:238-46.		
Book	665 (4.74)	American Psychiatric Association. <i>Diagnostic and Statistical Manual of Mental Disorders: DSM-IV</i> . 4 <sup>th</sup> ed.. Washington (DC): American Psychiatric Association; 1994.	14,031	1994
Article	165 (1.18)	Kessler RC, McGonagle KA, Zhao S, Nelson CB, Hughes M, Eshleman S, <i>et al.</i> Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States. Results from the National Comorbidity Survey. <i>Arch Gen Psychiatry</i> 1994;51:8-19.		
Book	146 (1.04)	Mrazek PJ, Haggerty RJ. <i>Reducing for Preventive Intervention Research: Frontiers for Preventive Intervention Research</i> . Washington (DC): National Academics Press; 1994.		
Article	208 (0.81)	Spitzer R, Kroenke K, Williams JB. Validation and utility of a self-report version of PRIME-MD: The PHQ primary care study. <i>JAMA</i> 1999;282:1737-44.	25,690	1999
Article	169 (0.66)	Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. <i>Struct Equ Model Multidiscip J</i> 1999;6:1-55.		
Book	661 (1.95)	American Psychiatric Association. <i>Diagnostic and Statistical of Manual Disorder</i> . 5 <sup>th</sup> ed.. Washington DC: APA; 2000.	33,885	2000
Article	298 (0.55)	Teasdale JD, Segal ZV, Williams JM, Ridgeway VA, Soulsby JM, Lau MA. Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. <i>J Consult Clin Psychol</i> 2000;68:615-23.		

aims to reduce depression by reducing perceived stress. Another important publication in this year is on the subject of statistics. In this publication, Bentler aims to compare and analyze different fit indexes.

The fourth peak happened in the year 1994. The majority of citations in this year are to three publications. The first publication is “Diagnostic and statistical manual of mental disorders: DSM-IV. 4<sup>th</sup> ed. Washington (DC): American Psychiatric Association” which offers a standardized method for categorizing mental disorders. This manual is based on the opinions of physicians, researchers, list of psychiatric drugs, insurance companies, and pharmaceutical industries and has been developed in a joint effort by ICD and WHO. The second important publication is published by Kessler *et al.* (Kessler RC, McGonagle KA, Zhao S, Nelson CB, Hughes M, Eshleman S, *et al.* Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders

in the United States. Results from the national comorbidity survey. *Arch Gen Psychiatry* 1994;51:8-19.). This study presents estimations on lifetime and prevalence of 12 DSM-III-R psychological disorders in the USA using structured interviews and survey method. The book by Marsek and Hagerti titled “Reducing for preventive intervention research: Frontiers for preventive intervention research” is the third important publication of this year which was published by committee of psychological disorder prevention in the department of psychological disorders and behavioral sciences. This publication mentioned the financial burden of psychological disorders for people and society and concluded that prevention of psychological disorders is more logical than their treatment. However, prevention of psychological disorders has a lower priority in society compared to the prevention of physiological disease which had led to numerous attempts to fill this gap. A committee of experts in child and adult

psychiatry, child psychology, epidemiology, sociology, anthropology, and public advocacy cooperated for creating this publication. The goal of this publication was to coordinate the knowledge of public and private sectors for the prevention of psychological disorders.

The fifth peak happened in the year 1999. In this year, Spitzer *et al.* published “Validation and utility of a self-report version of PRIME-MD”. This scale is used as a screening tool for mental disorders, and its use was limited to its clinical usefulness. The Patient Health Questionnaire (PHQ) is used for diagnosis of psychological disorders in primary care and is comparable to PRIME-MD questionnaire. The second important publication is on “Structural equation modeling and cutoff criteria” published by Hu and Bentler. This article investigates the quality of cutoff criteria and proposes several alternatives for model fitness assessment.

The sixth peak is in the year 2000. The book titled “Diagnostic and statistical of manual disorder” by the American Psychiatric Association was the most important publication of this year. The content of this book is about statistical analyses which are the basis of analyses by many psychology researchers in their studies. The second influential publication is the study by Teasdale *et al.* titled “Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy”. They believe that teaching mindfulness can reduce the attention of mind toward repetitive pattern and reduces ruminations which is the thought pattern of patients with depression. Mindfulness-based cognitive therapy (MBCT) proposes an effective psychological approach for the prevention of relapse and recurrence in recently treated depression patients.

### Peaks in 21<sup>st</sup> century

#### Part one: Period of 2001–2016

Figure 3 shows frequency distribution of references cited in records in the area of depression prevention in the period of 2001–2016. According to these results, the area of depression prevention has witnessed five major peaks in years 2001, 2002, 2003, 2004, and 2005 [Figure 3 and Table 3]. The gap between the occurred peaks in this period is small compared to previous periods. This is due to the fact that not many years have passed since the publication of these articles. Given the increased attention to depression disorder in recent years, important publications in these years are investigated.

The year 2001 witnessed two influential publications. The first article is about evaluation of PHQ-9 scale for measuring depression. Kroenke *et al.* state that for treatment decisions, measuring the severity of depression is just as important as diagnosis of depression. This questionnaire is a self-management version of PRIME-MD questionnaire for common psychological disorders which has become a useful tool for research and clinical studies. The second

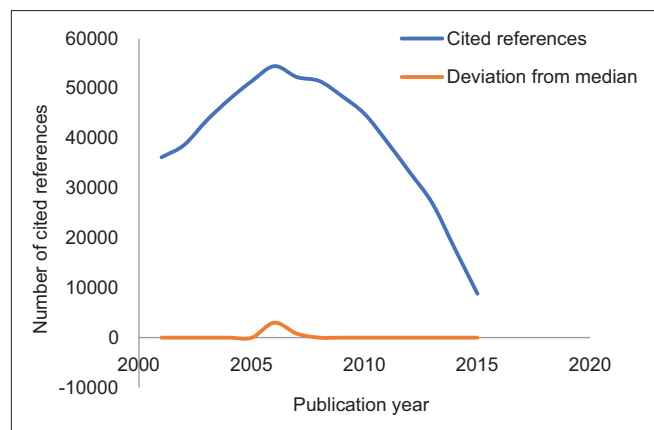


Figure 3: Results of reference publication year spectroscopy analysis in the realm of prevention of depression (period 2001–2015)

influential article of this year is belonged to Clarke *et al.* who have investigated the effects of depression in parents on their teenagers with the purpose of depression prevention. They state that a short and brief group-based cognitive therapy can greatly reduce the chances of depression in teenagers of parents with a background of depression.

The peak in the year 2002 begins with the book by Segal *et al.* entitled “Mindfulness-based cognitive therapy for depression: A new approach to preventing relapse” which was referenced 224 times. This publication is about challenges of depression and its prevention using mental activities. This book proposes an 8-session MBCT program. The second publication belongs to Bjelland *et al.* which is a review article investigating studies using HADS. Their findings showed that HADS has a good performance in assessing the severity of depression and anxiety disorders in primary care and psychological care in general population.

The peak in the year 2003 is due to the publication by Kessler *et al.* which investigates major depression disorder using an epidemiology approach. The second important publication of this year is the study by Caspi *et al.* which is a longitudinal futuristic study which investigates why stressful experiences lead to depression in some people while others are unaffected. According to their results, a functional polymorphism in the promoter region of the serotonin transporter (5-HTT) gene was found to moderate the influence of stressful life events on depression.

The peak in the year 2004 is due to the publication by Teasdale and Ma which has been cited 226 times and investigates “MBCT” in recently treated depression patients. Their results show that MBCT is an effective and suitable method for preventing the relapse of depression in treated patients.

The peak in the year 2005 is again due to work of Kessler *et al.* which states that there is limited information on lifetime prevalence and age-of-onset distributions of

**Table 3: Historical mutations in realm of prevention of depression with the most cited works between 2001 and 2015**

Type of Document	Number of references per document (%)	Most referred work	Total References	Intervals
Article	404 (1.12)	Kroenke K, Spitzer RL, Williams JB. The PHQ-9. <i>J Gen Intern Med</i> 2001;16:606-13.	36,161	2001
Article	148 (0.41)	Clarke GN, Hornbrook M, Lynch F, Polen M, Gale J, Beardslee W, <i>et al.</i> A randomized trial of a group cognitive intervention for preventing depression in adolescent offspring of depressed parents. <i>Arch Gen Psychiatry</i> 2001;58:1127-34.		
Book	224 (0.58)	Segal ZV, Williams JM, Teasdale JD. <i>Mindfulness-Based Cognitive Therapy for Depression: A New Approach to Preventing Relapse</i> . New York: Guilford; 2002.	38,624	2002
Article	170 (0.44)	Bjelland I, Dahl AA, Haug TT, Neckelmann D. The validity of the hospital anxiety and depression scale. An updated literature review. <i>J Psychosom Res</i> 2002;52:69-77.		
Article	246 (0.56)	Kessler RC, Berglund P, Demler O, Jin R, Koretz D, Merikangas KR, <i>et al.</i> The epidemiology of major depressive disorder: Results from the National Comorbidity Survey Replication (NCS-R). <i>JAMA</i> 2003;289:3095-105.	43,544	2003
Article	201 (0.46)	Caspi A, Sugden K, Moffitt TE, Taylor A, Craig IW, Harrington H, <i>et al.</i> Influence of life stress on depression: Moderation by a polymorphism in the 5-HTT gene. <i>Science</i> 2003;301:386-9.		
Article	226 (0.47)	Ma SH, Teasdale JD. Mindfulness-based cognitive therapy for depression: Replication and exploration of differential relapse prevention effects. <i>J Consult Clin Psychol</i> 2004;72:31-40.	47,769	2004
Article	313 (0.61)	Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. <i>Arch Gen Psychiatry</i> 2005;62:593-602.	51,425	2005
Article	248 (0.48)	Mann JJ, Apter A, Bertolote J, Beautrais A, Currier D, Haas A, <i>et al.</i> Suicide prevention strategies: A systematic review. <i>JAMA</i> 2005;294:2064-74.		
Article	193 (0.38)	Kessler RC, Chiu WT, Demler O, Walters EE. Prevalence, severity, and comorbidity of twelve-month DSM-IV disorders in the national comorbidity survey replication (NCS-R). <i>Arch Gen Psychiatry</i> 2005;62:617-27.		

DSM-IV disorders. Therefore, they decided to carry out a national survey. Another important publication in this year is by Mann *et al.* which uses systematic review to investigate methods of suicide prevention. Training physicians to spot depression, limited access to lethal instruments, general education, screening programs, and media programs are among methods used for suicide prevention. Another influential publication in this year is another study by Kessler *et al.* titled "Prevalence, Severity, and Comorbidity of Twelve-month DSM-IV Disorders in the National Comorbidity Survey Replication (NCS-R)". They state that the reason for selecting this topic is lack of suitable information in previous publications.

## Discussion

Depression is the most common mental disorder that happens in all societies and age groups. Identifying influential and determining the historical background of research on depression prevention can help guide future studies and investments. Studies regarding depression prevention can be analyzed based on several different

aspects. The first aspect is the fundamental and basic concepts and theories, categorization of mental disorders, and determination of the symptoms of mental disorders with emphasis on depression investigated in the studies. Discussions about proper terminology are also investigated in this category. Another aspect is the approach used by researchers to investigate depression. Studies have used physiological, epidemiological, biological and genetic, physical, environmental, and other approaches to investigate depression. Another important aspect is design and implementation of different scales for measuring depression over time. Researchers attempted to create suitable scales for each age group. Another aspect is the emphasis and attention to correlation between depression and other factors such as stress, pressures of life, suicide, depression in parents, and other similar factors. In this regard, creating various scales for measuring depression and its severity and determining the effect of depression in parents on their teenage children with the goal of depression prevention is another important aspect. Statistical aspects and related topics have also been one of the topics with

high citations which is due to large number of statistical tests used to determine factors affecting depression.

## Conclusions

Researchers have examined depression prevention with physiological, epidemiological, biological as well as physical aspects. In addition, constructed criteria for measuring depression in various target societies have played an important and vital role in depression prevention.

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## Conflicts of interest

There are no conflicts of interest.

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