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Moderate alcohol consumption and depression prevention: A critical review

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ABSTRACT

Background. There is a clear consensus that alcohol use disorders are associated with poorer outcomes concerning depression, and that drinking alcohol shouldn`t be recommended because of the risk of dependence. Until recently, literature focused almost exclusively on patients with alcohol use disorders and excludes patients with moderate alcohol use (MAU). It's has been shown that MAU can prevent or improve the evolution of chronic diseases such as cardiovascular diseases, but several researchers have suggested that there is no safe level of alcohol drinking due to other effects on health. Nevertheless, there is some evidence regarding the antidepressant effect of moderate alcohol consumption. This critical review aims to sum up the direction and tendency of current research on the effect of MAU on depression and relate the causal or confounders factors that might explain the results.

Methods. A research was carried out through PubMed with the following keywords and Boolean operators: *("light alcohol" OR "light drinking" OR "moderate alcohol" OR "moderate drinking" OR "low risk drinking" OR "low risk alcohol") AND (depress*) NOT (dependence OR abuse).*

Results. Most of the 23 studies selected aim to investigate longitudinal effects. MAU prevents depressive symptoms in most studies, but it is still unclear to what extent this can be alternatively explained by neurochemical factors or other confounding factors (health status, sociability, other related lifestyle factors, etc.).

Conclusion. There is currently no clear and consistent scientific evidence to support moderate alcohol consumption per se as a protective factor against depression.

Key words. Depressive Disorders; Alcohol induced Disorders; Preventive Medicine; Lifestyle.

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CONSUMO MODERADO DE ALCOHOL Y PREVENCIÓN DE LA DEPRESIÓN. UNA REVISIÓN CRÍTICA

RESUMEN

Introducción. Hay un claro consenso en torno a que los trastornos por uso de alcohol se asocian con una mayor incidencia y peor pronóstico de depresión, además de otros problemas médicos. Sin embargo, se está planteando que el consumo de alcohol moderado previene y mejora la evolución de algunas enfermedades crónicas, especialmente cardiovasculares. No obstante, otros investigadores sugieren que no hay un consumo seguro de alcohol debido a sus efectos globales sobre la salud (aumento del riesgo de cáncer, por ejemplo). En relación a la depresión, también hay evidencia dispar sobre el posible efecto antidepresivo del consumo moderado de alcohol. Esta revisión crítica intenta resumir dicha evidencia, así como analizar la posible influencia relativa de factores involucrados.

Metodología. Se realizó una búsqueda a través de PubMed con las siguientes palabras claves y operadores booleanos: *("light alcohol" OR "light drinking" OR "moderate alcohol" OR "moderate drinking" OR "low risk drinking" OR "low risk alcohol") AND (depress*) NOT (dependence OR abuse).*

Resultados. La mayoría de los 24 estudios seleccionados fueron longitudinales. El consumo moderado de alcohol se asocia a menor sintomatología depresiva en la mayoría de los estudios. Sin embargo, estos estudios no descartan que esta

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asociación pueda explicarse alternativamente por importantes factores de confusión no causales (estado de salud, comportamiento prosocial, otros factores de estilo de vida relacionados, etc.). **Conclusiones.** No hay evidencia científica clara y consistente actual que respalde el consumo moderado de alcohol per se como factor protector frente a la depresión.

Palabras clave. *Trastornos Depresivos, Trastornos inducidos por Alcohol, Medicina Preventiva, Estilo de vida.*

INTRODUCTION

Until recently, the medical literature on depression dealt almost exclusively with alcohol use disorders, excluding moderate drinking from the study[1]. Moderate alcohol use can be assimilated to low-risk drinking according to the "Alcohol Use Disorders Identification Test (AUDIT)" scale[2,3]. In addition, intake not exceeding 60 g per day in men and 40 g in women is also considered as moderate or low-risk alcohol use, according to the World Health Organisation (WHO)[4].

Few health issues are as capable of generating controversy as the possible preventive effect of alcohol on health[3,5–12]. Theoretically, alcohol should be considered a hazard to health due to the risk of dependence it entails, as well as the high rates of disease and mortality associated with highly prevalent abusive consumption[13–16]. However, the most frequent alcohol intake pattern is of moderate consumption, and is maintained by more than half of the adult population[17]. The physical and psychological effects of this, especially in the case of wine, are an area of particular interest that is increasingly under investigation[3,18].

Studies of the physical implications of alcohol consumption point to a J-shaped curve in the relationship between the amount of alcohol consumed and its protective effects on cardiovascular health, where moderate consumption protects more than abstinence; however, as consumption increases, the risk increases still more[19,20]. The results are more controversial regarding other health aspects, since it has been suggested that it may be protective for some diseases and a risk factor for others[3,4,15,16,18].

In the field of mental health, there is an undoubted direct association between abusive or high-risk alcohol consumption patterns and depression[2,3,21–23]. However, when the effect of the moderate or low-risk consumption pattern began to be investigated, the results were controversial and contradictory[17,24–26]. It is therefore necessary to be acquainted with the study results as well as the factors clarifying these contradictory findings.

Depression is associated with a heavy burden in terms of suffering and disability, so identifying any factor that may influence it is crucial to advancing the understanding of its complex etiopathogenesis[27,28]. It has already been noted that moderate alcohol consumption is very common in today's society[23,29], as is the risk of alcohol dependence and that low-risk amounts can easily increase to dangerous levels[13]. Therefore, prudently and carefully drawing conclusions from the current empirical evidence of the possible preventive effect of moderate alcohol consumption on depression is very important. This is precisely what this critical review intends to do.

More specifically, the following research questions were proposed:

1. What has been discovered in the past decade about the effect of moderate alcohol consumption on the prevalence of depressive syndromes?

2. What causal or confounding factors may influence this association, and which ones should receive the most attention in future research?

METHODOLOGY

A critical and non-systematic review was carried out in accordance with the PRISMA[30] classification proposals.

Selection criteria

This critical review is aimed at identifying peer-reviewed articles in English language journals that link the effects of moderate alcohol consumption with depression in adult samples. Detailed inclusion and exclusion criteria are listed in Table 1.

Search strategy

A pilot test was carried out with Google Scholar, with keywords for the articles decided by the research team.

The following areas were selected:

1) Alcohol Consumption (alcohol consumption, alcohol intake, alcoholic beverage): light intake, moderate intake, low-risk intake.

2) Depression: depressive symptoms, Major Depression, prevalence of depression, onset of depression, affective disorder, depressed mood.

The PICO method was used to reframe the research question more precisely and to identify the most appropriate search strategy. Thus, the question was formulated in more detail to establish the search strategy:

In representative samples of adults (with or without depression) (P), can moderate alcohol consumption, defined as regular consumption of moderate amounts of alcohol (I), reduce the prevalence of Major Depression or depressive symptoms (O) compared with persons abstaining from alcohol or heavy drinkers of it (C)?

A search was carried out in PubMed with filters activated to focus on full-text articles published since 2009. The following keywords and Boolean operators were used: ("light alcohol" OR "light drinking" OR "moderate alcohol" OR "moderate drinking" OR "low risk drinking" OR "low risk alcohol") AND (depress *) NOT (dependency OR abuse). This resulted in 111 articles being obtained.

Review strategy

The 111 PubMed search results were included in a selection based on the title and the summary of the inclusion and exclusion criteria listed in Table 1. Two additional reviewers participated to improve objectivity and validity. The reviewers then discussed their selection differences until agreement was reached. The articles included were loaded onto the Citavi 6 program for data management. The full text of the selected articles was reviewed in a second phase. Again, articles that did not meet the criteria in Table 1 were discarded. Figure 1 shows a flow diagram of the changes in the number of articles during the review process.

RESULTS

A summary of the included articles, their sample sizes and a very brief summary of the most important results related to the research questions are shown in Table 2 at the end of the review.

There were 10 cross-sectional and 13 longitudinal or mixed studies analysed. The most notable finding from a joint evaluation of all these articles was that the majority (17/23) found an association between moderate alcohol consumption and a reduction in depressive symptoms. However, only 4 of them (Fukunaga, Paulson, Pavlidou, Noh) point to the alcohol intake itself as the most likely explanation for this association, due to its antioxidant and anti-inflammatory properties. Most studies suggest there are difficulties in attributing causality, as they recognized they were not able to sufficiently control for potentially important variables involved. Nevertheless, it was proposed that current and previous good health favoured moderate alcohol consumption and a reduction in depressive symptoms (Yang, Calhoun, Fuehrlein, García-Esquinas, Nelson, Sánchez-Villegas). Other studies (Buttery, Velteu, Harrington) indicated that moderate alcohol consumption was associated with other lifestyle-related factors known to prevent depression (e.g. healthy diet and physical activity). Finally, other authors point to a sociable personality as the factor that links moderate alcohol consumption with the lower risk of depression (Gemes, Scott, Aihara).
Almost all the studies point out the methodological complexity of this type of research and its inadequacy.

DISCUSSION

There were 23 studies found that assessed the relationship between moderate alcohol use and depression. Most were longitudinal studies of elderly adult samples. The effects of moderate alcohol use were examined as either the main independent variable or one factor among other lifestyle-related behaviours in comparing the effect of various alcoholic intake patterns on depression.

Alcohol consumption as part of a healthy lifestyle

Several studies examined alcohol use in the context of lifestyle effects on depression[26,31–36]. In this line of research, moderate alcohol consumption was usually considered as healthy behaviour associated with the Mediterranean diet[36]. It was also suggested that it could prevent depression[31,32,34]. However, the results were controversial, as sometimes the preventive effects for depression were also obtained with abstinence[32]. Another recent longitudinal study that followed a sample of 15,000 participants for 15 years found a non-statistical trend in the reverse direction: moderate alcohol consumption increasing the risk of depression[26].

Finally, we present the conclusions of a secondary data analysis of 1,025 patients with overweight and subdepressive symptoms. This was a European multicentre study on the effects of dietary changes and other proposals for lifestyle modifications for depression in which our group participated[37]. It was observed that moderate alcohol users had reduced depressive symptoms than non-drinkers at baseline. However, at 12 months of follow-up, there were no differences in the appearance of depressive symptoms between the two groups[38]. These data were not included in the review as they are not yet published.

Relationship between moderate alcohol consumption and depression

Studies comparing the intake of different amounts of alcohol are important for understanding its effect on depression. The typical finding of a J or U-shaped

curve between the amount of alcohol and the risk of depression, with a lower risk for moderate consumption compared to teetotallers and heavy users, was found in longitudinal[17] and cross-sectional[39] studies. However, other studies in samples of older people with an adequate methodology did not find this effect for moderate alcohol consumption in depression[41]. It was also not found in specific populations, such as war veterans[40]. This disparity in the results raises questions about possible explanations.

Adding up all the available evidence, most articles support some preventive effect for moderate alcohol consumption in depression. Only 4 articles did not find this association, as shown in Table 2. However, the question about whether there is a causal relationship between moderate alcohol consumption and the prevention of depression is not easy to establish, as there are possible methodological problems, mainly related to confounding factors that play an important role, which need to be considered.

Important methodological problems in this research area

The depressive symptoms for non-drinkers were different for two subgroups: people who had always been teetotal and ex-drinkers[41]. Within the latter, there were a significant proportion of people who had stopped drinking due to health problems (sick abstainers)[41–43]. Here, a higher risk of depression might be expected due to medical comorbidity, as shown in the bibliography[44]. In addition to the amount of alcohol, the pattern of intake seems to matter, where frequent and controlled consumption is generally less harmful than sporadic, binge drinking[26,42]. Another factor to consider is gender[31]. Some studies found beneficial effects for alcohol consumption in depression for both men and women[43], while others did so only in men[31,45] and still others only in women[46]. However, it should be taken into account that women drinkers may be underrepresented, especially in the higher consumption categories[45]. Also, the ability to metabolise alcohol is usually lower for women and therefore dangerous doses are usually lower, as recognized by the WHO[47].

The age of participants might also be an important factor; quite a few studies, especially longitudinal ones, seemed to use samples of elderly people[34,48]. This may be associated with a higher prevalence of disease and therefore the proportion of ex-drinkers who give up alcohol for health reasons, with the possible aforementioned implications (the "sick abstainers" theory). Along the same lines, some studies were carried out in samples of war veterans, who are associated with a greater vulnerability to physical and mental disorders and the consequent risk of a higher percentage of sick abstainers. Therefore, extrapolating these studies to the general population must be done with caution.

To summarise, for samples of elderly people, it is very important to consider their background in relation to alcohol consumption and even dependence on it[43]. It is also important to consider whether the sample was of people under consultation for health problems or not, as their illness or medication history will be different[36,40]. Thus, the association between moderate alcohol consumption and depression should be reviewed based on whether the participants suffer from illnesses and may need to take medication that contraindicates alcohol consumption, which may distort the results.

Causal or confounding factors

The factors that may suggest the possible preventive effect of moderate alcohol consumption in depression may be causal; based for example on the antioxidant properties of some components of alcoholic beverages, such as polyphenols, especially in the case of wine[3]. There are also other possible metabolic and neurophysiological causal factors[32]; for example, the inhibition of inflammatory mechanisms through C-reactive protein[48]. Also, the positive effect of moderate alcohol consumption on cardiovascular health can in turn lead to a decrease in depression risk[17].

However, as has been previously described, a plausible alternative explanation for the association between moderate alcohol consumption and reduced depression is that alcohol consumption is a marker that identifies people with personality traits and health states that are less predisposed to depression[26,49–53]. A protective personality trait that has been discussed[17,54] and investigated is an increase in the level of social interaction, which could explain the relationship between moderate alcohol consumption and depression[51]. In other words, moderate drinkers would have more opportunities to socialise in events where people usually drink[51], rather than avoid them, which we know by itself can reduce depression symptoms[54]. However, this relationship is not so clear and there are even contradictory findings that indicate less social support in moderate drinkers[41]. Finally, it has been suggested that people who drink alcohol in moderation have better physical health and healthier lifestyles, and may therefore be more confident about drinking alcohol[41]. Thus, physical health, sociable behaviour and lifestyle may be non-causal confounders that explain the relationship between moderate alcohol consumption and depression. Unfortunately, the best

of the available studies only partially and incompletely control for this[1,55,56]. Longitudinal studies with sufficiently large samples are needed to control for the effect of these 3 large areas already mentioned: physical health status, personality traits and the most important areas of the subjects' lifestyle (e.g. physical activity, diet, sleep, stress level and social interactions).

CONCLUSIONS

Taken as a whole, studies investigating the effects on depression of moderate alcohol users, compared with non-drinkers and heavy drinkers, conclude that moderate drinkers do experience less depression. However, there may be several confounding factors involved in this association, notable among which is the hypothesis of "sick ex-drinkers", as well as other lifestyle-linked factors. The studies available so far have not been able to sufficiently control for these potential confounders; thus, there is no evidence that moderate alcohol consumption is the cause of a lower prevalence of depression. Future studies need to be designed to clarify this issue. Meanwhile, one should avoid spreading the word that moderate alcohol consumption improves depression per se, given the increased risk of alcohol dependence and associated diseases that this can lead to.

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Conflicts of interest of the authors: None

Table 1 Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
English language	Article not written in English
Peer-reviewed journal articles	Non-peer-reviewed journal articles
Adults (18 years or older)	Children (under 18 years)
Representative sample of people with depression	Non-representative sample focused on a special subgroup (e.g. pregnancy, physical illness or mental health problems other than depression)
Depression is evaluated (depressive symptoms or prevalence of Major Depression)	Depression is not evaluated but other physical or mental health measures are.
Moderate consumption of alcohol is addressed	Moderate consumption of alcohol is not addressed, whereas dangerous use, alcohol dependence or abuse, for example, is.
The effect of moderate alcohol consumption on depression is measured	The effect of moderate alcohol consumption on depression is not measured
Articles published in the last 12 years	Articles published more than 12 years ago

Figure 1 Review strategy flow diagram

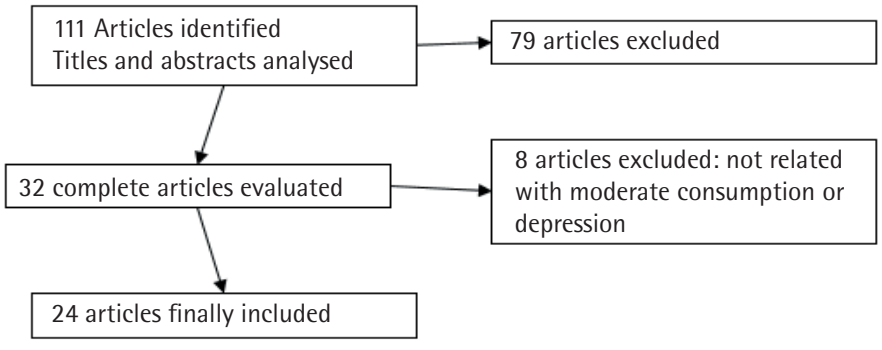

Table 2 Articles included in the analysis of the relationship between Moderate Alcohol Consumption (MAU) and depression.

Authors Journal year and quartile	Study type Follow-up period, if applicable.	Sample no Sample type Countries	Main variable and Diagnosis Most important results.	Main suggestions
Liang et al., 2021	Longitudinal 14 years	N = 278,782. Community US, UK and China.	Main variable: CES-D score. MAU was associated with reduced depression.	The effects of personality, lifestyle and health status were not controlled.
Yang et al., 2021	Cross-sectional	N = 216,771. Community South Korea	Main variable: PHQ-9 score. MAU associated with reduced depression, but with differences between the sexes. Women had detrimental effects with lower doses of alcohol.	In both men and women, only non-drinkers who were ex-drinkers had increased depression.
Li et al., 2020	Longitudinal Studies Review 1-40 years	N= 338,426 Community 42 countries. Studies published 1966-2019.	Main variable: Different depression scales MAU, compared with abstinence, was associated with a lower risk of depression.	The association usually found between MAU and lower depressive symptoms was most likely explained by confounding factors, rather than by the biological effects of alcohol.
Fukunaga et al. 2019	Longitudinal 3 years	N = 917. Community Japan	Main variable: CES-D total score MAU and abstinence were associated with a significantly lower risk of depression.	Possible proposed explanation for the results is based on metabolic and neurophysiological changes.
Gémes et al. 2019	Longitudinal 10 years	N = 5087. Community Sweden	Main variable: Major Depression Inventory. J-shaped association; non-drinkers and heavy drinkers had a higher risk of depression than the MAU group.	Drinking alcohol can help socially, which may be the factor that lowers the risk of depression.
Ruiz-Estigarribia et al. 2019	Longitudinal 17 years	N = 14,908 Community Spain	Main variable: items from Structured Clinical Interview for DSM-IV. MAU did not have a statistically significant effect on the risk of depression.	Personal alcohol consumption pattern is important.
Calhoun et al. 2018	Cross-sectional	N = 1,083 War Veterans USA	Main variable: PHQ-2. U-shaped curve, more depressive symptoms in non-drinkers and abusive drinkers than in MAU.	The reason for being a teetotaller may be poor health (sick teetotallers).
Fuehrlein et al. 2018	Longitudinal 4 years	N = 3,157 War Veterans USA	Main variable: Major Depression diagnosis using the MINI scale. Lower prevalence of Major Depression in MAU.	Better health may give you more confidence to drink alcohol in moderation.
García-Esquinas et al. 2018	Longitudinal 5 years	N = 5,299 Community, Elderly Spain	Major Depression diagnosis using GDS-10 and CES-D. No protective effects for MAU in depression.	Non-drinkers may have stopped drinking alcohol due to illness.
Nelson et al. 2018	Longitudinal 10 years	N = 9,704. Community, Women ≥ 65 years USA	Main variable: Geriatric Depression Scale. Subjects who had stopped drinking alcohol had higher levels of depression than the MAU group.	The association may be due to differential characteristics of the sample (sick abstainers), rather than to a biological mechanism.
Paulson et al. 2018	Longitudinal 8 years	N = 3,177 Community, Elderly USA	Main variable total CES-D score. MAU was associated with reduced depressive symptoms.	The relationship was partially explained by C-reactive protein (CRP), which suggests an anti-inflammatory mechanism.
Pavlidou et al. 2018	Review, longitudinal and cross-sectional	10 studies published 2013-2018. Various countries	Main variable: Different depression scales. MAU, especially of wine, was associated with a lower risk of depression.	The antioxidant components of wine (polyphenols) may be important.

Table 2 cont. Artículos incluidos en el análisis de la relación entre Consumo Moderado de Alcohol (CMA) y depresión.

Scott et al. 2018	Longitudinal and cross-sectional 2 years	N = 2,294 Community, Elderly USA	Main variable total CES-D score. MAU was associated with reduced depressive symptoms, but this might be explained by social interaction.	MAU may prevent depression symptoms due to associated greater social interaction.
Wilson et al. 2018	Cross-sectional	N = 3,003. War veterans. USA	Main variable: total score in BDI-II, 21 items. Compared with MAU, heavy drinkers and non-drinkers with a history of alcohol use disorder had greater depressive symptoms.	Alcohol consumption history very important. Psychiatric problems may be greater in ex-drinkers than lifetime teetotallers.
Bellos et al. 2016	Longitudinal, 1 year	N = 3,201 Primary care patients 14 countries	CIDI scale used for depression diagnosis. MAU had a lower risk of onset of depression after 1 year.	Results were independent of chronic diseases and demographic variables.
Maher et al 2016	Cross-sectional	N = 2,047 Community, Elderly Ireland	Main variable: CES-D. Variables related to a healthy lifestyle reduce the risk of depression, with MAU being one of these variables.	No independent relationship was found between MAU and depression.
Buttery et al. 2015	Cross-sectional	N = 21,940 women, N = 17.,061 men Community Germany	Depression was diagnosed by asking participants if they had been diagnosed by a professional in the last 12 months. In men, MAU was associated with self-diagnosis of depression. In women, the combination of healthy lifestyle behaviours was associated with diagnosis of depression.	There are numerous aspects of an unhealthy lifestyle that can contribute to depressive symptoms.
Noh et al. 2014	Cross-sectional	N=10,181 Community, > 45 years' old South Korea	Main variable: CES-D. MAU was more frequent in men (55.8% vs. 18.0%), who were less likely to have depressive episodes than non-drinkers.	Alcohol can relieve stress and anxiety, as well as improve mood.
Velten et al. 2014	Cross-sectional	N = 7,937 18 -99 years. Germany	Main variable: Depression Anxiety Stress Scales – 21 (DASS-21). Better mental health (including fewer depressive symptoms) for MAU relative to non-drinkers or heavy drinkers.	Numerous lifestyle factors may be involved in this association.
Gea et al. 2012	Longitudinal 10 years	N = 13.619 Community, University students Spain	Depression was diagnosed by asking participants if they had been diagnosed by a doctor or were taking antidepressants. Women with MAU had a lower risk of depression, with a J-shaped curve. No such association was found in men.	Maybe gender differences are important.
Aihara et al. 2011	Cross-sectional	N = 957 Community, Elderly Japan	Main variable: Geriatric Depression Scale. MAU was associated with less depression in women.	The increase in sociability associated with MAU may be a mediating factor.
Harrington et al. 2010	Cross-sectional	N = 10,364. Community Ireland	The CIDI scale was used to diagnose depression. MAU, as a component of a healthy lifestyle, was associated with fewer depressive symptoms.	Many combined variables related to lifestyle may be involved in the association of MAU and less depressive symptoms.
Sánchez-Villegas et al. 2009	Longitudinal 4.4 years (average)	N = 10,094 Community Spain	Depression was diagnosed by asking participants if they had been diagnosed by a doctor or were taking antidepressants. No clear influence of MAU on depression was observed.	Perhaps medical history is a major confounder.

BIBLIOGRAPHY

1. Li J, Wang H, Li M, Shen Q, Li X, Zhang Y, et al. Effect of alcohol use disorders and alcohol intake on the risk of subsequent depressive symptoms: a systematic review and meta-analysis of cohort studies. Addiction. 2020 Jul;115(7):1224–43.
2. Sullivan LE, Fiellin DA, O'Connor PG. The prevalence and impact of alcohol problems in major depression: A systematic review. Am J Med [Internet]. 2005 Apr;118(4):330–41. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0002934305000082
3. Pavlidou E, Mantzorou M, Fasoulas A, Tryfonos C, Petridis D, Giaginis C. Wine: An Aspiring Agent in Promoting Longevity and Preventing Chronic Diseases. Diseases [Internet]. 2018 Aug 8;6(3):73. Available from: http://www.mdpi.com/2079-9721/6/3/73
4. Niemelä O, Nivukoski U, Bloigu A, Bloigu R, Aalto M, Laatikainen T. Laboratory test based assessment of WHO alcohol risk drinking levels. Scand J Clin Lab Invest [Internet]. 2019 Feb 17;79(1–2):58–64. Available from: https://doi.org/10.1080/00365513.2019.1571625
5. Conner KR, Pinquart M, Gamble SA. Meta-analysis of depression and substance use among individuals with alcohol use disorders. J Subst Abuse Treat [Internet]. 2009 Sep;37(2):127–37. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0740547208002201
6. Sullivan PF, Neale MC, Kendler KS. Genetic Epidemiology of Major Depression: Review and Meta-Analysis. Am J Psychiatry [Internet]. 2000 Oct;157(10):1552–62. Available from: http://psychiatryonline.org/doi/abs/10.1176/appi.ajp.157.10.1552
7. Sadhu JS, Novak E, Mukamal KJ, Kizer JR, Psaty BM, Stein PK, et al. Association of Alcohol Consumption After Development of Heart Failure With Survival Among Older Adults in the Cardiovascular Health Study. JAMA Netw Open [Internet]. 2018 Dec 28;1(8):e186383. Available from: http://jamanetworkopen.jamanetwork.com/article.aspx?doi=10.1001/jamanetworkopen.2018.6383
8. Tresserra-Rimbau A, Medina-Remón A, Lamuela-Raventós RM, Bulló M, Salas-Salvadó J, Corella D, et al. Moderate red wine consumption is associated with a lower prevalence of the metabolic syndrome in the PREDIMED population. Br J Nutr [Internet]. 2015 Apr 7;113(S2):S121–30. Available from: https://www.cambridge.org/core/product/identifier/S0007114514003262/type/journal_article
9. Degenhardt L, Charlson F, Ferrari A, Santomauro D, Erskine H, Mantilla-Herrara A, et al. The global burden of disease attributable to alcohol and drug use in 195 countries and territories, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. The Lancet Psychiatry [Internet]. 2018 Dec;5(12):987–1012. Available from: https://linkinghub.elsevier.com/retrieve/pii/S2215036618303377
10. Serra-Majem L, Aranceta J. [Reply: Alcohol consumption recommendations in the dietary guidelines for the Spanish population. A very ambiguous message]. Nutr Hosp. 2017;34(4):1006–8.
11. Galán I, Aragonés N, Villalbí JR. [Reply: The recommendation for alcohol consumption in the "Dietary Guidelines for the Spanish Population". Message too ambiguous]. Nutr Hosp [Internet]. 2017 Jul 28;34(4):1004–5. Available from: http://revista.nutricionhospitalaria.net/index.php/nh/article/view/1227
12. Redondo N, Nova E, Díaz-Prieto LE, Marcos A. Effects of moderate beer consumption on health. Nutr Hosp. 2018;35(extra 6):41–4.
13. Perez-Vizcaino F, Fraga CG. Research trends in flavonoids and health. Arch Biochem Biophys [Internet]. 2018 May;646:107–12. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0003986118301474
14. Traversy G, Chaput J-P. Alcohol Consumption and Obesity: An Update. Curr Obes Rep [Internet]. 2015 Mar 8;4(1):122–30. Available from: http://link.springer.com/10.1007/s13679-014-0129-4
15. Imaz-Roncero C, Redondo-Martín S, de la Puente-Martín MP. Initial results of the preventive Ícaro- Alcohol Programme. Actas Esp Psiquiatr. 2020 Mar;48(2):54–63.
16. González E, Arias F, Szerman N, Vega P, Mesias B, Basurte I. Coexistence between personality disorders and substance use disorder. Madrid study about prevalence of dual pathology. Actas Esp Psiquiatr. 2019 Nov;47(6):218–28.
17. Gémes K, Forsell Y, Janszky I, László KD, Lundin A, Ponce De Leon A, et al. Moderate alcohol consumption and depression – a longitudinal population-based study in Sweden. Acta Psychiatr Scand [Internet]. 2019 Jun 6;139(6):526–35. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1111/acps.13034
18. Zorraquín-Peña I, Esteban-Fernández A, González de Llano D, Bartolomé B, Moreno-Arribas M. Wine-Derived Phenolic Metabolites in the Digestive and Brain Function. Beverages [Internet]. 2019 Jan 11;5(1):7. Available from: http://www.mdpi.com/2306-5710/5/1/7
19. de Gaetano G, Costanzo S, Di Castelnuovo A, Badimon L, Bejko D, Alkerwi A, et al. Effects of moderate beer consumption on health and disease: A consensus document. Nutr Metab Cardiovasc Dis [Internet]. 2016 Jun;26(6):443–67. Available from: http://dx.doi.org/10.1016/j.numecd.2016.03.007
20. O'Keefe JH, Bybee KA, Lavie CJ. Alcohol and Cardiovascular Health. J Am Coll Cardiol [Internet]. 2007 Sep;50(11):1009–14. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0735109707020074
21. Boden JM, Fergusson DM. Alcohol and depression. Addiction [Internet]. 2011 May;106(5):906–14. Available from: http://doi.wiley.com/10.1111/j.1360-0443.2010.03351.x
22. Fergusson DM, Boden JM, Horwood LJ. Tests of Causal Links Between Alcohol Abuse or Dependence and Major

Depression. Arch Gen Psychiatry [Internet]. 2009 Mar 1;66(3):260. Available from: http://archpsyc.jamanetwork.com/article.aspx?doi=10.1001/archgenpsychiatry.2008.543
23. Polimanti R, Peterson RE, Ong J-S, MacGregor S, Edwards AC, Clarke T-K, et al. Evidence of causal effect of major depression on alcohol dependence: findings from the psychiatric genomics consortium. Psychol Med [Internet]. 2019 May 1;49(07):1218–26. Available from: https://www.cambridge.org/core/product/identifier/S0033291719000667/type/journal_article
24. Gea A, Beunza JJ, Estruch R, Sánchez-Villegas A, Salas-Salvadó J, Buil-Cosiales P, et al. Alcohol intake, wine consumption and the development of depression: the PREDIMED study. BMC Med [Internet]. 2013;11:192. Available from: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3765610&tool=pmcentrez&rendertype=abstract
25. Godos J, Castellano S, Ray S, Grosso G, Galvano F. Dietary Polyphenol Intake and Depression: Results from the Mediterranean Healthy Eating, Lifestyle and Aging (MEAL) Study. Molecules [Internet]. 2018 Apr 24;23(5):999. Available from: http://www.mdpi.com/1420-3049/23/5/999
26. Ruiz-Estigarribia L, Martínez-González MÁ, Díaz-Gutiérrez J, Sánchez-Villegas A, Lahortiga-Ramos F, Bes-Rastrollo M. Lifestyles and the risk of depression in the "Seguimiento Universidad de Navarra" cohort. Eur Psychiatry [Internet]. 2019 Sep;61(July):33–40. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0924933819301002
27. Garcia-Toro M, Rubio JM, Gili M, Roca M, Jin CJ, Liu S-M, et al. Persistence of chronic major depression: A national prospective study. J Affect Disord [Internet]. 2013 Oct;151(1):306–12. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0165032713004916
28. Mojtabai R, Olfson M, Han B. National Trends in the Prevalence and Treatment of Depression in Adolescents and Young Adults. Pediatrics [Internet]. 2016 Dec 1;138(6):e20161878–e20161878. Available from: http://pediatrics.aappublications.org/cgi/doi/10.1542/peds.2016-1878
29. Velten J, Lavallee KL, Scholten S, Meyer AH, Zhang X-C, Schneider S, et al. Lifestyle choices and mental health: a representative population survey. BMC Psychol [Internet]. 2014 Dec 23;2(1):58. Available from: http://bmcpsychology.biomedcentral.com/articles/10.1186/s40359-014-0055-y
30. Moher D, Liberati A, Tetzlaff J, Altman DG. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. J Clin Epidemiol [Internet]. 2009 Oct;62(10):1006–12. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0895435609001796
31. Buttery AK, Mensink GBM, Busch MA. Healthy be-haviours and mental health: findings from the German Health Update (GEDA). Eur J Public Health [Internet]. 2015 Apr;25(2):219–25. Available from: https://academ-ic.oup.com/eurpub/article-lookup/doi/10.1093/eurpub/cku094
32. Fukunaga A, Inoue Y, Kochi T, Hu H, Eguchi M, Kuwa-hara K, et al. Prospective Study on the Association Be-tween Adherence to Healthy Lifestyles and Depressive Symptoms Among Japanese Employees: The Furukawa Nutrition and Health Study. J Epidemiol [Internet]. 2019; Available from: https://www.jstage.jst.go.jp/article/jea/advpub/0/advpub_JE20190018/_article
33. Harrington J, Perry IJ, Lutomski J, Fitzgerald AP, Shiely F, McGee H, et al. Living longer and feeling better: healthy lifestyle, self-rated health, obesity and depression in Ireland. Eur J Public Health [Internet]. 2010 Feb 1;20(1):91–5. Available from: https://academic.oup.com/eurpub/article-lookup/doi/10.1093/eurpub/ckp102
34. Maher GM, Perry CP, Perry IJ, Harrington JM. Protective lifestyle behaviours and depression in middle-aged Irish men and women: a secondary analysis. Public Health Nutr [Internet]. 2016 Nov 16;19(16):2999–3006. Available from: https://www.cambridge.org/core/product/identifier/S1368980016001105/type/journal_article
35. Patel S, Ram F, Patel SK, Kumar K. Association of behavioral risk factors with self-reported and symptom or measured chronic diseases among adult population (18–69 years) in India: evidence from SAGE study. BMC Public Health [Internet]. 2019 Dec 14;19(1):560. Available from: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-019-6953-4
36. Sánchez-Villegas A, Delgado-Rodríguez M, Alonso A, Schlatter J, Lahortiga F, Majem LS, et al. Association of the Mediterranean Dietary Pattern With the Inci-dence of Depression. Arch Gen Psychiatry [Internet]. 2009;66(10):1090. Available from: http://archpsyc.jamanetwork.com/article.aspx?doi=10.1001/archgenpsychiatry.2009.129
37. Bot M, Brouwer IA, Roca M, Kohls E, Penninx BWJH, Watkins E, et al. Effect of Multinutrient Supplemen-tation and Food-Related Behavioral Activation Thera-py on Prevention of Major Depressive Disorder Among Overweight or Obese Adults With Subsyndromal Depres-sive Symptoms: The MooDFOOD Randomized Clinical Trial. JAMA. 2019 Mar;321(9):858–68.
38. Fuster M. Relación entre consumo de bajo riesgo de alcohol y sintomatología depresiva en personas con sobrepeso y Depresión subclínica. Universidad de las Islas Baleares; 2020.
39. Calhoun PS, Wilson SM, Dedert EA, Cunningham KC, Burroughs TK, Hicks TA, et al. The association of alcohol consumption patterns with self-rated physical health and psychiatric distress among Afghanistan- and Iraq-era U.S. veterans. Psychiatry Res [Internet]. 2018 Jan;259:142–7. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0165178117301531

40. Fuehrlein BS, Kachadourian LK, DeVylder EK, Trevisan LA, Potenza MN, Krystal JH, et al. Trajectories of alcohol consumption in U.S. military veterans: Results from the National Health and Resilience in Veterans Study. Am J Addict [Internet]. 2018 Aug;27(5):383–90. Available from: http://doi.wiley.com/10.1111/ajad.12731
41. García-Esquinas E, Ortolá R, Galán I, Soler-Vila H, Laclaustra M, Rodríguez-Artalejo F. Moderate alcohol drinking is not associated with risk of depression in older adults. Sci Rep [Internet]. 2018 Dec 31;8(1):11512. Available from: http://www.nature.com/articles/s41598-018-29985-4
42. Brennan PL, SooHoo S, Lemke S, Schutte KK. Alcohol Use Predicts 10-Year Depressive Symptom Trajectories in the Health and Retirement Study. J Aging Health [Internet]. 2016 Aug;28(5):911–32. Available from: http://journals.sagepub.com/doi/10.1177/0898264315615837
43. Wilson SM, Burroughs TK, Newins AR, Dedert EA, Medenblik AM, McDonald SD, et al. The Association Between Alcohol Consumption, Lifetime Alcohol Use Disorder, and Psychiatric Distress Among Male and Female Veterans. J Stud Alcohol Drugs [Internet]. 2018 Jul;79(4):591–600. Available from: https://www.jsad.com/doi/10.15288/jsad.2018.79.591
44. Gili M, Comas A, García-García M, Monzón S, Antoni S-B, Roca M. Comorbidity between common mental disorders and chronic somatic diseases in primary care patients. Gen Hosp Psychiatry. 2010;32(3):240–5.
45. Noh J-W, Juon H-S, Lee S, Kwon YD. Atypical Epidemiologic Finding in Association between Depression and Alcohol Use or Smoking in Korean Male: Korean Longitudinal Study of Aging. Psychiatry Investig [Internet]. 2014;11(3):272. Available from: http://psychiatryinvestigation.org/journal/view.php?doi=10.4306/pi.2014.11.3.272
46. Gea A, Martinez-Gonzalez MA, Toledo E, Sanchez-Villegas A, Bes-Rastrollo M, Nuñez-Cordoba JM, et al. A longitudinal assessment of alcohol intake and incident depression: the SUN project. BMC Public Health [Internet]. 2012 Dec 7;12(1):954. Available from: http://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-12-954
47. Yan Z, Yingjie Z, Na A, Qi Q, Wei L, Wenzheng W, et al. The Effects of Light-to-Moderate Alcohol Consumption on the Cognitive Function of Community Nondemented Male Elderly: A Cohort Study. Behav Neurol. 2021;2021:5681913.
48. Paulson D, Shah M, Herring D, Scott R, Herrera M, Brush D, et al. The relationship between moderate alcohol consumption, depressive symptomatology, and C-reactive protein: the Health and Retirement Study. Int J Geriatr Psychiatry [Internet]. 2018 Feb;33(2):316–24. Available from: http://doi.wiley.com/10.1002/gps.4746
49. Bellos S, Skapinakis P, Rai D, Zitko P, Araya R, Lewis G, et al. Longitudinal association between different levels of alcohol consumption and a new onset of depression and generalized anxiety disorder: Results from an international study in primary care. Psychiatry Res [Internet]. 2016 Sep;243:30–4. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0165178115306417
50. Nelson HD, Lui L, Ensrud K, Cummings SR, Cauley JA, Hillier TA. Associations of Smoking, Moderate Alcohol Use, and Function: A 20-Year Cohort Study of Older Women. Gerontol Geriatr Med [Internet]. 2018 Jan 22;4:233372141876612. Available from: http://journals.sagepub.com/doi/10.1177/2333721418766127
51. Scott RG, Wiener CH, Paulson D. The Benefit of Moderate Alcohol Use on Mood and Functional Ability in Later Life: Due to Beers or Frequent Cheers? Gerontologist [Internet]. 2018 Oct 24; Available from: https://academic.oup.com/gerontologist/advance-article/doi/10.1093/geront/gny129/5144392
52. Ruiz-Juan F, Isorna-Folgar M, Vaquero-Cristóbal R, Ruiz-Risueño J. Consumo de alcohol en adultos de Monterrey: Relación con actividad físico-deportiva y familia. Nutr Hosp. 2016;33(2):351–8.
53. Nakhoul L, Obeid S, Sacre H, Haddad C, Soufia M, Hallit R, et al. Attachment style and addictions (alcohol, cigarette, waterpipe and internet) among Lebanese adolescents: a national study. BMC Psychol [Internet]. 2020 Dec 16;8(1):33. Available from: https://bmcpsychology.biomedcentral.com/articles/10.1186/s40359-020-00404-6
54. Aihara Y, Minai J, Aoyama A, Shimanouchi S. Depressive Symptoms and Past Lifestyle Among Japanese Elderly People. Community Ment Health J [Internet]. 2011;47(2):186–93. Available from: http://dx.doi.org/10.1007/s10597-010-9317-1
55. Yang J-H, Choi CK, Kim H-Y, Heo Y-R, Shin M-H. Association between Alcohol Drinking Status and Depressive Symptoms in Korean Adults. Chonnam Med J. 2021 Jan;57(1):68–75.
56. Liang L, Hua R, Tang S, Li C, Xie W. Low-to-Moderate Alcohol Intake Associated with Lower Risk of Incidental Depressive Symptoms: A Pooled Analysis of Three Intercontinental Cohort Studies. J Affect Disord. 2021 May;286:49–57.