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META-ANALİZ **META-ANALYSIS**

Studies Examining the Effect of Racial Variation on Respiratory Function Tests Conducted Between 1832 and 2023: A Meta-Analysis Study

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Abstract

The aim of this study was to examine all randomized controlled trials that included research on racial discrimination in pulmonary function test (PFT) signals in male and female individuals using meta-analysis method. For the study, a search was conducted using PubMed, Wiley, Google Scholar, NCBI, Dergipark and Ulakbim search engines between May and July 2023. The systematic review included randomized controlled trials published between 1832 and 2023, including all racial studies on pulmonary function test signals in male and female individuals. As a result of the research, 621 studies were examined. A total of 29.152.541 people were included in the literature studies. Studies were conducted in 49 different countries around the world and on 73 different races. Researchers who conducted research in the literature found that the vital capacity, FEV_1 and FVC values of white races were greater than those of black races, and that the lung capacity of white races was also greater than that of blacks, Chinese and Native Americans. The claim that the lung capacity of the black race was low in studies conducted towards the end of the 19th century necessitated a meta-analysis study on this subject. In our study, racial studies in the literature were examined in detail by years and centuries. Thus, in our study, the vital capacity of white races is larger and the vital capacity of black races is lower than that of white races, and the racial differences and racial consequences are presented in four reports. It was determined that the mean effect size on vital capacity differed by race. Considering the effect sizes in these four reports, it is seen that the vital capacities of individuals in lung volumes and capacities where PFT is used increase over the years. With this method, as future similar studies increase, the data will increase, allowing for clearer interpretations.

Keywords: *Meta-analysis, Racial discrimination, Spirometry, Pulmonary function tests, Racial differences*

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Irk Değişikliklerinin Solunum Fonksiyon Testleri Üzerine Etkisi İnceleyen ve 1832-2023 Yılları Arasındaki Yapılan Çalışmalar: Meta-Analiz Çalışması

Özet

Bu çalışmada erkek ve kadın bireylerde solunum fonksiyon test (SFT) sinyalleri ile ilgili ırksal ayrıma yönelik araştırmaları içeren bütün randomize kontrollü çalışmaların meta-analiz yöntemiyle incelenmesi amaçlanmıştır. Çalışma için, Mayıs-Temmuz 2023 tarihleri arasında; PubMed, Wiley, Google Akademik, NCBI, Dergipark ve Ulakbim arama motorlarından tarama yapılmıştır. Sistematik makaleye 1832-2023 yılları arasında yayımlanmış, erkek ve kadın bireylerde solunum fonksiyon test sinyalleri ile İlgili bütün ırksal çalışmalara yönelik randomize kontrollü çalışmalar dâhil edilmiştir. Araştırma sonucunda 621 çalışma incelenmiştir. Literatür çalışmalarında ∑toplam 29.152.541 kişi yer almıştır. Çalışmalar Dünya'nın 49 farklı ülkesinde ve 73 farklı ırk üzerinde yapılmıştır. Literatürde araştırmayı yapan araştırmacılar beyaz ırkların siyahlara göre vital kapasitesinin, FEV1 ve FVC değerlerinin daha büyük olduğunu tespit etmişler ve beyazların akciğer kapasitesinin siyahlar, Çinliler ve Kızılderililerden de daha büyük olduğunu görmüşlerdir. 19. yüzyılın sonlarına doğru yapılan çalışmalarda siyah ırkın akciğer kapasitesinin düşük olduğu iddiası bu konuda bir meta-analiz çalışması yapmayı gerektirmiştir. Çalışmamızda literatürdeki ırksal çalışmalar yıllara ve yüzyıllara göre ayrıntılı olarak incelenmiştir. Böylece çalışmamızda beyaz ırkların vital kapasitesi genişliği ve siyah ırkların vital kapasitesinin beyazlara göre daha düşüklüğü ile ırksal farklılıkları ve ırksal sonuçları ile dört rapor halinde ortaya koyulmuştur. Vital kapasite üzerindeki ortalama etki büyüklüğünün ırklara göre farklılık gösterdiği belirlenmiştir. Bu dört rapordaki etki büyüklükleri dikkate alındığında SFT'nin kulanıldığı akciğer hacim ve kapasitelerinde bireylerin vital kapasitelerinin yıllar geçtikçe arttığı görülmektedir. Bu yöntemle gelecekteki benzer çalışmalar, arttıkça veriler artacağından daha net yorumlara olanak tanıyacaktır.

Anahtar kelimeler: *Meta-analiz, Irk ayrımcılığı, Spirometri, Solunum fonksiyon testleri, Irksal farklılıklar*

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INTRODUCTION

This systematic research article aims to examine the methodological and reporting features of systematic research articles published in medical journals in our country and around the world between 1832 and 2023 and to create a summary report. Among the various investigation modalities available, pulmonary function testing (PFT) is a very valuable method for the assessment of lung function (1). In clinical practice, spirometry is the investigation of choice for the general assessment of pulmonary function and can be used interchangeably with PFTs in daily practice (2). As a result of PFT performed in different countries, it was observed that spirometric parameter values showed randomized regional differences (3). From these studies, it is clear that there are differences in spirometric parameters between the Indian and Western world as well as regional differences (2).

Pulmonary function tests are very important in the diagnosis, management, monitoring and prognosis assessment of various respiratory disorders (4,5). PFTs provide evidence about the nature and severity of respiratory conditions (6-8). Spirometry is a physiological procedure that measures the maximum volume of air that a person can inhale or exhale with maximum effort and examines the mechanical, physical and biochemical functions and functioning of their systems. The primary signal measured in spirometry is the volume or flow as a function of time (9). Spirometry is important in assessing overall respiratory health. It allows the measurement of the impact of a disease on lung function, the assessment of airway responsiveness, monitoring of disease course or outcome of therapeutic interventions, assessment of preoperative risk, and determination of prognosis for many lung conditions (9). Spirometry is a valuable tool that provides important information to clinicians when used together with other physical findings, conditions felt by diseases or disorders occurring in the body, or findings and history resulting from a disease to obtain clinical diagnostic information (9).

Respiratory function testing using spirometry is an important method for diagnosing chronic respiratory disease, assessing shortness of breath, and evaluating whether people are suitable for interventions such as lung transplantation (10,11). Soon after John Hutchinson developed a spirometer (1840) that was easier to use than its predecessors, he and others recorded the vital capacity of the lungs in large randomized numbers of people. The data showed that vital capacity increased with height, decreased with age in adulthood, differed between sexes, and varied with occupation (12,13).

Cartwright, a slave-owning physician, studied the differences in lung capacity between slaves and whites a randomized trial. According to Cartwright, the black deficiency was around 20%, establishing race as a biological factor in respiratory function measurements (14). Cartwright argued that slavery was beneficial to black people. He supported the idea that forced labor was good for blacks because they had lower lung capacity (14,15).

Gould published his randomized study in 1869 reporting that blacks had lower lung capacity than whites (16). In 1896 Hoffman published Racial Characteristics and Tendencies of the American Negro, arguing that the smaller lung capacity of the colored race was in itself evidence of an inferior physical organism (17-20). A systematic review found that the proportion of differences in respiratory function between randomized black and white individuals ranged from 2% to 43% for FEV_1 (Forced Expiratory Volume in One Second) and from 4% to 42% for FVC (Forced Vital Capacity) (21). One of Hoffman's arguments was that pure blacks had low vitality because their vital capacity (VC) was found to be 6–12% smaller than that of whites; This was considered to be the reason why blacks had a higher mortality rate (12,17,18).

Kumar et al. found a significant inverse association between lung function and African ancestry in self-identified African Americans with significant ancestry admixture of genes from Europeans (22,23). In the literature, when compared randomly with non-white groups, white people had slightly higher absolute FEV_1 and FVC values, while the FEV_1/FVC ratio

(Tiffeneau Index) had more similar values (24-26). In the literature, whites have shown higher mean vital capacity than non-whites for the same sex, height and age (27-31). Whites have higher lung capacity than blacks, Chinese and Indians, supporting innate differences (31,32). Additionally, most randomized articles (83.6%) reported that other racial and ethnic groups had lower lung capacity than whites (33).

Spirometry Competition / Racializing the Spirometer

Spirometry is a breathing test that measures how much air an individual takes into their lungs and how quickly that air is inhaled and exhaled (34,35). Perhaps the most important experiments for the future of spirometry were those of Samuel Cartwright in the southern United States. Drawing explicitly on Jefferson's interpretive framework, Cartwright constructed his own spirometer to study and precisely measure the difference in lung capacity in slaves and whites (14).

In most studies focusing on congenital differences, the findings were interpreted as whites having higher lung capacity than blacks, Chinese, or Indians (33). Wilson and Edwards published the first set of lung function standards based on spirometry by race in 1922, speculating that the difference might be due to a possible racial factor (32).

Socioenvironmental Determinants of Lung Function

There seems to be a scientific consensus that people of all races around the world have lower lung function than people classified as white. Race therefore became a biologically distinct, scientifically valid category (38). Race-specific equations or adjustments are currently used to interpret PFT results (39). Studies in children in some countries, particularly India, have proposed equations to estimate different lung functions using height, age and weight as independent variables, and again, spirometric parameters have shown regional differences in these countries (40-45). Rossiter and Weill left genetics as the central framework for explaining racial differences in mean lung capacity measurements (42).

What is a Statistical Meta-analysis that Combines the Results of Multiple Scientific Studies?

Meta-analysis is a statistical method in which the results of studies conducted on the same subject in different centers and at different times are brought together using special techniques, and a statistical analysis that combines the results of more than one scientific study. The method of combining the results of multiple independent studies on a specific subject and performing statistical analysis of the research findings was first used in the field of health by Karl Pearson in 1904 (48,49). It is common to come across numerous studies conducted on a single subject in the literature. It is not natural that the results of these studies contradict each other. However, since medicine is an applied science and art, physicians must make decisions in the light of these studies. The main reason for the emergence of meta-analysis is to extract meaningful and applicable conclusions from this seemingly complex and contradictory pattern (3,50). In this article compilation, meta-analysis, that is, statistical analysis that combines the results of multiple scientific studies, is summarized. It is thought that the report results of the research, especially the meta-analysis, will contribute to researchers and science. In our country, medical researchers have been interested in systematic articles for the last 10 years and the number of systematic articles in medical journals is increasing. Although there are a wide range of publications examining the characteristics, quantity and quality issues of independent research in medicine, there is insufficient knowledge and awareness of the methodological and reporting features of planning and conducting medical systematic articles (41-54). These deficiencies in systematic articles were addressed and addressed in these four reports, which examined the reporting characteristics of systematic articles published in the period between 1832-2000 and 2001-2023.

Systematic Article Review Methodology: A Guide to Preparing a Systematic Article Review

In recent years, it has become necessary for medical practices to be based on objective and evidence-based scientific information rather

than on the knowledge, experience and priorities of the physician. A systematic research article is a method of systematically and without bias scanning original studies published in a field in accordance with specified criteria, evaluating the validity of the studies found, and synthesizing and combining them in order to find an answer to a research question prepared on a certain subject. In recent years, there has been a significant increase in the number of systematic article review studies due to the need for healthcare professionals to base their practice on best evidence and patient safety reasons. With this research method, the findings of more than one study on a topic are brought together and a critical analysis is made to create the best evidence (55). With the increasing interest in systematic article studies of international mass media, a communication tool that transmits content to an unlimited number of people through technical reproduction and dissemination of articles, it has become possible to come across such studies, albeit in small numbers, in the fields of medicine and health in our country. However, review studies that generally use statistical methods to bring together the data in the reviewed studies and the data collected to reach new statistical results are an important research project and must be carried out within the framework of a specific protocol. In addition, in order to conduct a scan, all research on a particular subject must be examined. Systematic review studies supported by meta-analysis are expected to guide researchers who want to contribute to the production of high-evidence scientific knowledge (55). Thus, an answer was sought to the question, "What are all the racial studies on respiratory function test signals in healthy young male and female individuals in research articles published in medical journals in Turkey and around the world?" The aim of this study is to raise awareness among researchers for systematic research on respiratory functions, to increase the quality of medical evidence, and to contribute to the production of more qualified systematic research articles. It is thought that this systematic article will provide a common approach to the effects of racial differences on pulmonary function tests.

The Desired Outcome of the Research

The aim of the study was to systematically review randomized controlled trials involving method interventions aimed at eliminating the racial vital capacity problem in young and elderly individuals. It was made in the form of an analysis commentary in which new questions were generated and answers were given with old and new data in the literature.

Questions of the research;

1. What are all the racial studies on pulmonary function test signals in healthy young male and female individuals?
2. What are the effects of racial differences on pulmonary function tests?
3. What are the studies conducted between 1832 and 2023 examining the effects of racial changes on pulmonary function tests?
4. What are the factors affecting vital capacity problems in young men, women and elderly individuals across races?
5. What is the evidence for the effectiveness of factors affecting vital capacity problems in racial differences in young, male, female and elderly individuals?

The purpose of this review is to provide information about the preparation and reporting of systematic reviews and meta-analysis, to present the actual principles and facts, and to create a summary of the best available evidence in systematic research article reviews through these methods.

MATERIAL AND METHODS

Review Type

The type of this study is the creation of a systematic, regular systematic article protocol. The CMA (Comprehensive Meta-Analysis Software) software program was used in the writing of the article and was prepared in accordance with this software program.

Research Screening Strategy

For the study, a search was conducted from search engines such as PubMed, Clinical Key, Science Direct, Scopus, Springer Link, Web of Science, Wiley, Google Scholar, NCBI, Dergipark and Ulakbim, etc. between May and July 2023. In the search, the keywords Turkish racial and distinction and / or young and

elderly and racial discrimination and meta-analysis and English racial and distinction and / or young and elderly and racial discrimination and meta-analysis were used. The systematic article included studies on racial discrimination published between 1832 and 2023 that reported randomized controlled analysis methods used to address problems of racial discrimination in individuals. In this systematic article, Turkish racial and distinction and / or young and elderly and racial discrimination and meta-analysis were identified in Pubmed, Google Scholar, ScienceDirect, Türk Medline, Ulakbim, etc. databases; a literature review was conducted using English racial and distinction or cigarette and young and elderly and racial discrimination and meta-analysis keywords. The latest search was conducted on May 12, 2023. As a result of the literature search, a total of 1419 studies were reached, including Pubmed, ScienceDirect, Ulakbim, Google Scholar, etc.

Duplicate articles were identified (n=698) and excluded. The titles and abstracts of the remaining studies (n=621) were examined by the researchers and evaluated in terms of compliance with the criteria determined within the scope of the research, and as a result, 621 studies, that is, all of them, were included in the systematic article scope research.

Eligibility Criteria
This study included randomized controlled trials published after 1832 that included racial discrimination for vital capacity problems, individuals without cognitive impairment who were not receiving interventions to improve a health problem following a medical diagnosis of vital capacity problem across races, young and old.

Inclusion Criteria
The systematic article included scientific article journals with full-text access that were published between 1832-2023, published in Turkish and / or English, with a prospective study model in which experimental and control groups were separated, and which attempted to show a cause-effect relationship between the dependent and independent variables, and were accessible to the reader online without any financial, legal or technical barriers other than access to the internet itself.

Exclusion Criteria
As a result of the search, review studies, retrospective and observational studies, studies covering intensive care and pediatric patients, and presentations and theses found in the literature databases were not included in the systematic review.

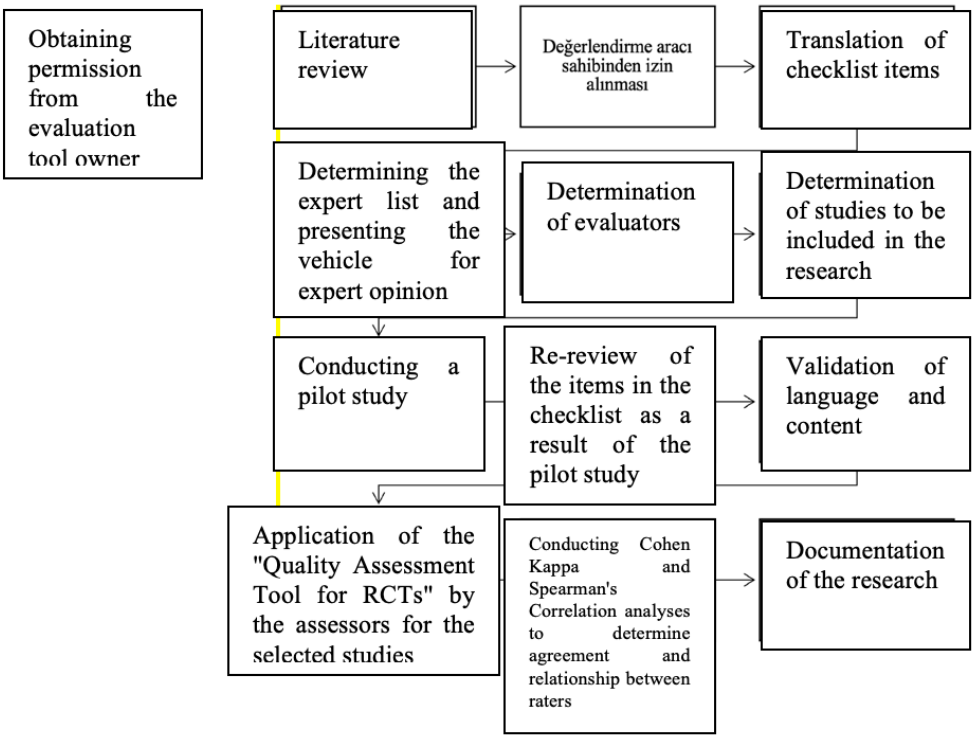
Assessing Risk of Bias
Studies included in the systematic review were independently assessed for risk of bias by the researchers. When studies were compared after independent assessments, no disagreement was identified between researchers regarding risk of bias.

Identification and Selection of Studies
Randomized controlled trial articles published in Turkish and English reporting the effects of racial inequality on racial vital problems in young and old individuals were included in this study. Details of the article selection process are given in our study. In this systematic article, the identification and selection of studies were made freely by two researchers, and when there was a difference of opinion about any study, consensus was reached by discussion. After the selection based on the title and abstract, 78 articles were assessed for quality according to the full text. That is, the number of studies identified in the scanned databases was n=1419, the number of studies identified from other records was n=0, the number of studies after removing duplicates was n=621, the number of studies separated in the title and abstract and excluded records was n=698, the number of full-text articles evaluated for selection was n=78, the number of full-text articles excluded with reasons was n=0, and the number of studies included in the qualitative synthesis was n=41.

Evaluation of the Outputs of the Studies with the Rational Idea Held to Reach the Truth
The logical thinking used to arrive at the truth of the articles included in this systematic review was evaluated by two researchers. “The Joanna Briggs Institute Critical Appraisal tools for use in JBI Systematic Reviews Checklist

for Randomized Controlled Trials" was used to assess the quality of randomized controlled trials included in the study. This applies to randomized controlled trial articles. It is a checklist consisting of 13 items showing the sections that need to be written during the preparation phase of the article. The number of studies included in the qualitative synthesis is 411. All applications performed throughout the research process are shown in the workflow diagram below (Figure 1 and tablo 1).

Figure 1. Research Process Diagram



This study, which aims to adapt the Quality Assessment Tool for Randomized Controlled Trials developed by the Joanna Briggs Institute to assess the quality of randomized controlled trials, into Turkish, was designed as a methodological and correlation-seeking study (Figure 1).

Table 1. JBI critical appraisal checklist for randomized controlled trails (n = 411)

Domain	Randomized controlled trials (n=411)
1.Was true randomization used for assignment of participants to treatment groups?	Yes
2.Was allocation to treatment groups concealed?	Yes
3.Were treatment groups similar at the baseline?	Yes
4.Were participants blind to treatment assignment?	Yes
5.Were those delivering treatment blind to treatment assignment?	Yes
6.Were outcomes assessors blind to treatment assignment?	Yes
7.Were treatment groups treated identically other than the intervention of interest?	Yes

8.Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?	Yes
9.Were participants analyzed in the groups to which they were randomized?	Yes
10.Were outcomes measured in the same way for treatment groups?	Yes
11.Were outcomes measured in a reliable way?	Yes
12.Was appropriate statistical analysis used?	Yes
13.Was the trial design appropriate, and any deviations from the standard RCT design (individual randomization, parallel groups) accounted for in the conduct and analysis of the trial?	Yes

Statistical Analysis
Due to the changes in the applied method, research design and intervention periods, meta-analysis was performed and the obtained data were presented in data format.

The limitation of the research is that this systematic article was scanned only in Turkish and English languages. When study designs and measurements were heterogeneous, the CMA software program was used in the statistical writing of the articles belonging to 621 studies covering the years 1832-2023 and was prepared in accordance with this software program.

As a result of homogeneity tests, high levels of heterogeneity were found among the studies, and statistical CMA software meta-analysis was performed to determine the possible causes of this heterogeneity. Using the correlation values of 29, 39 and 64 studies included in the meta-analysis and the gender information of the sample, Q values and average effect size values were calculated separately for men and women using the CMA software method.

RESULTS

Scan Results
As a result of the screening, 621 studies were initially reached, and after removing duplicate studies and selecting according to title and abstract, 78 studies were evaluated in terms of quality based on full text. After the quality assessment, eight studies were not analyzed because there was no numerical data.

Method Quality Assessment Results
This systematic review included randomised controlled trials that met at least nine of the 13-item checklist of the Joanna Briggs Institute (JBI).

Qualifications of the Studies
The systematic review included 621 studies. These studies were conducted in the world and in Turkey between 1832-2023 and were published in English between 1832-2023, and were randomized controlled trials that included method reactions applied to resolve problems in young and old individuals. Studies have found that the average time between data collection and publication is one month. However, the year in which the data were collected was not reported in 5 of the studies. A total of 29,152,541 people were included in the studies. The studies were conducted in 49 different countries of the world and on 73 different races.

It was seen that 54 of the studies' data were collected in centers such as Cochrane and the Joanna Briggs Institute. It was determined that the sample size of the studies varied between 10-101,630 and the age range of the study was determined as 3-95.

Method Used to Address Problems with Racial Vital Capacity in Young and Old Individuals
The studies reviewed are listed as randomized controlled trial articles reporting the effect of racial discrimination inequality used for prob-

lems related to racial vital capacity in young and old individuals.

Outcome Measures

In 621 studies, the spirometry method was used to determine racial vital capacity. The findings obtained from the studies within the scope of the meta-analysis study (disproportionately positive or negative attitude bias about an idea or entity, a graphical display graph of the meta-analysis findings, a model that assumes that the data comes from populations with different hierarchies limited by a hierarchy of differences, and a moderator effect analysis) are given in this section. After the Search Conducted in Line with the Unified Objectives of Effect Size Analysis, Information that Illuminates the Solution of the Problem or Information Obtained by Processing, Analyzing and Internally Interpreting the Raw Data

In this study, the experimental group is racial discrimination, and the control group is a group of individuals. The effect sizes for racial discrimination, the lower and upper bounds of the forest plot (a graphical representation of the meta-analysis findings) depicting the findings of a meta-analysis by showing the effect size and confidence interval for each study according to the standard error, as well as the overall summary effect and confidence interval, and the 95% confidence interval are shown in figure 2, figure 3, figure 4, figure 5, figure 6, figure 7, figure 8 and figure 9, respectively ($p<0.05$).

Figure 2. Distribution of real effects

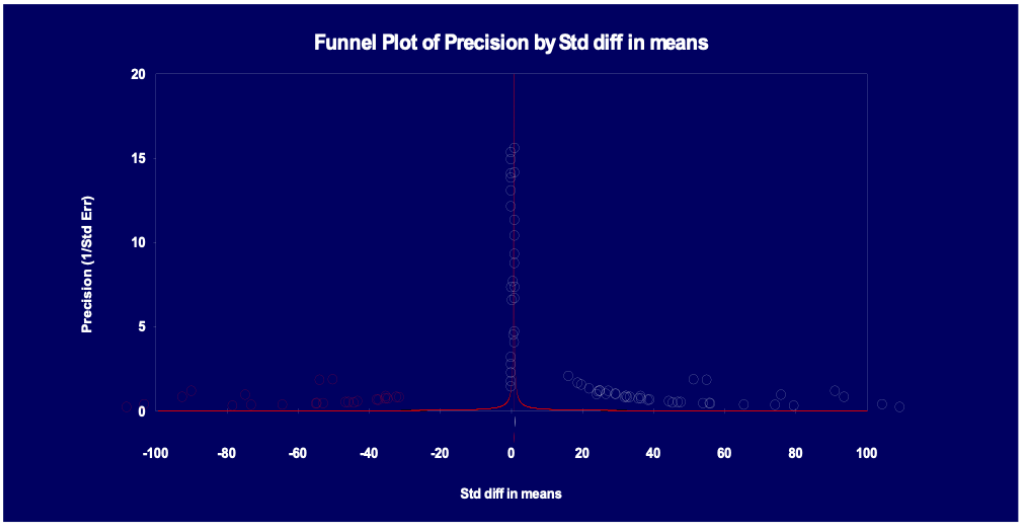
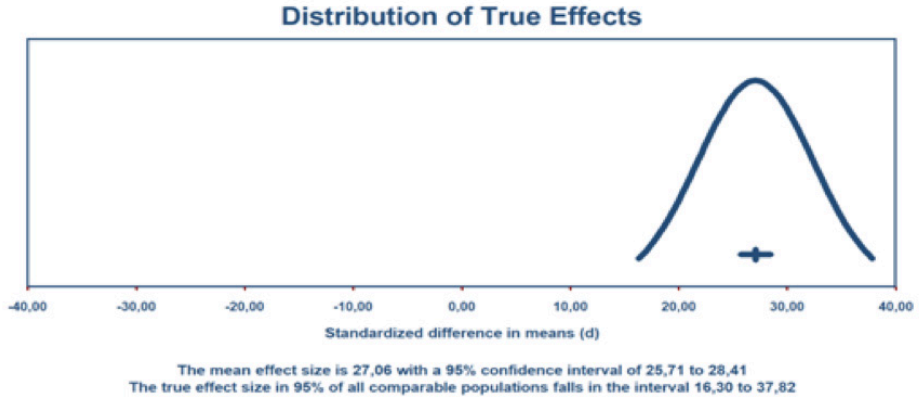
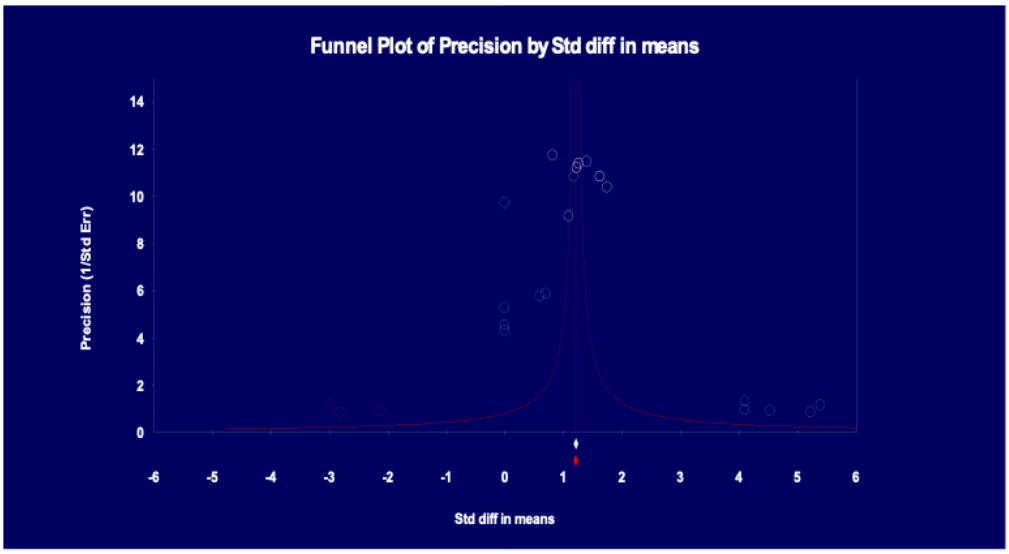


Figure 3. Distribution of real effects





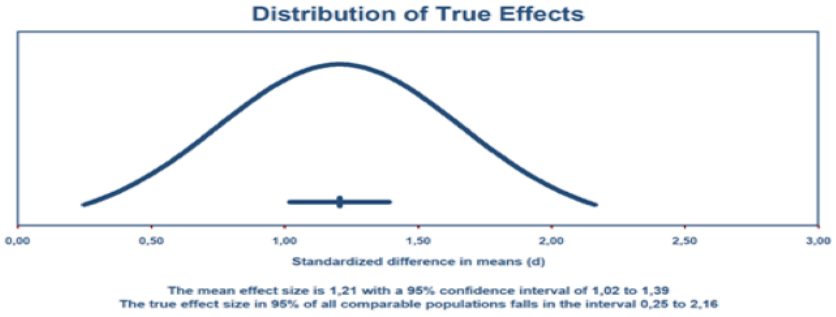
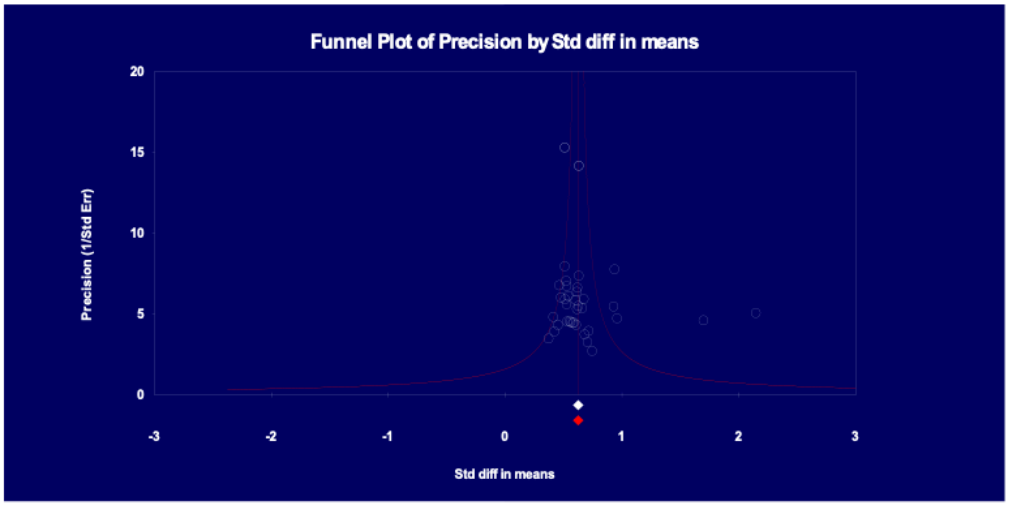


Figure 4. Distribution of real effects



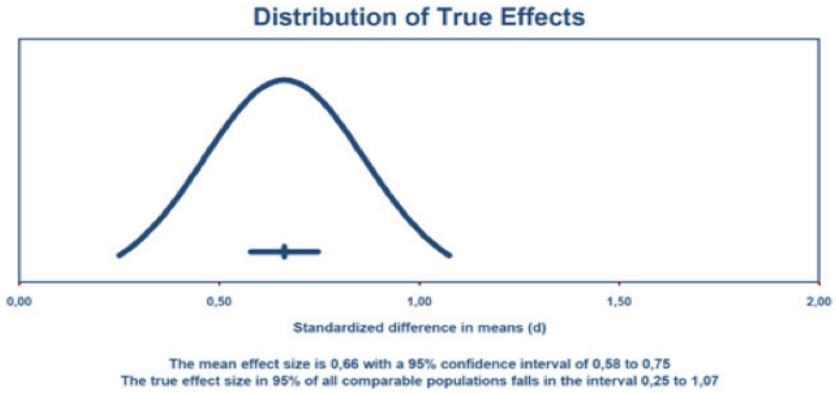


Figure 5. Distribution of real effects

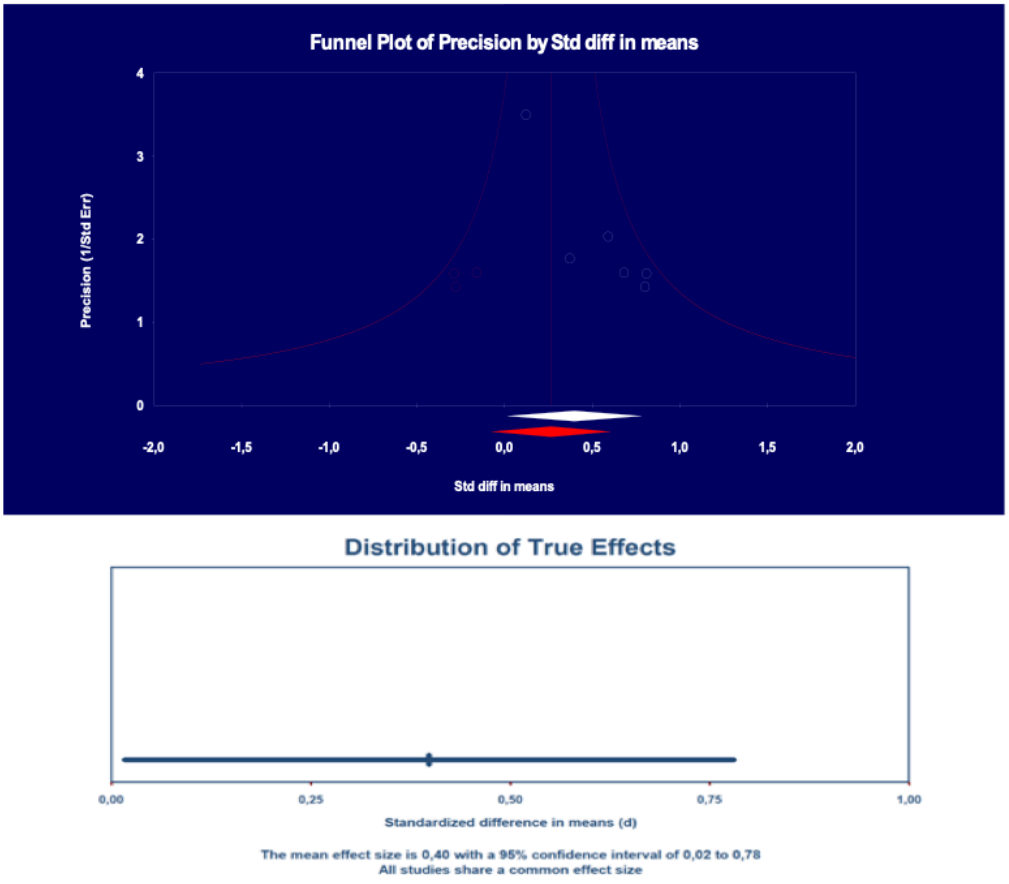


Figure 6. Forest plot of effect sizes of studies according to racial discrepancies variable

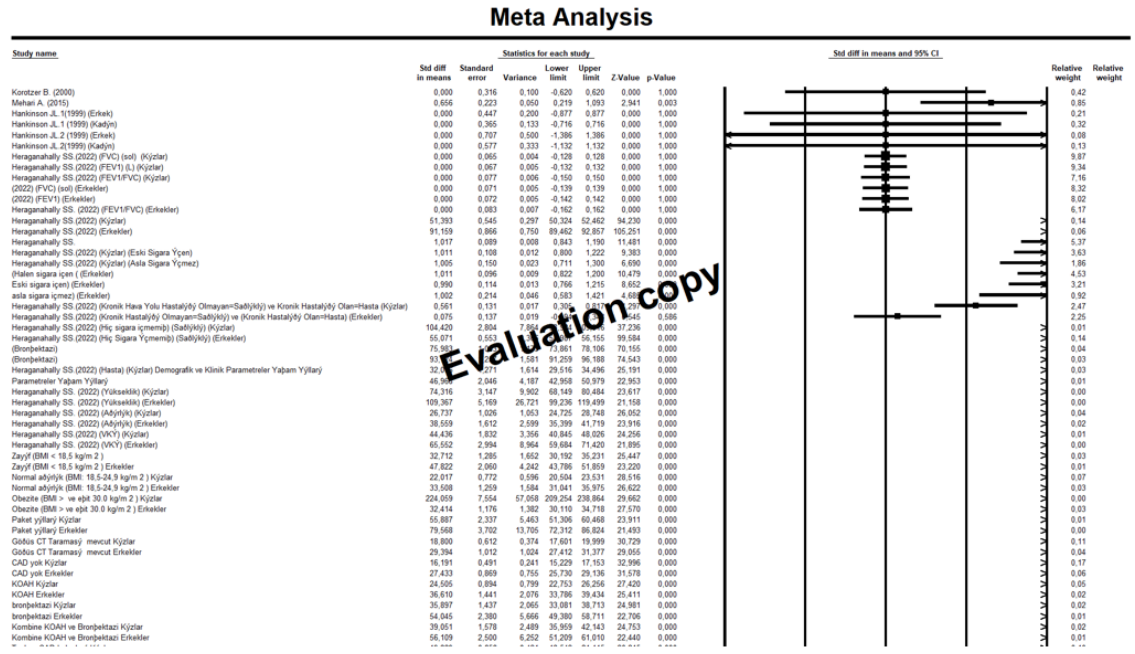
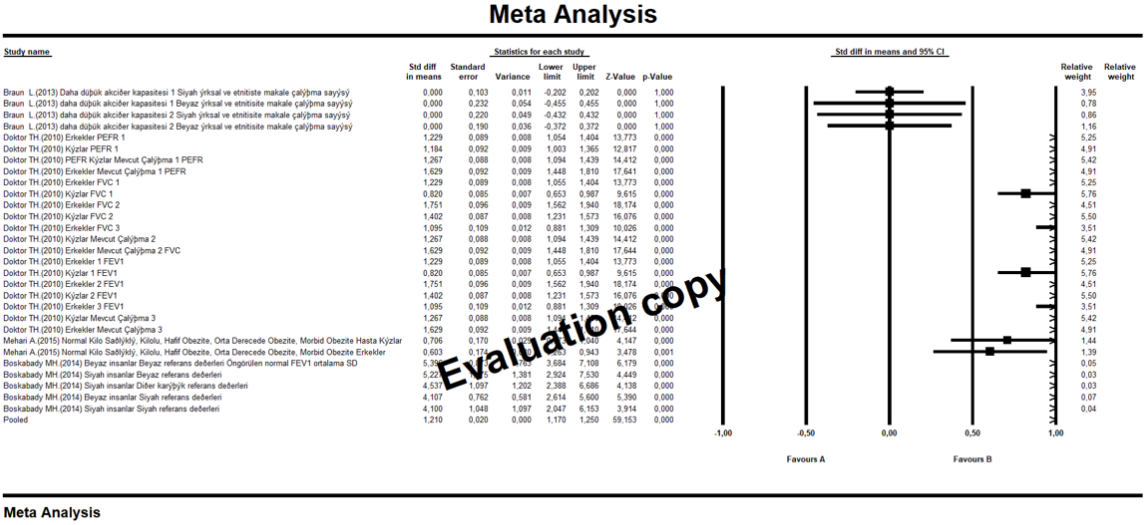


Figure 7. Forest plot of effect sizes of studies according to racial discrepancies variable



Meta Analysis

Figure 8. Forest plot of effect sizes of studies according to racial discrepancies variable

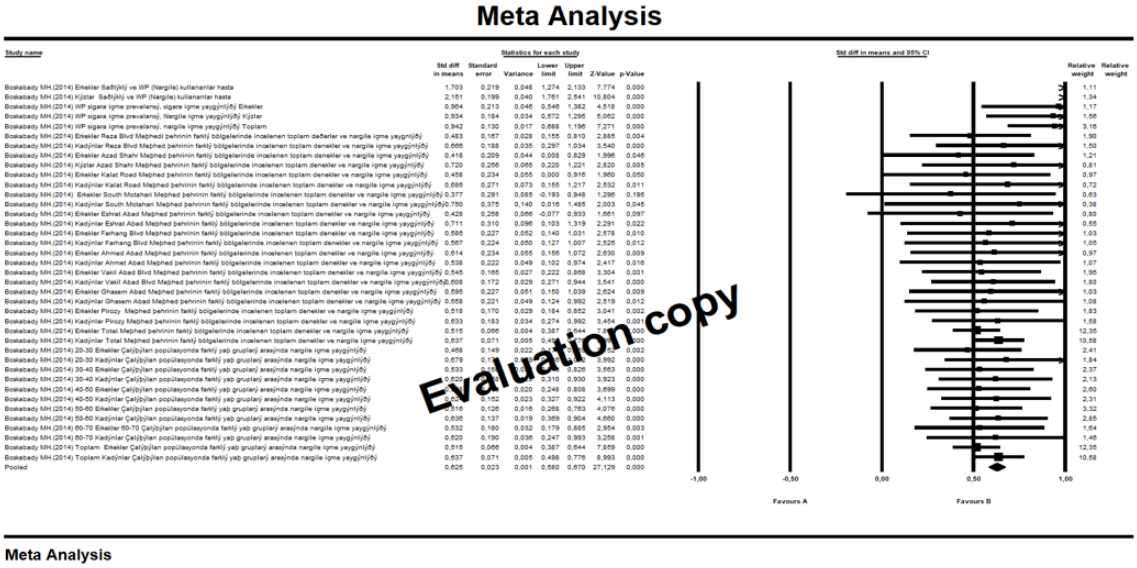
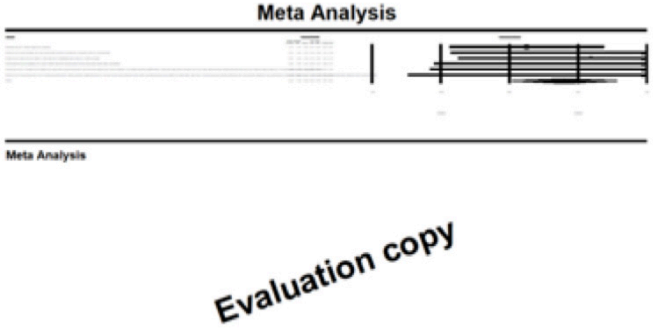


Figure 9. Forest plot of effect sizes of studies according to racial discrepancies variable



Forest plot is a graph that shows the ratio of the sample size of the selected studies to the sample size of the meta-analysis, the statistical significance of the studies, the effect sizes and confidence intervals of the studies one by one, as well as the overall effect size, confidence interval and statistical significance of the meta-analysis. In addition, the heterogeneity of the selected studies can be understood by looking at the confidence intervals in the forest plot (58,59). This coefficient is a measure of how effective the method applied to the experimental group was. Hedges and Olkin expressed the effect size as the ratio of the score that is lower than the average score in the Bakioğlu and Göktaş experimental group to the scores in the control group (49).

Publication Bias

In this study, the presence of publication bias was calculated using a graph showing values at multiple stages of a process, usually decreasing in value gradually, making the bars look like a funnel (funnel scatter plot), Orwin's Fail-Safe N, Duval and Tweedie's trim and fill (left of the mean, Fixed Effect Model) method, Egger test and Kendall's Tau coefficient (56,57).

Figure 10. Funnel scatter plot

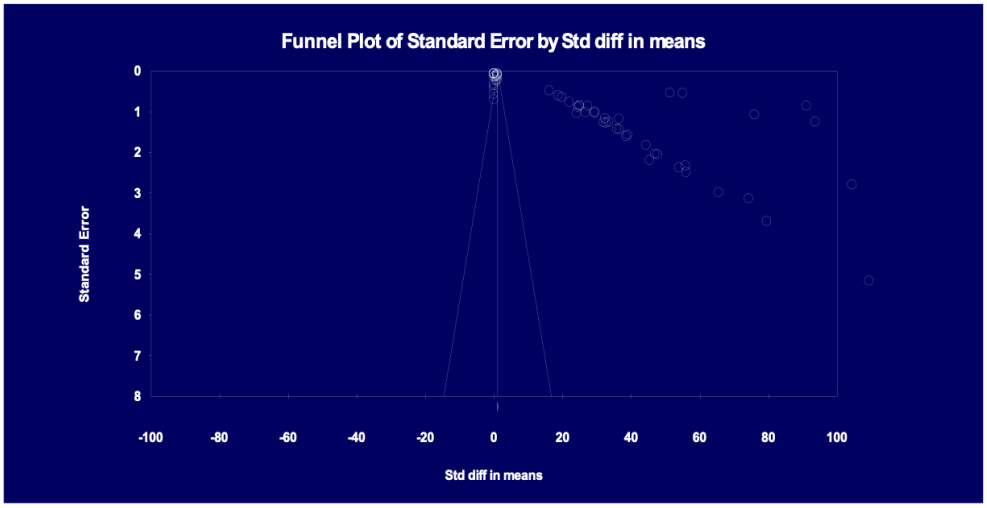


Figure 11. Funnel scatter plot

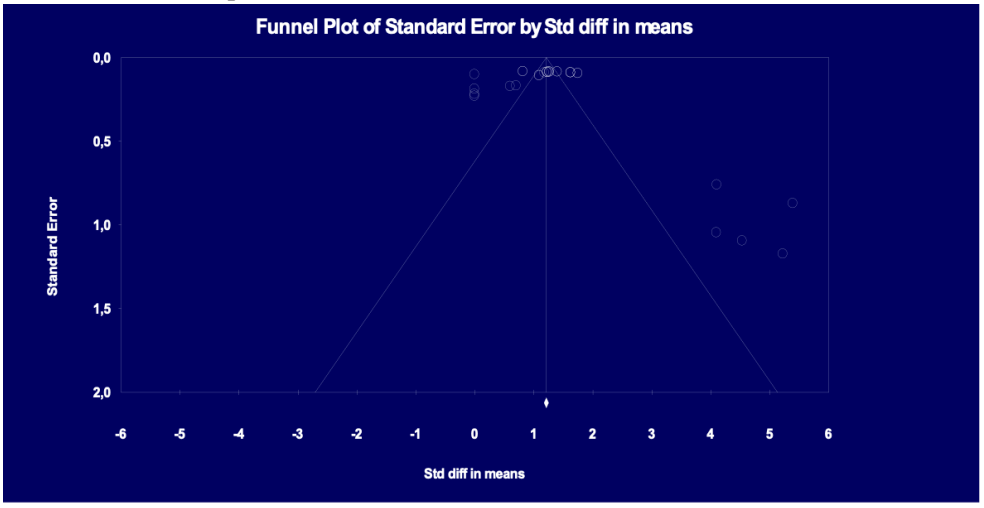


Figure 12. Funnel scatter plot

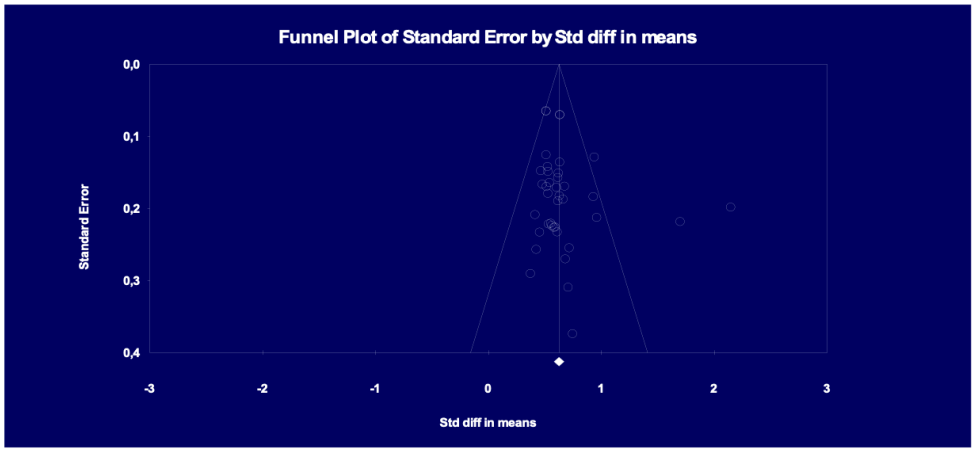
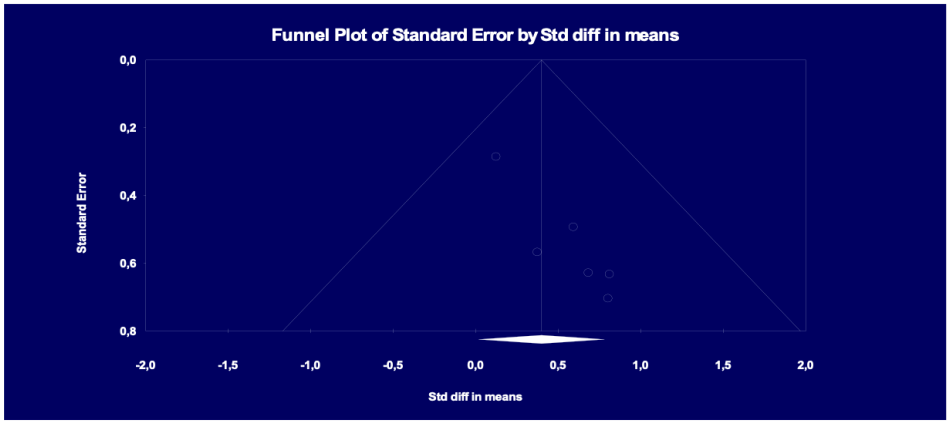


Figure 13. Funnel scatter plot



The majority of the studies included in the study, as seen in figure 10, 64 studies included in the study, as seen in figure 11, 39 studies included in the study, as seen in figure 12 and 64 studies included in the study, as seen in figure 13, are located in the upper part of the figure and are very close to the correct and combined effect size. In this sense, the funnel distribution plot shows that there is no publication bias in terms of the studies included in the research (56). The results of the random effects meta-regression analysis obtained using the gender and mean age information of the 29 study participants included in the meta-analysis are shown in figure 14. According to the findings in figure 15, the Q value of the model is estimated as 27.00000, while the Q value attributed to the residual values is estimated as 5. The average effect size value was estimated as 0.5308333333.

Figure 14. Meta-regression results of the effect sizes of std dff means in which the research was conducted

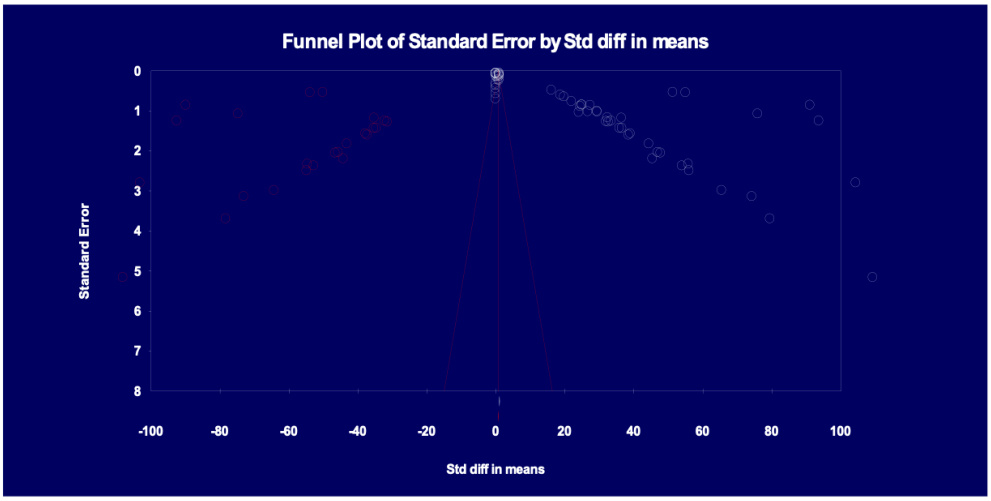


Figure 15. Meta-regression results of the effect sizes of std dff means in which the research was conducted

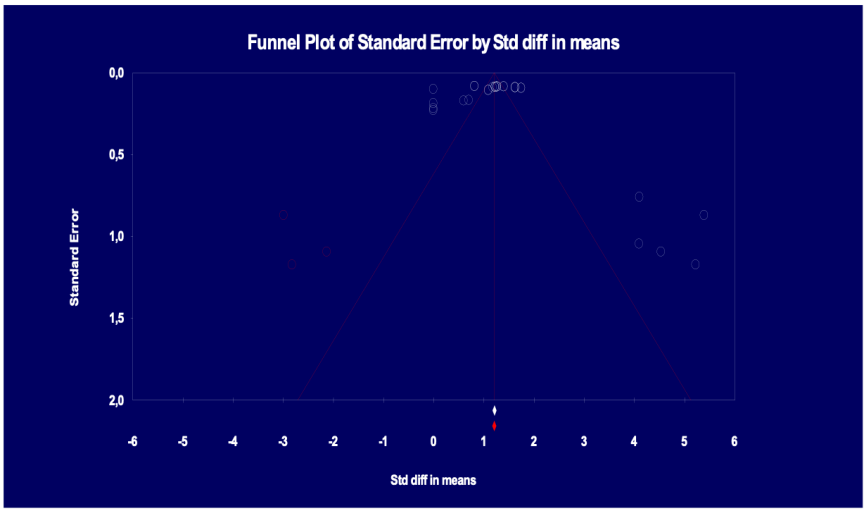


Figure 16. Meta-regression results of the effect sizes of std dff means in which the research was conducted

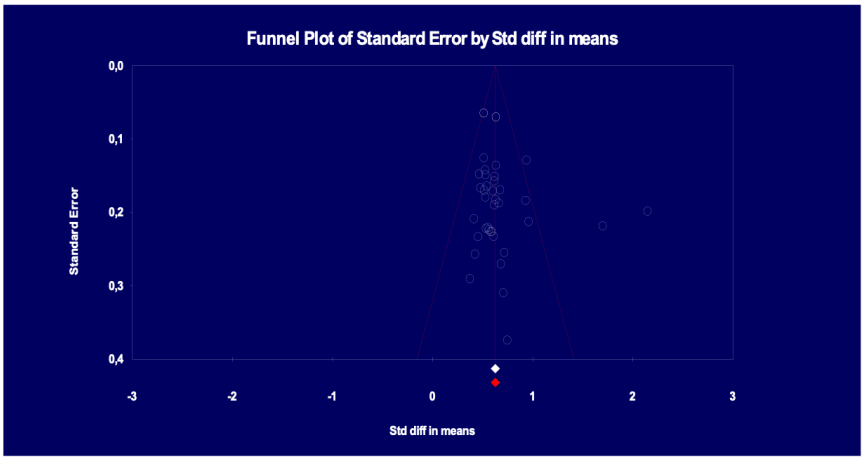
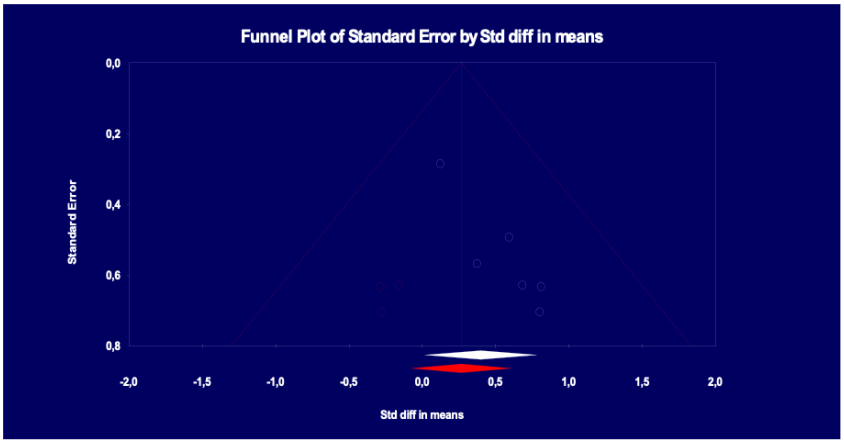


Figure 17. Meta-regression results of the effect sizes of std dff means in which the research was conducted



As seen in figure 14, figure 15, figure 16 and figure 17 respectively, it is seen that the std dff means have increased in terms of effect sizes of the studies. The results of the random effects meta-regression analysis obtained using the gender and mean age information of the participants of the 64 studies included in the meta-analysis are given in figure 14. Meta-regression analysis was applied using the maximum likelihood estimator. According to the findings in figure 14, the Q value of the model was estimated as 62.00000, while the Q value attributed to the residual values was estimated as 63.00000. The average effect size value was estimated as 12.0780. The results of the random effects meta-regression analysis obtained using the gender and mean age information of the 29 study participants included in the meta-analysis are shown in figure 14. According to the findings in figure 15, the Q value of the model is estimated as 27.00000, while the Q value is attributed to the residual values is estimated as 5. The average effect size value was estimated as 0.5308333333. The results of the random effects meta-regression analysis of 39 studies included in the meta-analysis are shown in figure 16. According to the findings in figure 16, the Q value of the model is estimated as 37.00000, while the Q value attributed to the residual values is estimated as 38. The average effect size value was estimated as 0.7042. The coefficients of the regression model were estimated as 0.0041 ($p<0.05$) for the null test (two-tailed) and 0.845 ($p>0.05$) for other heterogeneity statistics. The coefficients of the regression model were estimated as 0.000 ($p<0.05$) for the null test (two-tailed) and 0.000 ($p<0.05$) for other heterogeneity statistics. The results of the random effects meta-regression analysis of the 64 studies included in the meta-analysis are shown in figure 17. According to the findings in figure 17, the Q value of the model is estimated as 4.00000, while the Q value attributed to the residual values is estimated as 5. As a result of the three reports, both the model's Q values and estimated values were found to be statistically significant, respectively. The average effect size value was estimated as 0.5308333333. The coefficients of the regression model were estimated as 0.0041 ($p<0.05$) for the null test (two-tailed) and 0.845 ($p>0.05$) for other heterogeneity statistics. But as a result of the fourth report, both coefficients were interpreted and not interpreted because they were found significant in one and not significant in the other. Both coefficients were not interpreted because one of them was found to be significant. Significant meta-regression coefficients, standard errors, and p-values can be interpreted in the same way as traditional multivariate analyses used to measure the relationship between two or more quantitative variables.

Overview

The analysis is based on 64 studies, 29, 39 and 2 respectively. d: Effect size index, standardized difference in means.

Statistical Model

A fixed-effects (single-effects) model was used for the analysis. All studies included in the analysis were drawn from the same population and were identical in all material respects. The results of this analysis will only be used to make inferences for this population and will not be generalized to any other population. The random effects model was used for the analysis. It is assumed that the studies in the analysis are a random sample from the group where the results obtained by analyzing the data collected in a potential study will be valid and interpreted, and this analysis is used to make inferences on a limited part of it selected from the universe studied to collect information about it and its sample characteristics.

What is the Common Effect Size?

The first report result for these studies was a common effect size of 1.004 and a 95% confidence interval of 0.964 to 1.044. The second report result for these studies was a common effect size of 1.210 and a 95% confidence interval of 1.170 to 1.250, respectively. The fourth report result for these studies has a common effect size of 0.398 and a 95% confidence interval of 0.016 to 0.780. The effect size in this population could fall anywhere in this range. The third report result has an average effect size of 0.662 and a 95% confidence interval of 0.577 to 0.746. The average effect size in the counting of comparable studies and the aggregation of information across all units may fall anywhere in this range.

The Z value tests the null hypothesis that the common effect size is zero. The Z value is 48.931 with p<0.001, respectively. The Z value is 59.153 with p<0.001. The Z value is 15.346 with p<0.001. The Z value is 2.042 with p=0.041. Using an alpha criterion of 0.050, we reject the null hypothesis and conclude that the mean effect size in this universe of populations comparable to those in the analysis is not exactly zero.

Q-test for Heterogeneity

The Q inferential statistic provides a general propositional test for the null hypothesis that all studies in the analysis share a common effect size, which assumes that there is no unexpected situation, such as no relationship between groups or variables or no difference between two measured phenomena. If all studies share the same true effect size, the expected value of Q will be equal to the numerical freedom to vary (the number of studies minus one) by which number of values used in the precise calculation of a statistic is free to vary. The Q value, in turn, is 63104.544 with 63 degrees of freedom and p<0.001. The Q value is 503.370 with 28 degrees of freedom and p<0.001. Using the alpha criterion of 0.100, the Q value is 107.962 with 38 degrees of freedom and p<0.001. Using an alpha criterion of 0.100, we can reject the null hypothesis that the true effect size is the same in all these studies. The Q value is 2.028 with 5 degrees of freedom. Because the Q-value is less than the degrees of freedom, the amount of between-study variance in the observed effects is actually less than we would expect to see based on sampling error alone. There is no evidence that effect size varies across studies.

Heterogeneity Indices

Under the fixed effects model, we assume no change in the true effects. Therefore, all heterogeneity indices (I-squared, tau-squared and tau) are assumed to be zero. Additionally, we do not calculate an estimate interval. The estimate interval tells us how much the true effect size varies across studies, and is meaningless when all studies share the same true effect size.

I-square Statistics

The I-squared statistic is 65%, which tells us that approximately 65% of the variance in the observed effects reflects variance in the true effects rather than sampling error.

Tau-square and Tau

The variance of the true effect sizes of the third report, tau-squared, is 0.040 in d. The standard deviation of the true effect sizes, tau, is 0.199 in d.

Forecast Range

If we assume that the true effects of the third report are normally distributed (in d units), we can estimate that the estimate range is 0.249 to 1.075. The true effect sizes of the first, second, third, and fourth report in 95% of all comparable populations fall within this range (Table 2-6).

Table 2. Average effect size value for men and women (Hedges's g value)

Std dff in means	Std Err	Hedges's g	Std Err	Difference in means	Std Err
0,000	0,103	0,000	0,103	0,000	19,439
0,000	0,232	0,000	0,230	0,000	8,610
0,000	0,220	0,000	0,218	0,000	9,078
0,000	0,190	0,000	0,188	0,000	10,542
1,229	0,089	1,228	0,089	433,000	29,073
1,184	0,092	1,182	0,092	467,000	34,076
1,267	0,088	1,265	0,088	408,000	25,969
1,629	0,092	1,627	0,092	247,000	12,226
1,229	0,089	1,228	0,089	433,000	29,072
0,820	0,085	0,819	0,085	467,000	47,207

1,751	0,096	1,749	0,096	214,000	10,183
1,420	0,087	1,401	0,087	333,000	18,558
1,095	0,109	1,093	0,109	546,000	52,329
1,267	0,088	1,265	0,088	408,000	25,968
1,629	0,092	1,627	0,092	247,000	12,223
1,229	0,089	1,228	0,089	433,000	29,072

Table 3. Average effect size value for men and women

Std dff in means	Std Err	Hedges's g	Std Err	Difference in means	Std Err
1,703	0,219	1,700	0,219	615,000	76,034
2,151	0,199	2,146	0,199	615,000	51,726
0,964	0,213	0,962	0,213	348,000	76,034
0,934	0,184	0,932	0,184	267,000	51,726
0,942	0,130	0,941	0,129	605,000	81,704
0,483	0,167	0,480	0,166	42,000	14,365
0,666	0,188	0,662	0,187	58,000	16,017
0,418	0,209	0,415	0,208	22,000	10,910
0,720	0,256	0,714	0,253	38,000	13,146
0,458	0,234	0,454	0,232	20,000	10,080
0,686	0,271	0,678	0,268	30,000	11,573
0,377	0,291	0,371	0,287	10,000	7,649
0,750	0,375	0,735	0,367	20,000	9,733
0,428	0,258	0,423	0,255	15,000	8,936
0,711	0,310	0,701	0,306	25,000	10,648
0,586	0,227	0,581	0,225	31,000	11,804
0,567	0,224	0,562	0,223	30,000	11,674
0,614	0,234	0,609	0,231	32,000	11,927
0,538	0,222	0,533	0,221	28,000	11,401
0,545	0,165	0,543	0,164	52,000	15,480
0,608	0,172	0,605	0,171	58,000	16,058
0,595	0,227	0,590	0,225	32,000	11,967
0,558	0,221	0,553	0,220	30,000	11,709
0,518	0,170	0,516	0,170	45,000	14,575
0,633	0,183	0,630	0,182	55,000	15,593
0,515	0,066	0,515	0,066	301,000	37,730
0,637	0,071	0,636	0,071	372,000	40,498
0,468	0,149	0,466	0,148	51,000	15,976
0,679	0,170	0,676	0,169	74,000	18,112
0,533	0,150	0,531	0,149	61,000	16,852
0,620	0,158	0,167	0,157	71,000	17,733
0,528	0,143	0,526	0,142	66,000	17,564

0,624	0,152	0,622	0,151	78,000	18,576
0,516	0,126	0,514	0,126	81,000	19,576
0,636	0,137	0,634	0,136	100,000	21,009
0,532	0,180	0,529	0,179	42,000	13,992
0,620	0,190	0,617	0,189	49,000	14,737
0,515	0,066	0,515	0,066	301,000	37,730
0,637	0,071	0,636	0,071	372,000	40,498

Table 4. Average effect size value for men and women

Std dff in means	Std Err	Hedges's g	Std Err	Difference in means	Std Err
0,126	0,287	0,124	0,282	3,090	7,049
0,813	0,634	0,768	0,599	9,825	7,469
0,594	0,494	0,568	0,472	6,812	5,562
6,85	0,630	0,637	0,586	5,764	5,178
0,804	0,705	0,748	0,656	7,796	6,665
0,376	0,569	0,349	0,529	2,620	3,934

Table 5. Data analysis of weight (random) relative weight, weight (fixed) relative weight, cumulative weight (random) relative weight for men and women

Std dff in means	Standart Error	Variance	Lower limit	Upper limit	Z-value	0,000 P-value	Weight (Random) Relative Weight	Cümülatif analyzes Weight (Random) Relative Weight	Weight (Fixed) Relative Weight
0,000	0,103	0,011	-0,202	0,202	0,000	1,000	4,07	4,07	3,95
0,000	0,232	0,054	-0,455	0,455	0,000	1,000	3,40	7,47	0,78
0,000	0,220	0,049	-0,432	0,432	0,000	1,000	3,47	10,94	0,86
0,000	0,190	0,036	-0,372	0,372	0,000	1,000	3,65	14,59	1,16
1,229	0,089	0,008	1,054	1,404	13,773	0,000	4,12	18,71	5,25
1,184	0,092	0,009	1,003	1,365	12,817	0,000	4,11	22,82	4,91
1,267	0,088	0,008	1,094	1,439	14,412	0,000	4,13	26,95	5,42
1,629	0,092	0,009	1,448	1,810	17,641	0,000	4,11	31,06	4,91
1,229	0,289	0,008	1,055	1,404	13,773	0,000	4,12	35,18	5,25
0,820	0,085	0,007	0,653	0,987	9,615	0,000	4,13	39,31	5,76
1,751	0,096	0,009	1,562	1,940	18,174	0,000	4,10	43,41	4,51
1,402	0,087	0,008	1,231	1,573	16,076	0,000	4,13	47,53	5,50
1,095	0,109	0,012	0,881	1,309	10,026	0,000	4,05	51,58	3,51
1,267	0,088	0,008	1,094	1,439	14,412	0,000	4,13	55,70	5,42
1,629	0,092	0,009	1,448	1,810	17,644	0,000	4,11	59,81	4,91
1,229	0,089	0,008	1,055	1,404	13,773	0,000	4,12	63,94	5,25
0,820	0,085	0,007	0,653	0,987	9,615	0,000	4,13	68,07	5,76

1,751	0,096	0,009	1,562	1,940	18,174	0,000	4,10	72,16	4,51
1,402	0,087	0,008	1,231	1,573	16,076	0,000	4,13	76,29	5,50
1,095	0,109	0,012	0,881	1,309	10,026	0,000	4,05	80,34	3,51
1,267	0,088	0,008	1,094	1,439	14,412	0,000	4,13	84,46	5,42
1,629	0,092	0,009	1,448	1,810	17,644	0,000	4,11	88,57	4,91
1,706	0,170	0,029	0,373	1,040	4,147	0,000	3,76	92,33	1,44
0,603	0,174	0,030	0,263	0,943	3,478	0,001	3,74	96,07	1,39
5,396	0,873	0,763	3,684	7,108	6,179	0,001	0,92	96,99	0,05
5,227	1,175	1,381	2,924	7,530	4,449	0,001	0,56	97,55	0,03
4,537	1,097	1,202	2,388	6,686	4,138	0,001	0,63	98,18	0,03
4,107	0,762	0,581	2,614	5,600	5,390	0,001	1,13	99,32	0,07
4,100	1,048	1,097	2,047	6,153	3,914	0,001	0,68	100,00	0,04
1,205	0,095	0,009	1,020	1,390	12,747	0,001			
1,205			0,247	2,163					

Table 6. Data analysis of weight (random) relative weight, weight (fixed) relative weight, cumulative weight (random) relative weight for men and women

Std dff in means	Standart Error	Variance	Lower limit	Upper limit	Z-value	P-value	Weight (Random) Relative Weight	Cümülatif analyzes Weight (Random) Relative Weight	Weight (Fixed) Relative Weight
0,126	0,287	0,082	-0,437	0,688	0,438	0,661	46,11	46,11	46,11
0,813	0,634	0,402	-0,430	2,055	1,282	0,200	9,44	55,55	9,44
0,594	0,494	0,244	-0,375	1,563	1,202	0,229	15,52	71,07	15,52
0,685	0,630	0,397	-0,549	1,919	1,088	0,277	9,57	80,64	9,57
0,804	0,705	0,497	-0,578	2,187	1,140	0,254	7,63	88,27	7,63
0,376	0,569	0,323	-0,739	1,490	0,660	0,509	11,73	100,00	11,73
0,398	0,195	0,038	0,016	0,780	2,042	0,041			

The average effect size values of these 3 reports estimated according to the transformed Fisher correlation values obtained from 29, 39 and 64 studies are presented in table 2, table 3 and table 4. As shown in table 2, the average effect size value for the fixed effects model is 1.622, while the effect size value for the random effects model is 1.624. In order to calculate the Pearson value from the Fisher value estimated with the fixed effect model, it is sufficient to write = FISHERTINV (1.622) in the Microsoft Excel program. As a result of the transformation calculations, the average effect size value of the fixed effect model was calculated as 1.622, while the effect size value of the random effects model was calculated as 1.624. An easy way to obtain the converted coefficient values from Fisher correlation to Pearson correlation is to type / PRINT=IVZR in the MEANES macro. The Q value (Q=62.00000) calculated from the fixed effect model was found to be significant ($p<0.000$). The Q value (Q=27.00000) calculated from the fixed effect model was found to be significant ($p<0.000$). As shown in table 3, the average effect size value of the fixed effect model is 0.7040, while the effect size value of the random effect model is 0.7042. In order to interpret the average effect size value, the av-

erage values obtained according to the Fisher correlation must be converted to Pearson correlation values. In order to calculate the Pearson value from the Fisher value estimated with the fixed effect model, it is sufficient to write = FISHERTINV (0.7040) in the Microsoft Excel program. As a result of the transformation calculations, the average effect size value of the fixed effect model was calculated as 0.7040, while the effect size value of the random effects model was calculated as 0.7042. The Q value (Q=37.00000) calculated from the fixed effect model was found to be significant (p<0.000). As shown in table 4, the average effect size value of the fixed effect model is 0.5308111111, while the effect size value of the random effects model is 0.5308333333. In order to interpret the average effect size value, the average values obtained according to the Fisher correlation must be converted to Pearson correlation values. In order to calculate the Pearson value from the Fisher value estimated with the fixed effect model, it is sufficient to write = FISHERTINV (0.5308111111) in the Microsoft Excel program. As a result of the transformation calculations, the average effect size value of the fixed effect model was calculated as 0.5308111111, while the effect size value of the random effects model was calculated as 0.5308333333. An easy way to obtain the converted coefficient values from Fisher correlation to Pearson correlation is to type / PRINT=IVZR in the MEANES macro. The Q value (Q=4.00000) calculated from the fixed effect model was found to be significant (p>0.845). This finding also indicates that there is heterogeneity among the studies included in the meta-analysis. In addition to this test, the I^2 value can be calculated using the Q value. In this study, using the equation $I^2=Q / (n-1) / Q$, the I^2 value was calculated as 0.025559449942, 4.68613448253, -22.1867421698, -6.0540404675. According to the calculated I^2 value, we can say that heterogeneity is high.

Combined Findings and Heterogeneity Test Results of Effect Sizes of Studies According to Fixed and Random Effects Models

The combined average effect size of the effect sizes according to the fixed and random effects model (without removing outliers), standard error and lower and upper limits according to the 95% confidence interval are given in table 7, table 8, table 9 and table 10 according to the fixed and random effects model.

Table 7. Findings on average effect sizes of studies according to fixed and random effects models / combined findings of meta-analysis of effect sizes of studies according to fixed and random effects models and homogeneity test / findings on average effect sizes of studies according to fixed and random effects models

Model	Effect size and 95%confidence interval						Test of null (2-Tail)		Prediction interval
Model	Number studies	Point estimate	Standart Error	Variance	Lower limit	Upper limit	Z-value	P-value	Lower limit Upper limit
Fixed	64	1,004	0,021	0,000	0,964	1,044	48,931	0,000	
Random	64	27,061	0,691	0,477	25,708	28,414	39,189	0,000	16,303 37,819

Table 8. Findings on average effect sizes of studies according to fixed and random effects models / combined findings of meta-analysis of effect sizes of studies according to fixed and random effects models and homogeneity test / findings on average effect sizes of studies according to fixed and random effects models

Model	Effect size and 95%confidence interval						Test of null (2-Tail)		Prediction interval
Model	Number studies	Point estimate	Standart Error	Variance	Lower limit	Upper limit	Z-value	P-value	Lower limit Upper limit
Fixed	29	1,210	0,0020	0,000	1,170	1,250	59,153	0,000	
Random	29	1,205	0,095	0,009	1,020	1,390	12,747	0,000	0,247 0,2163

Table 9. Findings on average effect sizes of studies according to fixed and random effects models / combined findings of meta-analysis of effect sizes of studies according to fixed and random effects models and homogeneity test / findings on average effect sizes of studies according to fixed and random effects models

Model	Effect size and 95%confidence interval						Test of null (2-Tail)		Prediction interval	
Model	Number studies	Point estimate	Standart Error	Variance	Lower limit	Upper limit	Z-value	P-value	Lower limit	Upper limit
Fixed	39	0,625	0,023	0,0001	0,580	0,670	27,129	0,000		
Random	39	0,662	0,043	0,002	0,577	0,746	15,346	0,000	0,249	1,075

Table 10. Findings on average effect sizes of studies according to fixed and random effects models / combined findings of meta-analysis of effect sizes of studies according to fixed and random effects models and homogeneity test / findings on average effect sizes of studies according to fixed and random effects models

Model	Effect size and 95%confidence interval						Test of null (2-Tail)		Prediction interval	
Model	Number studies	Point estimate	Standart Error	Variance	Lower limit	Upper limit	Z-value	P-value	Lower limit	Upper limit
Fixed	6	0,398	0,195	0,038	0,0016	0,780	2,042	0,041		
Random	6	0,398	0,195	0,038	0,0016	0,780	2,042	0,041	0,000	0,000

Using the correlation values of 64, 29, 39, and 64 studies included in the meta-analysis and the gender information of the sample, Q values and average effect size values were estimated separately for women and men using the CMA software method. According to the outputs presented in figure 14, figure 15, figure 16, respectively, the inter-group Q value was estimated as 62.00000, 27.00000, 37.00000 and the intra-group Q value was estimated as 5 ($p<0.000$). When we look at the distribution of the Q value within the groups, the Q value for men was 63, while the Q value for women was estimated to be the same as 63 ($p<0.000$). When we look at the distribution of the Q value within the groups, the Q value for men was 28, while the Q value for women was estimated to be the same as 28 ($p<0.000$). When we look at the distribution of the Q value within the groups, the Q value for men was 38, while the Q value for women was estimated to be the same as 38 ($p<0.000$). The mean effect size (ES) value, standard error (SE) and confidence interval (CI) values for each group are given in table 2 and table 7, table 2 and table 8, table 3 and table 9. As seen in table 5, the average effect size values for men and women are 0.000, 0.000, 0.000, 0.000, 1.228, 1.182, 1.265, 1.627, 1.228, 0.819, 1.749, 1.401, 1.093, 1.265, 0.701, 0.581, 0.562, 0.609, 0.533, 0.543, 0.605, 0.590, 0.553, 1.627, 1.228, 0.819, 1.749, 1.401, 1.093, 1.265, 1.627, It was estimated as 0.703, 0.600, 5.233, 4.894, 4.221, 3.965, 3.814 ($p<0.000$). As seen in table 10, the average effect size values for men and women are 1.700, 2.146, 0.962, 0.932, 0.941, 0.480, 0.662, 0.415, 0.714, 0.454, 0.678, 0.371, 0.735, 0.423, 0.701, 0.581, 0.562, 0.609, 0.533, 0.543, 0.605, 0.590, 0.553, 0.516, 0.630, 0.515, 0.636, 0.466, 0.676, 0.531, 0.167, It was estimated as 0.526, 0.622, 0.514, 0.634, 0.529, 0.617, 0.515, 0.636 ($p<0.000$). According to the results presented in figure 15, the inter-group Q value was estimated as 4.00000 and the intra-group Q value was estimated as 5 ($p<0.041$). When we look at the distribution of the Q value within the groups, the Q value for men is 5, while the Q value for women is estimated to be the same as 5 ($p>0.845$). The mean effect size (ES) value, standard error (SE) and confidence interval (CI) values for each group are given in table 4 and table 10. As seen in table 4, the average effect size value for men and women was estimated as 0.124, 0.768, 0.568, 0.637, 0.748, 0.349 ($p>0.845$) (Table 11, table 12, table 13 and table 14).

Table 11. Tau and Tau-square, Q-test for heterogeneity, I-square statistics values for men and women

Between study		Other heterogenety statistics			
Tau	Tausq	Q-value	df(Q)	P-value	I-squared
5,337	28,487	63104,544	63	0,000	99,900

Table 12. Tau and Tau-square, Q-test for heterogeneity, I-square statistics values for men and women

Between study		Other heterogenety statistics			
Tau	Tausq	Q-value	df(Q)	P-value	I-squared
0,457	0,209	503,370	28	0,000	94,437

Table 13. Tau and Tau-square, Q-test for Heterogeneity, I-square statistics values for men and women

Between study		Other heterogenety statistics			
Tau	Tausq	Q-value	df(Q)	P-value	I-squared
0,199	0,040	107,962	38	0,000	64,802

Table 14. Tau and Tau-square, Q-test for Heterogeneity, I-square statistics values for men and women

Between study		Other heterogenety statistics			
Tau	Tausq	Q-value	df(Q)	P-value	I-squared
0,000	0,000	2,028	5	0,845	0,000

The effect size values of the studies included in the research according to racial discrimination were calculated according to the random effects model as follows: EB=12.0780, the standard error of the average effect size SH=0.691, the confidence interval of the average effect size was calculated as 28.414 and its lower limit as 25.708, EB=1.624, SH=0.095, its upper limit as 1.390 and its lower limit as 1.020, EB=0.7042, SH=0.043, its upper limit as 0.746 and its lower limit as 0.577, EB=0.5308333333, SH=0.195, its upper limit as 0.780 and its lower limit as 0.0016. According to the calculations, the data from 64, 29, 39, and 64 studies included in the meta-analysis show that the racial indicator is higher in individuals separated by races according to the random effects model. In the evaluation of effect size; in Cohen's classification, if the d effect size value is 0.20-0.50, the effect level is low, if it is 0.50-0.80, the effect level is medium, and if it is greater than 0.80, the effect level is high (84). In this study, since the effect size value was above 0.80, a high level of effect size was found according to Cohen's classification.

According to the classification made by Thalheimer and Cook;
- 0.15<d<0.15 indicates insignificant,
0.15<d<0.40 indicates low,
0.40<d<0.75 indicates medium,
0.75<d<1.10 indicates high,
1.10<d<1.45 indicates very high,

1.45<d indicates excellent effect size (85). According to this classification, it was observed that there was a high level of difference (1.10-1.45). When statistical significance was calculated according to the Z test, it was found as Z=31.395.585714286, Z=11.132046093, Z=1.1664499466, Z=0.0877047016, respectively. It was determined that the result achieved had statistical significance with p=0.00 (Table 15, table 16, table 17 and table 18).

Table 15. Publication bias test results. Egger's regression intercept

Intercept	30,98823
Standart Error	3,29739
95% lower limit (2-tailed)	24,39684
95% upper limit (2-tailed)	37,57962
t-value	9,39780
df (Q)	62,00000
p-value (1-tailed)	0,00000
p-value (2-tailed)	0,00000

Table 16. Publication bias test results. Egger's regression intercept

Intercept	0,51203
Standart Error	1,844466
95% lower limit (2-tailed)	-3,27290
95% upper limit (2-tailed)	4,29696
t-value	0,27758
df (Q)	27,00000
p-value (1-tailed)	0,39173
p-value (2-tailed)	0,78345

Table 17. Publication bias test results. Egger's regression intercept

Intercept	0,85006
Standart Error	0,59477
95% lower limit (2-tailed)	-0,35505
95% upper limit (2-tailed)	2,05518
t-value	1,41924
df (Q)	37,00000
p-value (1-tailed)	0,08066
p-value (2-tailed)	0,16132

Table 18. Publication bias test results. Egger's regression intercept

Intercept	1,63133
Standart Error	0,29920
95% lower limit (2-tailed)	0,80061
95% upper limit (2-tailed)	2,46204
t-value	5,45229
df (Q)	4,00000
p-value (1-tailed)	0,00275
p-value (2-tailed)	0,00550

Classic fail-safe N

Z-value for observed studies	180,37842
P-value for observed studies	0,00000
Alpha	0,5000
Tails	2,00000
Z for alpha	1,95996
Number of observed studies	64,00000
Number of missing studies that would bring p-value to>alpha	2004,00000

Classic fail-safe N

Z-value for observed studies	53,81042
P-value for observed studies	0,00000
Alpha	0,5000
Tails	2,00000
Z for alpha	1,95996
Number of observed studies	29,00000
Number of missing studies that would bring p-value to>alpha	1831,00000

Classic fail-safe N

Z-value for observed studies	25,32271
P-value for observed studies	0,00000
Alpha	0,05000
Tails	2,00000
Z for alpha	1,95996
Number of observed studies	39,0000
Number of missing studies that would bring p-value to>alpha	6472,00000

Classic fail-safe N

Z-value for observed studies	2,37192
P-value for observed studies	0,001770
Alpha	0,05000
Tails	2,00000
Z for alpha	1,95996
Number of observed studies	6,00000
Number of missing studies that would bring p-value to>alpha	3,00000

Orwin's fail-safe N

Std dff in means in observed studies	1,00413
Criterian for a "trivial" std dff in means	0,00000
Mean std dff in means in missing studies	0,00000
Criterian must fall between other values	

Orwin's fail-safe N

Std dff in means in observed studies	1,21001
Criterian for a "trivial" std dff in means	0,00000
Mean std dff in means in missing studies	0,00000
Criterian must fall between other values	

Orwin's fail-safe N

Std dff in means in observed studies	0,62514
Criterian for a "trivial" std dff in means	0,00000
Mean std dff in means in missing studies	0,00000
Criterian must fall between other values	

Orwin's fail-safe N

Std dff in means in observed studies	0,39785
Criterian for a "trivial" std dff in means	0,00000
Mean std dff in means in missing studies	0,00000
Criterian must fall between other values	

Begg and Mazumdar rank correlation
Kendall's S statistic (P-Q) respectively, 571,00000, 12,00000, 117,00000, 11,0000
Kendall's tau without continuity correction

Tau	0,28337
Z-value for tau	3,30816
P-value (1-tailed)	0,00047
Z-value (2-tailed)	0,00094

Begg and Mazumdar rank correlation
Kendall's S statistic (P-Q) respectively, 571,00000, 12,00000, 117,00000, 11,0000
Kendall's tau without continuity correction

Tau	0,02956
Z-value for tau	0,22510
P-value (1-tailed)	0,41095
Z-value (2-tailed)	0,82190

Begg and Mazumdar rank correlation
Kendall's S statistic (P-Q) respectively, 571,00000, 12,00000, 117,00000, 11,0000
Kendall's tau without continuity correction

Tau	0,15832
Z-value for tau	1,41533
P-value (1-tailed)	0,07849
Z-value (2-tailed)	0,15697

Begg and Mazumdar rank correlation
Kendall's S statistic (P-Q) respectively, 571,00000, 12,00000, 117,00000, 11,0000
Kendall's tau without continuity correction

Tau	0,73333
Z-value for tau	2,06654
P-value (1-tailed)	0,01939
Z-value (2-tailed)	0,03878

Kendall's tau with continuity correction

Tau	0,28288
Z-value for tau	3,30236
P-value (1-tailed)	0,00048
Z-value (2-tailed)	0,00096

Kendall's tau with continuity correction

Tau	0,02709
Z-value for tau	0,20634
P-value (1-tailed)	0,41826
Z-value (2-tailed)	0,83653

Kendall's tau with continuity correction

Tau	0,15697
Z-value for tau	1,40324
P-value (1-tailed)	0,08027
Z-value (2-tailed)	0,16055

Kendall's tau with continuity correction

Tau	0,66667
Z-value for tau	1,87867
P-value (1-tailed)	0,03014
Z-value (2-tailed)	0,06029

Duval and Tweedie's trim and fill (to left of mean, fixed effect model)

	Fixed Effects Studies Trimmed Point Estimate Lower limit Upper limit	Random Effects Point Estimate Lower limit Upper limit	Q-value
Observed values	1,00414 0,96391 .1,04436	27,06094 25,70751 28,41437	63104,544
Adjusted values	25 .0,65175 .0,61165 0,69184	4,62648 3,08761 6,16536	115296,156

Duval and Tweedie's trim and fill (to left of mean, fixed effect model)

	Fixed Effects Studies Trimmed Point Estimate Lower limit Upper limit	Random Effects Point Estimate Lower limit Upper limit	Q-value
Observed values	1,21001 1,16992 1,25010	1,20516 1,01986 1,39047	503,37008
Adjusted values	3 1,20533 1,6526 1,24540	1,12651 0,93632 1,31670	547,39924

Duval and Tweedie's trim and fill (to left of mean, fixed effect model)

	Fixed Effects Studies Trimmed Point Estimate Lower limit Upper limit	Random Effects Point Estimate Lower limit Upper limit	Q-value
Observed values	0,62515 0,57998 0,67031	0,66179 0,57727 0,74631	107,96194
Adjusted values	0...0,62515 0,57998 0,67031	0,66179 0,57727 0,74631	107,96194

Duval and Tweedie's trim and fill (to left of mean, fixed effect model)

	Fixed Effects Studies Trimmed Point Estimate Lower limit Upper limit	Random Effects Point Estimate Lower limit Upper limit	Q-value
Observed values	0,39785 0,01604 0,77966	0,39785 0,01604 0,77966	2,02767
Adjusted values	3 0,26474 -0,07454 0,60402	0,26474 -0,007454 0,60402	4,27227

Duval and Tweedie's trim and fill (to left of mean, fixed effect model)

	Fixed Effects Studies Trimmed Point Estimate Lower limit Upper limit	Random Effects Point Estimate Lower limit Upper limit	Q-value
Observed values	1,00414 0,96391 1,04436	27,06094 25,70751 28,41437	63104,544
Adjusted values	0 1,00414 0,96391 1,04436	27,06094 25,70751 28,41437	63104,544

Duval and Tweedie's trim and fill (to left of mean, fixed effect model)

	Fixed Effects Studies Trimmed Point Estimate Lower limit Upper limit	Random Effects Point Estimate Lower limit Upper limit	Q-value
Observed values	1,21001 1,16992 1,25010	1,20516 1,01986 1,39047	503,37008
Adjusted values	3...1,21001 1,16992 1,25010	1,20516 1,01986 1,39047	503,37008

Duval and Tweedie's trim and fill (to left of mean, fixed effect model)

	Fixed Effects Studies Trimmed Point Estimate Lower limit Upper limit				Random Effects Point Estimate Lower limit Upper limit			Q-value
Observed values			0,62515	0,57998	0,67031	0,66179	0,57727	0,74631	107,96194
Adjusted values	6	0,64006	0,59659	0,68354	0,68114	0,60365	0,75862	113,82607

Duval and Tweedie's trim and fill (to left of mean, fixed effect model)

	Fixed Effects Studies Trimmed Point Estimate Lower limit Upper limit				Random Effects Point Estimate Lower limit Upper limit			Q-value
Observed values			0,39785	0,01604	0,77966	0,39785	0,01604	0,77966	2,02767
Adjusted values	0	0,39785	0,01604	0,77966	0,39785	0,01604	0,77966	2,02767

Publication bias test results for the studies included in the meta-analysis are given in table 15, table 16, table 17 and table 18. Orwin's Fail-Safe N was also calculated to test for publication bias. Orwin's Fail-Safe N calculates the number of studies that may be missing in a meta-analysis (86). As a result of these analyses, Orwin's Fail-Safe N was calculated as 1.00413, respectively. The number of studies required for the average effect size of 12.0780 found as a result of the meta-analysis to reach the level of 0.01 (trivial), that is, almost zero effect level, is 1.00413. As a result of this analysis, Orwin's Fail-Safe N was calculated as 1.21001. The number of studies required for the 1.624 average effect size found as a result of the meta-analysis to reach the level of 0.01 (trivial), that is, almost zero effect level, is 1.21001. According to the inclusion criteria, 64, 29, 39, 64 studies were determined as all studies conducted in Turkey on this research question. Since it was not possible to reach 1.00413 studies other than these, this result was accepted as another indicator that there was no publication bias in this meta-analysis. According to the results of Duval and Tweedie, when included in the study, it was seen that the average effect size of 12.0780 found in the meta-analysis changed to 37.819. Since this change was insignificant, the reported effect size can be considered reliable. The significance of the Egger test result (p=0.00000) was accepted as another indicator of publication bias in this meta-analysis. Another method, Kendall's Tau coefficient was found to be 0.28288 and p=0.00048, p=0.00096. Since it is not possible to reach 1.21001 studies other than these, this result was accepted as another indicator that there is no publication bias in this meta-analysis. According to the result of Duval and Tweedie, when included in the study, it was seen that the average effect size of 1.624 found in the meta-analysis result changed to 0.2163. As a result of this analysis, Orwin's Fail-Safe N was calculated as 0.39785. The number of studies required for the average effect size of 0.5308333333 found as a result of the meta-analysis to reach the level of 0.01 (trivial), that is, almost zero effect level, is 0.39785. The 64 studies determined according to the inclusion criteria are all the studies conducted in Turkey on this research question. Since it was not possible to reach 0.39785 studies apart from these, this result was accepted as another indicator of the absence of publication bias in this meta-analysis. According to the results of Duval and Tweedie, when included in the study, it was seen that the average effect size of 0.5308333333 found in the meta-analysis changed to 0. Since this change was insignificant, the reported effect size can be considered reliable. The significance of the Egger test result (p=0.39173 and p=0.78345) was accepted as another indicator of publication bias in this meta-analysis. Another method, Kendall's Tau coefficient was found to be 0.02709 and p=0.41826, p=0.83653. As a result of this analysis, Orwin's Fail-Safe N was calculated as 0.62514. The number of studies required for the average effect size of 0.7042 found as a result of the meta-analysis to reach the level of

0.01 (trivial), that is, almost zero effect level, is 0.62514. The 39 studies determined according to the inclusion criteria are all the studies conducted in Turkey on this research question. Since it is not possible to reach 0.62514 studies other than these, this result was accepted as another indicator that there is no publication bias in this meta-analysis. According to the results of Duval and Tweedie, when included in the study, it was seen that the average effect size of 0.7042 found in the meta-analysis changed to 1.075. Since this change was insignificant, the reported effect size can be considered reliable. The significance of the Egger test result (p=0.08066 and p=0.16132) was accepted as another indicator of publication bias in this meta-analysis. Another method, Kendall's Tau coefficient was found to be 0.15697 and p=0.08027, p=0.16055. As a result of this analysis, Orwin's Fail-Safe N was calculated as 0.39785. The number of studies required for the 0.5308333333 average effect size found as a result of the meta-analysis to reach the 0.01 level (trivial), that is, almost zero effect level, is 0.39785. The 64 studies determined according to the inclusion criteria constitute all the studies conducted in Turkey regarding this research question. Since it was not possible to reach 0.39785 studies apart from these, this result was accepted as another indicator of the absence of publication bias in this meta-analysis. According to the results of Duval and Tweedie, when included in the study, it was seen that the average effect size of 0.5308333333 found in the meta-analysis changed to 0. Since this change was insignificant, the reported effect size can be considered reliable. The significance of the Egger test result (p=0.00275 and p=0.00550) was accepted as another indicator of publication bias in this meta-analysis. Another method, Kendall's Tau coefficient, was found to be 0.66667 and p=0.03014, p=0.06029, and in this case, the expectation that the p-value would not create a significant difference, that is, greater than 0.05, was met, and thus, it was statistically demonstrated that there was no publication bias (Table 15, table 16, table 17 and table 18).

Homogeneity Test and Q and I^2 Statistics

With the Levene Test in 64 studies, Q=62.00000 and Q=4.00000 were calculated for the Q-statistics. From the chi square table, the values of 64, 39 degrees of freedom at the 95% significance level were found to be 99.900, 0.000, 64.802. Respectively, the Q-statistic value (Q=63) was calculated as the critical value of the chi-square distribution with 64 degrees of freedom (x^2 0.95 =99.900), and the homogeneity test in 29 studies, also known as Q-statistics, was calculated as Q=27.00000. From the chi-square table, the value of 29 degrees of freedom was found as 94.437 at a significance level of 95%. Since the Q-statistic value (Q=28, Q=38, Q=5) exceeded the critical value of the chi-square distribution (x20.95=94.437, x20.95=64.802, x20.95=0.000) with 29, 39, 64 degrees of freedom, the hypothesis of the absence of homogeneity of the distribution of effect sizes was rejected in the fixed effects model. In other words, it was determined that the distribution of effect sizes had a heterogeneous feature according to the random effects model. Developed as a complement to the Q statistic, I^2 provides a clearer result regarding heterogeneity. I^2 shows the ratio of total variance to effect size. Unlike the Q statistic, the I^2 statistic is not affected by the number of studies. In the I^2 interpretation, 25% represents low heterogeneity, 50% represents moderate heterogeneity, and 75% represents high heterogeneity (60). As a result of the homogeneity tests (Q and I^2) performed respectively, there is a low level of heterogeneity among the studies (I^2=99.900), (I^2=94.437), (I^2=64.802), (I^2=0.000). The model was converted to a random model for the assembly process. Since there was a high level of heterogeneity among the studies as a result of the homogeneity tests, meta-analysis was performed using CMA software to determine the possible causes of this heterogeneity.

Features of Research Articles

All of the research articles in the study and published in medical journals were prepared by medical researchers. The majority of the evaluated studies (n=78; 71.17%), 442 articles, were published between 2000 and 2023. Of these, 93 (14.97%) were between 1990 and 1988. 2 (0.322%) were in 1990. 21 (3.381%) were between 1980-1984. Three of these (0.483%) were between 1978 and 1979. 1 (0.16103%) from 1976, 3 (0.483%) from 1974, 1 (0.1647%)

from 1972, 5 (0.823%) from 1971, 1 (0.1647%) from 1967, 1 (0.16103%) from 1964, 1 (0.16103%) from 1963, 2 (0.322%) from 1960, 1 (0.16103%) from 1959 1 (0.16103%) from 1925, 2 (0.334%) from 1922, 1 (0.16103%) these are studies from 1921, 2 (0.322%) from 1896, 1 (0.16103%) from 1877, 1 (0.16103%) from 1869, 2 (0.322%) from 1860, 2 (0.16103%) from 1851, 2 (0.322%) from 1846, five (0.823%) from 1832, 1 (0.16103%) from 1779 and 1 (0.16103%) from 1775. The review subjects included different fields of medicine, and the design types of the studies included in the review were mostly mixed (n=621; 100%), and experimental and non-experimental designs were used together. Most of the publications in the review articles were accessed from electronic media, databases and search engines, and the most frequently used databases are "PubMed, NCBI, Wiley, TÜBİTAK, ULAKBİM, Google Scholar etc." The number of databases scanned was 78 in 41 articles. The number of studies included in the reviewed reviews was 206. The characteristics of the research articles and literature review studies are as follows (∑n=284) (Table 19)

Table 19. Randomized studies revealing the vital capacity of white races in publications by year and date

1832	Jefferson T. Notes on the State of Virginia. Boston, MA: Lilly and Wait, 1832 (69).
1846	Hutchinson J. On the capacity and respiratory functions of the lungs, with a view to establishing an accurate and easy method of detecting disease by spirometry. Med Chir Trans (London). 1846;29:137–252 (13).
1851	Cartwright S. Report on the diseases and physical peculiarities of the Negro race. New Orleans Med Surg J. 1851;7:691–715 (15).
1860	Cartwright S. Slavery in the light of ethnology. In: Elliott EN, editor. Cotton is king and defends slavery. Augusta GA: Pritchard, Abbott & Loomis, 1860 (14).
1869	Gould B. Investigations in the Military and Anthropological Statistics of American Soldiers. New York: Hurd and Houghton, 1869 (16).
1896	Hoffman F. Race Traits and Tendencies of the American Negro. NewYork: American Economic Association Macmillan Company, 1896 (18).
1922	Stewart CA. Diagnostic value of determining the vital capacity of children's lungs. JAMA. 1922;78:1107–9 (32).
1925	Myers JA. Vital Capacity of the Lungs: A Handbook for Clinicians and Others Interested in the Examination of the Heart and Lungs Both in Health and Disease. Baltimore, MD: Williams & Wilkins, 1925 (31).
1966	Damon A. Black-white differences in lung function. Hum. Biol. 1966;38(4):380–93 (82).
1984	Myers JE. Different ethnic standards for lung function or one standard for all? S Afr Med J. 1984;65(19):768-72 (25).
1986	Massey DG, Fournier-Massey G. Japanese-American pulmonary reference values: influence of the environment on anthropology and physiology. Environ Res 1986;39(2):418–33 (36).
1988	Marcus EB, MacLean CJ, Curb J D, Johnson L R, Vollmer W M, Buist A S. Reference values for FEV_1 in Japanese-American men aged 45 to 68 years. Am. Rev. Respiratory. External. 1988;138(6):1393–97 (37).
1991	Chatterjee S, Mandal A. Pulmonary function studies in healthy school boys in West Bengal. Jpn J Physiol. 1991;41(5):797–808 (75). Aelony Y. Ethnic norms for pulmonary function tests. Chest. 1991;99(4):1051 (28).
1996	Sharp DS, Enright PL, Chiu D, Burchfiel CM, Rodriguez BL, Curb JD. Reference values for pulmonary function tests in Japanese-American men aged 71 to 90 years. Am. J. Respiration. Critical Care Med. 1996;153(2):805-11 (81).
1999	Hankinson JL, Odencrantz JR, Fedan KB. Spirometric reference values from a sample of the general US population. Am J Respir Crit Care Med. 1999;159(1):179–87 (68).
2000	Korotzer B, Ong S, Hansen JE. Ethnic Differences in Respiratory Function in Healthy Nonsmoking Asian-Americans and European-Americans, American Journal of Respiratory and Critical Care Medicine, 2000;161(4):1101-8 (5).
2005	Whittaker AL, Sutton AJ, Beardsmore CS. Are ethnic differences in lung function explained by breast size? Arch Dis Child Fetal Neonatal Ed. 2005;90(5):423–8 (74).

2008	Whitrow MJ, Harding S. Ethnic differences in adolescent lung function: anthropometric, socioeconomic, and psychosocial factors. J Respir Crit Care Med. 2008;177(11):1262–7 (60).
2010	Kumar R, Seibold MA, Aldrich MC, et al. Genetic ancestry in lung function prediction. N Eng J Med. 2010;363(4):321–30 (23).
2012	Quanjer PH, Quanjer PH, Cole TJ, et al. Multi-ethnic reference values for spirometry for the 3-95-yr age range: the global lung function 2012 equations. Eur Respir J. 2012;40(6):1324–43 (22). Burney PG, Hooper RL. The use of ethnically specific norms for ventilatory function in African-American and white populations. Int J Epidemiol. 2012;41(3):782–90 (76).
2014	Braun L. Breathing Race into the Machine: The Surprising Career of the Spirometer from Plantation to Genetics. Minneapolis, MN: University of Minnesota Press, 2014 (17).
2015	Burney P, Jarvis D, Perez-Padilla R. The global burden of chronic respiratory disease in adults. Int J Tuberc Lung Dis. 2015;19(1):10–20 (77).
2018	Heidi LL, Stephen ED. Science reflects history as society influences science: brief history of "race," "race correction," and the spirometer Department of Physiology, College of Osteopathic Medicine, Michigan State University, East Lansing, Michigan Submitted 27 December 2017; accepted in final form 9 February 2018 Adv Physiol Educ 2018;42:163-5 (38).
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DISCUSSION

The widespread use of the principle that diagnostic and treatment methods used today should be based on scientific evidence and the increasing number of medical literature sources have made the Meta-analysis research method even more important (61-63). To advance scientific knowledge on a topic, systematic reviews of articles or new large-scale clinical studies that combine and summarize existing literature would be more useful (63). A meta-analysis of randomized controlled clinical trials is demonstrated in this study. In conclusion; Meta-analyses provide a great opportunity to collect scattered information and produce high-level evidence-based information. Systematic research articles, known as the best source of evidence in the field of health, are gradually increasing in the medical literature of our country (21). In this study, systematic articles containing racial discrimination published in medical journals in Turkey between 1832-2023, that is, in 191 years, were examined.

Although there is no comparable publication on the reporting quality and characteristics of systematic articles published in medical journals in Turkey, a study conducted in China revealed that systematic articles published by medical researchers had serious reporting deficiencies, especially in the methods and results sections (29-31). There is no information anywhere in the literature about the protocol-registration numbers of the systematic articles evaluated and whether an existing systematic article in the literature has been updated. However, systematic articles need to be planned and registered within a certain protocol due to their methodology. The purpose of the protocol and registration is to prevent duplication of systematic articles, to ensure their updating and to demonstrate transparency in methodology. It was created as an international database prepared for researchers planning systematic articles, for the purpose of capturing data or converting information into one of the recording formats to be stored in some data storage devices (56,60). The absence of protocol-registration numbers in most of the systematic articles reviewed in the literature can be attributed to the lack of awareness of researchers about systematic article protocol and registration and the lack of policy on this issue in medical journals in our country (83).

Systematic articles summarize the facts on which a proposition from multiple studies is true to answer a particular research question and the reasoning that leads to a particular conclusion (65). For this purpose, how the findings or results of the articles to be included in the systematic article are synthesized and combined is explained in the methods and findings section. As stated in the article by Ata and Urman (2009), systematic articles are research projects and the question the article tries to answer should be clear and concise (66). At the same time, the aims of the article are included in this question and form the basis for the development of inclusion criteria (12,66). Pubmed, MEDLINE ranked first among the databases from which the studies included in the article were obtained. The findings provide some evidence about the databases and literature search opportunities that are most easily accessible to medical researchers in our country.

This systematic article summarizes the methods used to address racial differences in vital capacity in young and elderly individuals in studies in the literature and the available empirical evidence on the effect of racial vital capacity factors. The methods evaluated in the studies included in the systematic article are listed as follows. In the clinical studies in the literature, it has been determined that all of these methods have an increasing effect on the lung volume and capacity of individuals compared to before the PFT application in the treatment of individuals with racial differences or low vital capacity quality in different regions. As the clinical use of PFT increases, it is important for researchers to examine all aspects of lung volume and capacity and discuss the results. Based on this fact, we used the meta-analysis method in our systematic research study to investigate the validity of the claim that the lung capacity of the black race is low, dating back to the end of the 19th century. Effect size is the dependent variable of the experiment. In our study, a random effect size model was used, which accepts that the true effect size of each study may dif-

fer. The average effect size with standard error and 95% confidence interval was calculated as 12.0780 in the first report; 0.5308333333 in the second report; 0.7042 in the third report and 0.5308333333 in the fourth report. At the same time, the common effect size was found to be 1.004 in the first report, 1.210 in the second report, 0.662 in the third report and 0.398 in the fourth report.

When the effect sizes of the studies conducted on the right side of the forest plots of figure 2, figure 3, figure 4 and figure 5 are examined according to the racial discrimination variable, it is seen that there is a difference greater than zero in favor of the success of the random effects model in PFTs according to the lung volumes and capacities of the individuals. The Z value tests the null hypothesis that the common effect size is zero. The Z value is 48.931 and $p<0.001$. When statistical significance was calculated according to the Z test, it was found as Z=59.153 and 15.346. The result was determined to be statistically significant at p=0.001. In the evaluation of effect size; in Cohen's classification, if the d effect size value is 0.20-0.50, the effect level is low, if it is 0.50-0.80, the effect level is medium, and if it is greater than 0.80, the effect level is high (34). In this study, since the effect size value was above 0.80, a high effect size was found according to Cohen's classification. According to the classification made by Thalheimer and Cook (2002); $-0.15<d<0.15$ indicates insignificant effect size, $0.15<d<0.40$ indicates low effect size, $0.40<d<0.75$ indicates medium effect size, $0.75<d<1.10$ indicates high effect size, $1.10<d<1.45$ indicates very high effect size, and $1.45<d$ indicates excellent effect size (67). According to this classification, it was observed that there was a very high level of difference (1.10-1.45). The result obtained was determined to be statistically significant at p=0.00. This value was found to be an excellent effect size according to the classification of Cohen, Thalheimer and Cook. $1.45<d$ indicates an excellent effect size. According to this classification, it was observed that there was an excellent level of difference. It was determined that the result obtained was statistically significant with $p<0.05$ and p=0.001, while $p>0.05$ was not statistically significant (34). The diamond below the forest visual graph represents the effect size. In the first, second, third and fourth reports, statistically significant differences were found in 64 ($p<0.001$), 29 ($p<0.001$), 39 ($p<0.001$) and 64 (p=0.041) studies, respectively. In the funnel distribution graphs in the four reports (Figure 10, figure 11, figure 12 and figure 13), the effect sizes in terms of studies included in 64, 29, 29 and 64 studies show a symmetric distribution in the graph, indicating that there is no publication bias and that it is consistent with the literature (56). The level of heterogeneity in the meta-analysis is low. Therefore, a random effects model was applied when calculating the effect size, that is, it was assumed that studies could estimate different true effects. It was determined that the average effect size on vital capacity differed according to race. It was determined that the effect sizes of the studies (d=0.8185) did not differ according to the publication type, the region where the research was conducted and the application period. Considering the effect sizes in these four reports, it is seen that the vital capacities of individuals in lung volumes and capacities where PFT is used increase over the years. Our study covers the period from 1832 to the end of 2023. Some studies in the literature are studies that examine PFT and racial changes using the meta-analysis method. Thus, the racial differences in the vital capacity width of white races, the lower vital capacity of black races compared to white races and the racial consequences were revealed. 64, 29, 39 and 64 studies between 1832 and 2023 were included in the analysis. In the analysis, the common effect size for the first, second, third and fourth reports was found to be 1.004, 1.210, 0.662 and 0.398, respectively. The results also coincide with the meta-regression results of these four reports in our study (Figure 14, figure 15, figure 16 and figure 17) and the effect sizes of the std dff means in which the research was conducted. In other words, it is seen that the std dff means increase according to the effect sizes of the studies. When similar studies are conducted in the future, clearer interpretations will be possible as the data will increase.

All studies included in the meta-analysis were composed of randomly selected, heterogeneous

sample groups in order to minimize the influence of the findings on characteristics such as personal characteristics and environmental factors. According to the meta-analysis results, when compared with racial variations made with classical methods, it was observed that the use of PFT in individuals was reflected as an increasing effect on the quality of vital capacity before the treatment compared to before the application, and while the average effect size value (Hedges's g value) of the fixed effect model was 0.5308111111, the effect size value of the random effect model was 0.5308333333, and it was concluded that it created a significant difference in terms of effect size. Thus, in clinical studies in the literature, it has been determined that all of these methods have an increasing effect on the lung volume and capacity of individuals compared to before the application of bronchodilators, thanks to the PFT, which are objective tests used to determine the degree of impairment and impairment in lung function, to evaluate the response to disease and treatment, and to determine the risk in surgical interventions, in the treatment of individuals with racial differences or with low vital capacity quality in different regions.

CONCLUSION

Integrating the best scientific evidence with the clinical experience of the physician and the values of the patient and making it applicable is at least as important as patient management using systematically developed, up-to-date evidence-based documents that can assist clinicians and patients in the decision-making process in practice, and it also requires attention and systematic work. For this purpose, it is necessary to clearly determine the research question, investigate the evidence, evaluate the determined evidence, make and implement the medical decision, and pay attention to the results of the application. In the prepared review, meta-analysis, which is at the top of the evidence pyramid, that is, the synthesis of many studies to reach a large amount of data; is a unique type of research that provides more objective information about the subject being investigated, and summary information is given to the reader. It is thought that this research can contribute especially to clinicians who are preparing to conduct research.

Although some important results were found in the study, the main limitations of this study were that it only included scientific medical journals published in our country and that articles with systematic review in their titles as well as articles with literature reviews were evaluated. According to the research results, it can be said that the number of systematic reviews in scientific medical journals in our country is increasing, but the reporting quality of these reviews and the level of convincing arguments about the accuracy and reality of a report are quite high. In this context, it is inevitable that the information obtained from the systematic reviews will contribute to medical knowledge. The basic recommendation based on the research findings is as follows: Further research is needed to assess the evidence produced by medical researchers and to examine systematic article reviews published in both national and international journals prepared by medical researchers in order to improve the reporting quality and characteristics of systematic article reviews. According to Hoffman, the smaller lung capacity of the colored race is in itself evidence of an inferior physical organism (17,18).

Limited data examining PFTs among adult Indigenous Australians suggest that Forced Vital Capacity (FVC) and Forced Expiratory Volume in one second (FEV_1) are lower compared to their non-Indigenous Caucasian counterparts, while the preserved FEV_1 / FVC ratio is almost similar (4,66-68). Allen suggests that differences in leg length and chest wall dimensions across races explain why black people have lower lung function than white people (21,71-74).

In a study of differences in mortality rates between African and European Americans, Burney and Hooper, Hoffman concluded that the higher mortality rates in African Americans could be explained solely by lower mandatory VC (18,76,77). VC and forced expiratory volume in one second (FEV_1), commonly used to describe lung size, are approximately 14% smaller in African Americans than in whites

(22). Japanese Americans produce larger flow-volume curves compared to Japanese natives, and US born Asian Indians have higher pulmonary function values compared to other people for their age and height (75). It is generally lower among younger people, with around 40% of Indians in Scotland and just over a third of Pakistanis (71,73,74).

In the literature, the estimated normal FEV_1 in black people decreased from 3.5 L using the white equation to 3.0 L using the black equation, a 14% decrease (24–26). In a population of young, healthy, nonsmoking subjects or regardless of length of residence in the United States, lower FVC, FEV_1, and VA' values than EAs for the same height represent a true physiological condition (4). Vijayan et al., in a study on South Indian children, showed that correlations of FVC and FEV_1 were highest with height, followed by weight and age (78,79). Without any adjustment for height or age, or attention to the working and living conditions of newly freed slaves, Gould reported that all-blacks had lower lung capacity than whites (80). Damon found that FVC and FEV_1 values (determined using the same equipment) were 13% lower in black soldiers than in white soldiers (36-38,76,81,82). The literature found that for the same height, FEV_1, VC, and TLC values were approximately 7% (range 4–11%) lower for Asians (AsAs) than for European Americans (EAs) (4). In this study, we aimed to examine all randomized controlled trials regarding racial discrimination among male and female individuals as a meta-analysis. In other words, as a result of the literature, the vital capacity of the white race has been highlighted as greater, especially in the 19th century, and this magnitude in vital capacity still continues in new studies in the 20th and 21st centuries, and studies conducted between 1832 and 2023 examining the effects of racial changes on respiratory function tests have been evaluated. From the 19th century to the 20th and 21st centuries, it was determined that the lung capacity of all black people was lower than that of white people. In other words, researchers who conducted research in the literature found that the vital capacity, FEV_1 and FVC values of white races were larger than those of blacks, and they found that the lung capacity of whites was higher than that of blacks, Chinese or Native Americans.

Publications grouped by century: 19th century (1860, 1869, 1896), 20th century (1922, 1925, 1966, 1986, 1988, 1991, 1996, 1997), and 21st century (2008, 2009, 2010, 2011, 2012, 2014, 2019, 2020, 2021, and 2022). In general, the magnitude of the vital capacity of the white race in the years 2008, 2009, 2010, 2011, 2012, 2014, 2019, 2020, 2021, and 2022 is approximately four times higher in the literature than in blacks, and moderate to severe impairment (<50% of predicted) is approximately twice as high as in whites over the centuries. In other words, the magnitude of the vital capacity of the white race in lung function has been maintained over the centuries and is increasing. The authors of the articles have absolutely no racist bias; on the contrary, to avoid racism, the American Thoracic Society / European Respiratory Society Joint Working Group has recommended the use of race and ethnicity-specific reference values whenever possible and, alternatively, correction factors. Therefore, race is accepted as a biologically important and scientifically valid category. The average effect size was calculated as 12.0780 in the first report; 0.5308333333 in the second report; 0.7042 in the third report and 0.5308333333 in the fourth report. It was also found that the common effect size was 1.004 in the first report, 1.210 in the second report, 0.662 in the third report, and 0.398 in the fourth report.

In this study, since the effect size value was above 0.80, a high effect size was found according to Cohen's classification. According to the classification made by Thalheimer and Cook (2002), it was seen that there was a very high level of difference (1.10-1.45). The result was found to be statistically significant at p=0.00. This value was found to be an excellent effect size according to the Cohen, Thalheimer, and Cook classifications. 1.45<d indicates an excellent effect size. According to this classification, it was observed that there was a very good level of difference. It was determined that the effect sizes of the studies (d=0.8185) did not differ according to the publication type,

the region where the research was conducted and the application period. Between 1832 and 2023, 64, 29, 39, and 64 studies were included in the analysis. In the analysis, it was found that the common effect size was 1.004 in the first notification, 1.210 in the second notification, 0.662 in the third notification and 0.398 in the fourth notification. According to the meta-analysis results, when compared with the racial differences made with classical methods, it was seen that the use of PFT in individuals was reflected as an increasing effect on the quality of vital capacity before the treatment compared to before the application, and while the average effect size value of the fixed effect model was 0.5308111111, the effect size value of the random effect model was found to be 0.5308333333, and it was concluded that it created a significant difference in effect size.

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Ethics Committee Approval Information
This study was performed in line with the principles of the Decralation of Helsinki. Approving Committee: Manisa Celal Bayar University Faculty of Medicine, Institute of Health Sciences Ethics Committee Approval Date: 25/12/2019, Decision Number: Protocol Registration number 20.0478.486

Researcher Contribution Declaration / Authors' Contributions
F.A. Have constructed / constructed the main idea and hypothesis of the study. F.A. They developed the theory and arranged / edited the material and method section. F.A. Has / have done the evaluation of the data in the results section. F.A. Discussion section of the article. F.A. Written by reviewed, corrected and approved. F.A. In addition author discussed the entire study and approved the final version. F.A. idea / concept and design. F.A. supervision / consultancy. F.A. Data collection and / or processing. F.A. Analysis and / or interpretation of data. F.A. Literature review. F.A. Writing of significant sections of the article. F.A. Writing the manuscript. F.A. Critical review. F.A. Materials. F.A. Other work. F.A. Planning and design. F.A. Materials and methods. F.A. Data analysis and interretation. F.A. Writing and editing. F.A. Conceptualization. F.A. Supervision. F.A. Writing. F.A. Original draft preparation. This scientific original review article publication is a part of my master's thesis.

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