

## SYSTEMATIC REVIEW/META-ANALYSIS



# A Meta-Analysis of the Association between Leisure Participation and Depressive Symptoms among Older Adults

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## ABSTRACT

**Background.** Depression is one of the major public health concerns among older adults. Participation in preferred leisure activities has been found to be effective for reducing the symptoms of depression among this population. **Objectives.** The purpose of this study was to conduct a meta-analysis of the association between leisure participation and depression. **Methods.** A systematic review of PubMed, Academic Search Complete, PsycINFO, and Google Scholar yielded 12 studies published between 2010 and 2020 (total participants = 10,681) that met the criteria for a meta-analysis. Comprehensive Meta-Analysis Software (CMA) was used to conduct the data analysis, and the correlation coefficient  $r$  was used as the effect size. **Results.** The average effect size across all 12 studies was  $-.221$  (Fisher's  $Z = -5.696$ ,  $P < .001$ ), indicating that participation in leisure activities had a significant negative effect on depression for the elderly. In addition, the  $Q$ -value (116.003,  $P < .001$ ) and the  $I$ -squared value (90.517) proved substantial heterogeneity between the 12 studies in the meta-analysis. The symmetrical funnel plot produced by the CMA analysis demonstrated a possible absence of publication bias. **Conclusion.** This meta-analytic study reinforced the effectiveness of leisure participation in reducing the symptoms of depression among older adults.

**KEYWORDS:** *Leisure Participation, Depressive Symptoms, Older Adults, COVID-19 Pandemic.*

## INTRODUCTION

The global population of older adults has consistently increased in the past several decades. According to the report of United Nations, there were an estimated 962 million older adults in 2017 over the age of 60 years old around the world, and the number is predicted to reach 2.1 billion by the year of 2050 (1). As a result of the rapid growth of older adult populations, various fields of academia such as gerontology, geriatrics, health promotion, social work, and leisure studies have developed and studied various aspects to improve their quality of life. Among the older population mental health has emerged as one of

the major issues affecting their quality of life. Research findings report that depressive symptoms among older adults (aged 60 years or older) have been a rising problematic topic around the globe (2).

Traditionally depressive symptoms among older adults have been alleviated by a specific use of chemical medication (3) but over the past decade, more non-pharmaceutical approaches have been examined (4). One effective approach to alleviate depressive symptoms is the use of preferred leisure activities in a format adapted for older adults (5). In particular, some recreational

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activities improve mental agility (card games) (6) and increase kinetic movements with other partners (gate ball/table tennis/dance) (7, 8). These activities have been shown to be an effective way to improve depressive symptoms as well as increase mutual socialization. In numerous findings of scientific research, leisure activities are believed to have significant positive effects on mental and physical health among older adults. (9, 10).

Due to the importance of leisure for mental and physical health, a number of studies have been carried out to investigate the association between leisure participation and depressive symptoms among older adults. Thus, there is a need for empirical studies conducting meta-analyses investigating the link between the two variables. There, however, is a lack of meta-analytic review on the correlation between leisure activities and depression among the elderly. To our best knowledge, only one study by Lam et al. (11) conducted a systematic review on the effects of recreation therapy on depression in older adults, but this study provided a narrative summary and did not conduct a meta-analysis that allows for statistically combining data from multiple quantitative studies (12).

A meta-analysis is a statistical tool that aggregates empirical results from a set of studies (12, 13). Stanley (14) defined meta-analysis as “a body of statistical methods that have been found useful in reviewing and evaluating empirical research results. If a number of independent studies have been conducted on a particular subject, using different data sets and methods, then combining their results can furnish more insight and greater explanatory power than the mere listing of the individual results.” (p. 131). The benefits of a meta-analysis include providing a powerful and accurate estimate of the mean effect size across studies. It allows researchers to identify trends and patterns among study results (15).

The purpose of this current study is to assess the strength of association between participation in leisure activities and depressive symptoms among older adults by employing a meta-analytic technique. Specifically, the authors of this study attempted to answer the following research questions:

1. What is the relationship between leisure participation and depression among elderly?
2. Is there a difference in the effect sizes (the correlation coefficient) between participation in

multiple leisure activities and participation in limited leisure activities?

3. Is there a difference in the effect sizes among subgroups in different geographic regions?

## MATERIALS AND METHODS

**Systematic Review of the Literature and Search Procedure.** To identify and retrieve related journal articles on the relationship between leisure participation and depression, the two authors used four search-engine databases including PubMed, Academic Search Complete, PsycINFO, and Google Scholar. Articles were searched for by using key words that included a combination of words associated with leisure participation, depression, and seniors or older adults. For this current study, we defined *leisure* as “a freely chosen activity done by older adults in their free time that is perceived as potentially enjoyable or relaxing” (16).

**Inclusion Criteria.** The two researchers established the following six eligibility criteria to select the relevant articles for the meta-analysis:

- (1) The study investigated the relationship between participation in leisure activities and depressive symptoms. The study identified the specific types of leisure activities that the sample populations participated in.

- (2) The study had older adults (both clinical and non-clinical population) in the sample.

- (3) The study demonstrated and reported a correlation between the two variables (Correlation coefficient  $r$ ).

The study included the scales measuring leisure participation and depressive symptoms.

The study was published between 2010 and 2020.

The full-text of the study was available for evaluation.

**Selection of Studies.** The two authors manually reviewed the titles and abstracts of the initially identified articles during the screening process. The articles that did not meet the selection criteria were excluded from the list. After close scrutiny of the text of each article, qualitative studies or studies that included not only older adult but also middle-aged adults in the sample were excluded.

As a result of the systematic review and selection process, a total of 12 articles met the eligibility criteria and were selected for the meta-analysis (N = 12; total participants = 10,681). A list of the 12 articles used to conduct the meta-analysis in this study is presented in [Table 1 \(17-24\)](#).

After the second author entered the essential data of the 12 articles (e.g., the sample size, correlation coefficients, demographic variables etc.), the first author independently reviewed the data to ensure that all of the data were correctly recorded.

When reporting the effect size of each of the 12 studies, the following two measurement issues should be noted. First, the study by Park, Park, and Chiriboga (25) the final list reported the regression beta coefficient  $b$  (.292) (a correlation coefficient for the link was not reported in the study). Regarding the issue of including regression coefficients in meta-analysis when the correlation coefficients are not reported, Peterson and Brown (26) pointed out “using knowledge of corresponding beta coefficients to impute missing correlations (effect sizes) generally produces relatively accurate and precise population effect-size estimates.” (p. 175). Based on the suggestion by the article, our authors included the regression beta coefficient by Park et al. (25) as a substitute for correlation coefficients  $r$  in reporting the effect size of the study. Second, Herrera et al. (27)’ study in the final list included the 16 different leisure activities and measured the correlations between each of the 16 leisure activities and depressive symptom. With the consultation of the first author who is an expert in the academic field of leisure, this study included nine of the 16 leisure activities and computed an average correlation coefficient  $r$ . In addition, Herrera et al. (27)’ study examined the relationship between mental health and leisure activities for two separate subgroups (older Latino and Caucasian women). Thus, the authors split the

group into two groups and considered them two separate studies in the current meta-analysis.

The average age of the samples in the 12 articles was 72.7. Regarding gender, females represented 55.2% of the total sample. Concerning geographic regions, eight studies were conducted in the U.S.A., three studies in Asian countries, and one study in a Middle Eastern country.

**Data Analysis and Effect Size Calculation.** Comprehensive Meta-Analysis Software (CMA) Version 3 was used to conduct the data analysis for this study. The user-friendly CMA program is recognized as one of the most widely used software program for meta-analysis due to its ability to enable a conversion between different indices of effect size (28). A random-effect model was used to measure the overall effect size in this study (29). The correlation coefficient  $r$  was used as the effect size.

## RESULTS

**Effect Size for Association between Leisure Participation and Depression.** The results showed the strength of the correlation between leisure participation and depression. The sample size of each of the 12 studies was added. The average effect size across all 12 studies was -0.221 (Lower limit = -0.293, Upper limit = -0.146, Fisher’s  $Z = -5.696$ ,  $P < 0.001$ ). This result suggests that participation in leisure activities had a significant negative effect on depression for older adults. The effect size results are presented in Table 1.

**Table 1. Effect Sizes of the 12 (17-24) Studies and the Overall Mean Effect Size**

Study name	Statistics for each study					Correlation and 95% CI
	Correlation	Lower limit	Upper limit	Z-Value	p-Value	
Ouyang et al. (2015)	-0.347	-0.392	-0.301	-13.671	0.000	
Sharifian et al. (2019)	-0.270	-0.294	-0.245	-20.449	0.000	
Poelke et al. (2016)	-0.210	-0.391	-0.013	-2.089	0.037	
Chen & Chippendale (2017)	-0.230	-0.410	-0.033	-2.283	0.022	
Lifshitz, et al. (2018)	-0.149	-0.257	-0.038	-2.613	0.009	
Park et al. (2018)	-0.292	-0.373	-0.206	-6.457	0.000	
Herreraa et al. (2011a)	-0.080	-0.261	0.106	-0.841	0.400	
Herreraa et al. (2011b)	-0.080	-0.261	0.106	-0.841	0.400	
Bradshaw et al. (2014)	0.015	-0.046	0.076	0.479	0.632	
Heo et al. (2018)	-0.230	-0.375	-0.074	-2.868	0.004	
Mausbach, et al. (2012)	-0.360	-0.509	-0.190	-4.006	0.000	
Lu (2011)	-0.330	-0.377	-0.281	-12.385	0.000	
	-0.221	-0.293	-0.146	-5.696	0.000	

**Analysis of Study Heterogeneity.** Heterogeneity in meta-analysis represents the

extent to which the articles selected in the meta-analysis are heterogeneous (13). This current

study analyzed heterogeneity by using Q-value and the I-squared value (I-squared value of 75% and above means represents high levels of heterogeneity). In this study, the Q-value (df = 11) was 116.003 ( $P < 0.001$ ) and the I-squared value was 90.517, which demonstrated substantial heterogeneity between the studies.

**Analysis for Publication Bias-Funnel Plot.** Publication bias is defined as “a bias against negative findings on the part of those involved in

deciding whether to publish a study” (30). Analyzing funnel plots is the most commonly used assessment for publication bias (31). The symmetrical plot indicates that the literature is unbiased, while asymmetrical plot shows there is a bias in the related published literature. In this current study, the CMA analysis showed the symmetrical funnel plot, indicating a possible absence of publication bias. The funnel plot is shown in Figure 1.

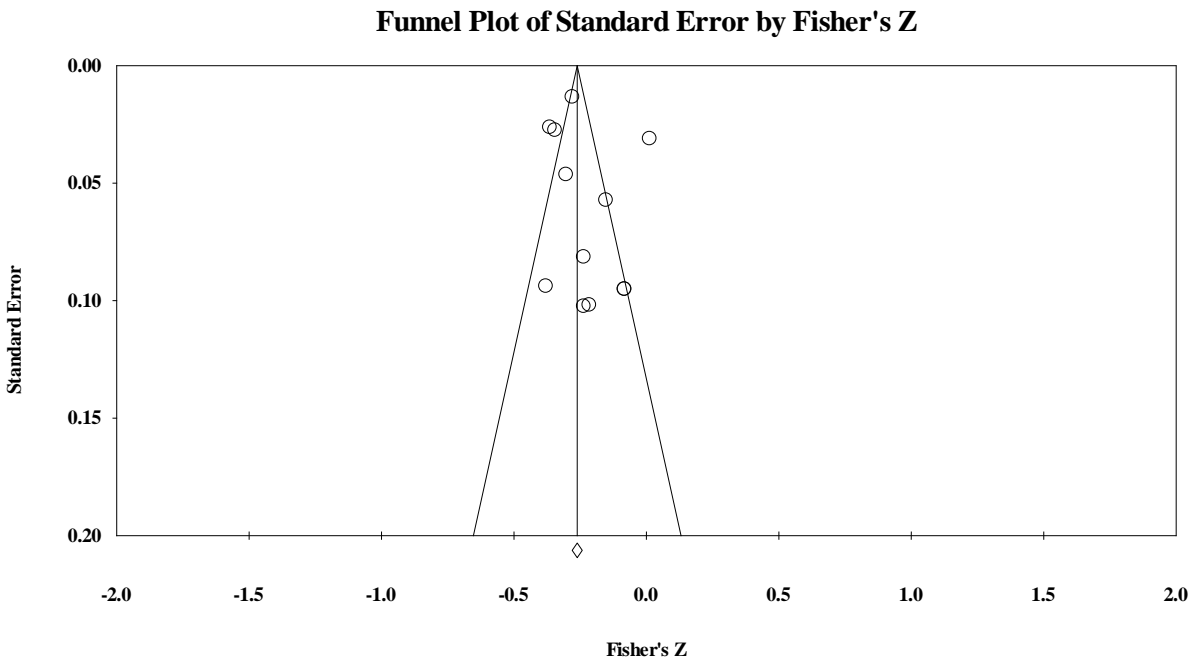


Figure 1. Funnel Plot of the Meta-Analysis of the 12 Studies

**Moderator Analysis.** This study evaluated the effect of potential moderator variables on the relationship between leisure participation and depressive symptoms. First, a subgroup analysis was conducted to see if the effect sizes for the correlation between leisure participation and depression were different between participating in multiple leisure activities and participating in limited leisure activities (one or two). The effect size for participating in multiple leisure activities was significant, while participating in limited leisure activities was marginally significant. For subjects who participated in multiple leisure activities ( $n = 8$ ), the effect size was  $-0.275$  (Lower limit =  $-0.327$ , Upper limit =  $-0.221$ , Fisher's  $Z = -9.648$ ,  $P < 0.001$ ), and for those who participated in limited leisure activities ( $n = 4$ ), the average effect size was  $-0.162$  (Lower limit =  $-0.320$ , Upper limit =  $0.005$ , Fisher's  $Z = -1.898$ ,  $P = 0.058$ ). Importantly, there was a statistically

significant difference in the effect size between the two conditions ( $Q$ -value =  $57.430$ ,  $P < 0.001$ ).

Second, an additional subgroup analysis was employed to see if the effect sizes were different among subgroups in different geographic regions [USA ( $n = 8$ ), Asian countries ( $n = 3$ ), a Middle East country ( $n = 1$ )]. The effect sizes for all of the three regions were significant [(USA =  $-0.180$ ,  $P < 0.001$ ; Asian =  $-0.332$ ,  $P < 0.001$ ; Middle East =  $-0.149$ ,  $P < 0.001$ ). The effect size for the link was significantly greater for older adults in Asian countries than for those in the USA or the Middle East ( $Q$ -value =  $15.479$ ,  $P < 0.001$ ).

## DISCUSSION

The present study extends the body of knowledge on the role of leisure in mental health by conducting a meta-analysis that shows an average effect size from the 12 separate studies on the link between leisure participation and

depression among older adults. The main finding of this meta-analytic review demonstrated a significant negative association between leisure participation and depressive symptoms among older adults. This meta-analysis study supported the evidence that participation in leisure activities can be used as an alternative therapeutic method for reducing depression among the elderly.

This meta-analysis study result demonstrating the negative relationship between leisure participation and depression is consistent with the findings of the existing empirical studies (23, 27, 32). In addition, this current study makes a meaningful contribution to the previous studies on the relationship by conducting the subgroup analysis that allowed direct comparison in the average effect size between participation in multiple leisure activities and participation in limited leisure activities. The result of the subgroup analysis that participation in multiple leisure activities rather than in limited leisure activities was more effective in reducing depression can provide important practical implications for health care managers serving older adults. Furthermore, this current meta-review also contributes to the existing literature on the topic by performing an additional moderator analysis measuring the differences in the effect size among subgroups in different geographic regions. To our best knowledge, there has been a lack of empirical studies investigating the effect of leisure participation on depression in terms of geographically different groups or different racial groups (e.g., 1).

A tremendous number of people have already died of COVID-19 and the pandemic is believed to continue for a while. Due to the great impact on older people, this vulnerable group has struggled with various symptoms of depression and COVID-19 significantly impacts older adults (23% of global death among age 65 and over) (33), therefore it is speculated that the loss of beloved parents, friends, or spouses will increase depression in even more families. Due to the fragile immune systems of older people, in particular, they may be easily exposed to the virus and have a higher probability of transmission (34). Thus, they are encouraged to shelter in place in residential environments and stay in their secure places for long periods of time. Another side effect of the pandemic among older adults is the quarantine issue: they are struggling with mental distress due to the COVID-19 quarantine (35). Therefore, it is an urgent matter to

improve depressive symptoms among the population of older adults.

Participating in safe leisure activities can be an alternative way to alleviate the various symptoms of depression for older people. Leisure activities can improve depressive symptoms including anxiety, stress, fear, and agitation, etc. Importantly, a majority of seniors have had limited access to structured leisure programs during the COVID-19 pandemic. Thus, based on the main finding of the current study, the authors suggest that recreation professionals and health care personnel serving older adults should develop virtual leisure activities for their clients (36). In addition, it would be very beneficial for those professionals to teach their older clients how to use video communications (e.g., Skype or Zoom) so that they can see their family and friends on a regular basis (37).

One of the main limitations of this meta-analysis study is that during the systematic review process, the authors found only 12 studies that met the criteria for inclusion. This is because the two authors manually reviewed each article, and thus some empirical studies that met the criteria might have been missed during the selection process. There is a need for further research in the meta-analytic examination on the role of leisure in mental health. First, it would be worthwhile to examine the extent to which leisure activities can be effective in reducing depressive symptoms. One of the objectives of this study was to explore if leisure activity may significantly improve depressive symptoms among older adults. Based on the existing studies, this meta-analysis study confirms a significant effect of participation in leisure activities on reducing depressive symptoms. However, there is a need for studies that examine how much of an effect leisure activities have on reducing negative mental health among the elderly.

Secondly, it would be meaningful to conduct a meta-analysis on the relationship between specific types of leisure activities and depression. In the process of searching articles, the authors found several leisure/recreation activities that were identified in each of the 12 studies, and they were frequently leisure activities that older adults could enjoy without difficulty during their discretionary time. These activities can be divided into two main categories. Some of the activities can be enjoyed alone, while other activities allow participants to interact with each other. In the



selective process, there were numerous scientific research articles that investigated leisure activities that involved social connection with other people rather than activities done alone, for instance; indoor sport/recreation activities, pleasant conversations, or engagement in collective fellowship, etc. A number of studies on the relationship between socialized activity and depressive symptoms among older adults have been conducted, and significant correlations have been reported. Thus, it could be more valuable if future studies consider the specific effect of interactive leisure activities on depressive symptoms.

It is anticipated that this knowledge can have meaningful implications for both researchers and practitioners in the health care and leisure sectors. Especially, by calculating the underlying effect of leisure activities on reducing depression, this meta-analytic review will help them understand the current state of the knowledge of the effectiveness of leisure activities on mental health.

## CONCLUSION

As depression among older adults has become an important public health problem, scholars in the field of health and recreation have conducted scientific research to examine the link between leisure participation on depressive symptoms among the elderly. However, there has been a lack of meta-analysis review on the relationship. The scientific process to synthesize the existing studies' findings through a meta-analytic methodology can help advance our understanding of how to improve the mental health for older adults. The purpose of this study is to conduct a meta-analysis of the relationship between leisure participation and depression among older adults. Based on the 12 studies that met the selection criteria (total participants = 10,681). The main findings demonstrated the average effect size

across all 12 studies was  $-.221$  (Fisher's  $Z = -5.696$ ,  $p < .001$ ), providing the evidence that leisure participation for older adults plays an important role in reducing depressive symptoms. There is a need for future studies to examine (1) which leisure activities are more effective or preferred among different subject groups, and (2) different comprehensive mental health outcome variables to include similar categories of depressive symptom (e.g., anxiety, distress, or sadness).

## APPLICABLE REMARKS

- Considering the benefit of conducting meta-analysis by combining the results of multiple studies, it would be worthwhile to investigate the impact of leisure activities among different ethnic/cultural/gender groups to determine if the effect sizes are homogeneous.
- Additionally the categorization or classification of preferred leisure activities can also be determined depending on different aspects of group.
- Given our current study used depressive symptoms as a dependent variable, a future study may examine the similar mental health outcomes including anxiety, distress, or sadness.
- The results of the present study may be applicable not only to older adults without disabilities but also to those who have specific disabilities (e.g., dementia, Alzheimer, or arthritis).
- A majority of older adults have limited access to leisure programs and are lacking social contacts outside their homes during the COVID-19 pandemic. Thus, it is important for health care and leisure professionals to develop preferred leisure activities that older adults can safely participate in during COVID-19 restrictions.

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