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We look forward to your ongoing interest and contribution to SES and hope to meet in the next issue.

Prof. Dr. Mahmut SAĞIR

Editor

Contents

A BIBLIOMETRIC ANALYSIS ON SUICIDE PREVENTION AND RESILIENCE AMONG YOUTH: MAPPING THE THIRTY YEARS OF RESEARCH

Berkan Demir[*]

Abstract

This study aims to examine the current state of the literature on suicide prevention and resilience among youth through bibliometric analysis. Studies published in the Web of Science (WoS) database between 1993 and 2023 were selected as the sample to meet this purpose. VOSViewer software and the default interface of WoS were utilized to analyze the results. According to the results of the analysis, a total of 451 studies were found. Most of the studies were research articles, followed by reviews and conference abstracts. The annual number of publications followed a 4-fold increase in 30 years, and the average number of citations per article was 18.01, while 139 studies were not cited at all. The majority of the studies belonged to the fields of psychology and psychiatry and were conducted and published in developed countries and in English. Suicide and Life-Threatening Behavior was found to be the journal in which the most studies on the subject area were published. The United States of America was found to be the country where the majority of the studies were conducted and the country most open to collaboration. The most frequently used keywords in the studies were suicide, suicide prevention, youth, prevention, and mental health. In conclusion, the issue of suicide prevention and psychological resilience in young people is an emerging research area that attracts the attention of researchers, and studies in this field should be encouraged, especially in developing and underdeveloped countries.

Keywords: suicide, suicide prevention, youth, resilience, mental health.

GENÇLERDE İNTİHARI ÖNLEME VE PSİKOLOJİK SAĞLAMLIK ÜZERİNE BİR BİBLİYOMETRİK ANALİZ: 30 YILLIK ARAŞTIRMANIN HARİTALANDIRILMASI

Özet

Bu çalışmanın amacı, gençler arasında intiharı önleme ve psikolojik sağlamlık ile ilgili literatürün mevcut durumunu bibliyometrik analiz yöntemiyle incelemektir. Bu kapsamda, Web of Science (WoS) veri tabanında 1993-2023 yılları arasında yayınlanan çalışmalar örneklem olarak seçilmiştir. Sonuçların analizinde VOSViewer yazılımı ve WoS'un varsayılan arayüzü kullanılmıştır. Analiz sonuçlarına göre toplamda 451 çalışmaya ulaşılmıştır. Çalışmaların

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[*] *Instructor, Bartın University, Bartın, Türkiye, berkandemir@bartin.edu.tr, Orcid id: 0000-0002-3944-1650*

çoğunu araştırma makaleleri oluştururken, bunları derleme ve konferans özetleri takip etmiştir. Yıllık yayın sayısı belirlenen 30 yılda 4 kat artış göstermiş ve makale başına ortalama atıf sayısı 18,01 olarak bulunmuş olup 139 çalışma ise hiç atıf almamıştır. Çalışmaların büyük çoğunluğu psikoloji ve psikiyatri alanlarına ait olup, gelişmiş ülkelerde ve İngilizce olarak yayımlanmıştır. Konu alanına yönelik çalışmaların en fazla yayınlanmış olduğu dergi Suicide and Life-Threatening Behavior olarak belirlenmiştir. Çalışmaların büyük çoğunluğunun yapıldığı ve iş birliğine en açık ülke Amerika Birleşik Devletleri olarak belirlenmiştir. Yapılan çalışmalarda en sık kullanılan anahtar kelimeler intihar (suicide), intiharı önleme (suicide prevention), genç (youth), önleme (prevention) ve ruh sağlığı (mental health) olarak belirlenmiştir. Sonuç olarak, gençlerde intiharı önleme ve psikolojik sağlamlık konusunun git gide gelişen ve araştırmacılar tarafından ilgi çeken bir araştırma alanı olduğu tespit edilmiş olup bu alanda yapılan çalışmaların özellikle gelişmekte olan ve az gelişmiş ülkelerde teşvik edilmesi gerektiği düşünülmektedir. Bu araştırmadan elde edilen bulguların gençlerde intiharı önleme ve psikolojik sağlamlık konusuyla ilgilenen araştırmacılara yol göstereceğine inanılmaktadır.

Anahtar kelimeler: intihar, intiharı önleme, gençlik, psikolojik sağlamlık, ruh sağlığı.

INTRODUCTION

Suicide is an umbrella term for a wide range of behaviors, including ideas, attempts, and completed suicides. It has widely been accepted that suicide is a global health problem leading to an annual one million casualties (World Health Organization [WHO], 2021), and the numbers are suggested to be underestimated due to stigma, underreporting, and misclassification related to the nature of the death (Katz et al., 2016). When trends in suicidality are investigated based on different developmental periods, it appears to be a more serious problem among youth, as periods of young and emerging adulthood (i.e., ages between 15 and 29) represent one of the most fragile periods, and suicide is ranked among top three causes of death during those periods (Glenn et al., 2020).

Particular risk factors, including the presence of major/clinical depression or past suicide attempts, have consistently been found to be associated with completed suicides across divergent samples (Bernal et al., 2007). However, although the efforts in identifying risk factors have undergone a substantial increase over the years, the effectiveness of the efforts seems to be falling short of the mark as the suicide rates still seem to be increasing (Stone et al., 2017). The WHO called nations to acknowledge suicide prevention as a crucial public health concern and aimed to reduce worldwide suicide rates by 10% by 2020 (WHO, 2023).

Fortunately, suicide is a preventable cause of premature deaths with timely, appropriate, evidence-based, and low-cost interventions (WHO, 2023). It is suggested that suicide prevention entails joint effort, and interventions should be provided by multiple stakeholders in multiple domains, potentially paving the way for multilevel interventions (Gunnell et al., 2017). Across the literature, the most prolific methods of preventing suicide were found to be increasing the number of suicide awareness programs, restricting lethal means such as guns, providing evidence-based treatments, and conducting effective follow-up protocols (Zalsman et al., 2016; Florentine & Crane, 2010).

Over the years, a substantial effort has been investigated in science, both in terms of human and economic resources. Therefore, it is crucial to evaluate the results of such investments. The aim of scientific mapping is to quantitatively analyze existing research to provide a more thorough descriptive understanding of a particular topic. It allows the revealing of information in areas such as trends and rates in annual publications, the most prolific and influential scholars, the most relevant journals, the most cited articles, the most

used keywords, country and scientific field information regarding the published works, and so on (Zhang et al., 2020).

It was argued that there is a scarcity of bibliometric analyses in suicide research (Astraud, 2021). One reason why bibliometric research might be needed in suicide research is related to its convenience for identifying research trends, pointing out the gaps, and providing insight for future research. The primary objective of this study is to explore trends in the number of annual publications on suicide prevention and resilience among youth over a 30-year period. Along with that, the distributions with regards to the type of publications, research areas, country, field, journal, and citation information were also aimed to be explored. This study aims to contribute to the existing literature on suicidality as the aim is to evaluate scientific productivity related to protective and resilience factors among youth. It is believed that the results will be of interest to researchers, practitioners, and institutions.

METHOD

The present study aims to offer a bibliometric analysis of literature on suicide prevention and resilience among youth in journals indexed in Web of Science (WoS), as it is a widely utilized database by scholars. Based on the suggestions of Zupic and Carter (2015), a five-order stage, which consists of designing the study, collecting data, analyzing data, visualization, and interpretation, was followed. The search was conducted by using the algorithm: suicid* AND (youth OR young* OR emerging adult*) AND (protect* OR prevent* OR resilien*) on 3rd January, 2024.

After the extraction, the information regarding author, country, research area, year of publication, keywords, journal information, and institutional affiliation was listed. The advanced search option was used, and the documents published between the years 1993 and 2023 were searched. The "title," "abstract," and "keywords" were applied as the preferred method of inquiry as the use of "topic" would be overly inclusive as it covers the terms within the title, abstract, or keywords. To crosscheck this decision, the analysis was conducted by utilizing "topic," and the first 100 randomly selected articles were visually inspected. It was revealed that using "topic" as the main source of inquiry would yield broad results, such as the inclusion of articles in which resilience or protective factors were only mentioned in the abstract without mentioning them in detail for the rest of the article. In a similar vein, the inclusion of "title", "abstract," and "keywords" resulted in another overinclusion, such as involving the articles where protective factors and/or resilience were only mentioned as a suggestion at the end of the abstract without touching upon

those concepts in the main text. To overcome this limitation, the algorithm was applied only to the "title," and visual inspection of the articles selected was in line with the purpose of the current study.

RESULTS

Global Findings

Overall, 451 studies on suicide prevention and resilience that met the search criteria were extracted. Among all, research articles (60.09%, n = 273) consisted the majority of the studies published, followed by meeting abstract (15.29%, n = 69), editorial material (8.65%, n = 39), review article (8.43%, n = 38), letter (3.77%, n = 17), proceeding paper (2.44%, n = 11), early access (2%, n = 9), correction (1.33%, n = 6), book chapters, (0.89%, n = 4), news item (0.67%, n = 3) and book review (0.44%, n = 2).

Although bearing slight fluctuations, most of the studies were published after 2010 (n = 349, 77.38%), and the number of publications has exponentially increased over the 30 years and has reached its peak in 2022. A similar but less floating pattern can be mentioned for the number of citations. In 1993, three articles were published, vs. 34 in 2023. The rate of exponential growth was calculated to be 18.87%. The number of studies covering suicide prevention and resilience followed a sharp increase from 2018 to 2019. The results regarding the number of citations and publications by year are presented in Figure 1.
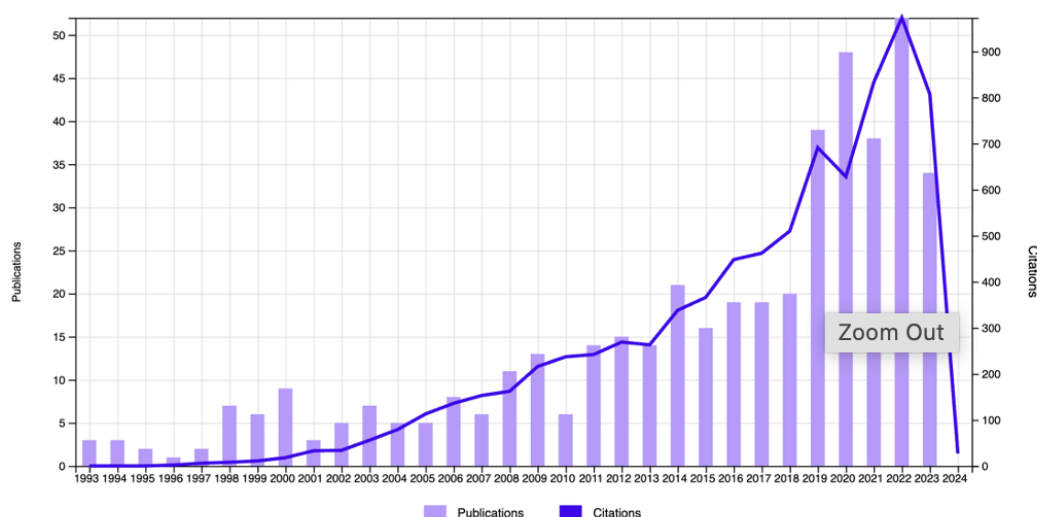
Figure 1. Number of citations and publications by year

Analyses by Country

Over 1993-2023, among 48 countries, the USA was ranked as the first country where the number of publications represented 53.21% of publications worldwide, as demonstrated in Table 1. This is followed by Australia (n = 58, 12.86%), Canada (n = 39, 8.64%), England (n = 15, 3.55%), and New Zealand (n = 12, 2.66%). All these countries appeared to increase their number of publications per year. Regarding co-authorships by country, the USA was found to be the center of the associations, as presented in Figure 2.

Table 1. Countries and the number of publications

Rank	Countries	Number of publications	Number of citations
1	USA	240 (53.21%)	5203
2	Australia	58 (12.86%)	1524
3	Canada	39 (8.64%)	564
4	England	15 (3.55%)	190
5	New Zealand	12 (2.66%)	530
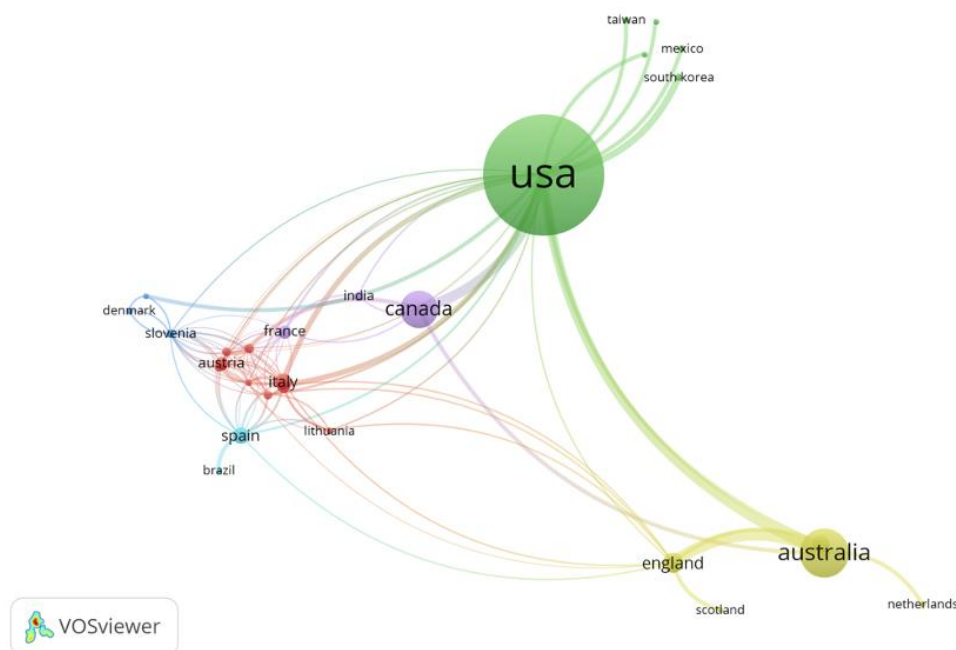
Figure 2. Co-authorship network by country

Analysis by Research Areas and Languages

In terms of the top-5 study area, the majority of the studies belonged to psychology (39.25%, n = 177), followed by psychiatry (n = 176, 39.02%), public environmental occupational health (21.73%, n = 98), psychology multidisciplinary (17.52%, n = 79), pediatrics (15.74%, n = 71) and general internal medicine (n = 39, 8.64%). Within this thirty-year period, an

overwhelming majority of the studies were published in English (n = 430, 95.44%), followed by German (n = 7, 1.55%), Spanish (n = 7, 1.55%), Russian (n = 3, 0.67%) and French (n=2, 0.44%).

Analysis by Citations and Index

Overall, the number of studies cited was 8.121, corresponding to 18.01 citations for each item, and the H-index score was 45. In terms of the web of science indices of the published articles, the top three were Social Sciences Citation Index (SSCI) (n = 331, 73.39%), Science Citation Index Expanded (SCI-EXPANDED) (n = 243, 53.88%), and Emerging Sources Citation Index (ESCI) (n=64, 14.19%). The results are presented in Table 2. As for the institutions, the highest number of citations belonged to Columbia University (n = 1331, 16.39%), Minnesota University (n = 910, 11.21%), Melbourne University (n = 623, 7.67%), University of California Los Angeles (n = 287, 3.53%) University of Illinois (n = 279, 3.44%), respectively. Lastly, 139 (30.82%) articles did not receive any citations.

Table 2. Web of science indices of the published papers

Web of Science index	Number of publications
Social Sciences Citation Index (SSCI)	331 (73.39%)
Science Citation Index Expanded (SCI-EXPANDED)	243 (53.88%)
Emerging Sources Citation Index (ESCI)	64 (14.19%)
Conference Proceedings Citation Index – Science (CPCI-S)	37 (8.20%)
Conference Proceedings Citation Index – Social Science & Humanities (CPCI-SSH)	10 (2.22%)
Book Citation Index – Social Sciences & Humanities (BKCI-SSH)	4 (0.88%)
Arts & Humanities Citation Index (A&HCI)	1 (0.22%)
Book Citation Index – Science (BKCI-S)	1 (0.22%)

Most Cited Papers

Table 3 presents the top 10 most-cited papers and the number of citations for each document. The most cited article was a review article cited 846 times, followed by a research article, which received 329 citations. Among ten papers, 4 were reviews, and 6 were research articles. Table 3 presents the results regarding the ten most cited papers, their journal, and citation numbers.

Table 3. Top 10 most-cited papers

Rank	Paper	Journal abbreviation	Citations
1	Youth suicide risk and preventive interventions: A review of the past 10 years	AACAP	846
2	Suicidality among gay, lesbian and bisexual youth: The role of protective factors	JAH	329

3	A brief screening tool for suicidal symptoms in adolescents and young adults in general health settings: Reliability and validity data from the Australian National General Practice Youth Suicide Prevention Project	Behav Res Ther	251
4	Vulnerability and resiliency to suicidal behaviours in young people	Psychol Med	243
5	Suicide attempts among American Indian and Alaska native youth: *Risk and protective factors*	Arch Pediatr Adolesc Med	228
6	Youth suicide prevention	Suicide Life-Threat Behav.	185
7	Protective school climates and reduced risk for suicide ideation in sexual minority youths	Am J Public Health	175
8	Risk and resiliency factors influencing suicidality among urban African American and Latino youth	Am J Community Psychol.	135
9	A systematic review of school-based interventions aimed at preventing, treating, and responding to suicide-related behavior in young people	Crisis	132
10	A systematic review of school-based interventions aimed at preventing, treating, and responding to suicide-related behavior in young people	Eur Child Adoles Psychiatry	120

Journal Information

Based on the number of publications, The Journal of American Academy of Child and Adolescent Psychiatry (n = 34, 7.54%) was found to be the journal with the highest number of publications. The journal that received the highest number of citations was Suicide and Life-Threatening Behavior (n = 908, 11.18%), followed by the Journal of the American Academy of Child and Adolescent Psychiatry (n = 901, 11.01%) and the Journal of Adolescent Health (n = 457, 5.63%). The results are presented in Table 4.

Table 4. Top 10 journals by the total number of suicide prevention and resilience studies included within the years of 1993-2023

Rank	Name of the Journal	Number of publications	Percentage	2023 impact factor	Number of citations
1	Journal of the American Academy of Child and Adolescent Psychiatry	34	846	13.3	901
2	Suicide and Life-Threatening Behavior	27	329	3.2	908
3	Crisis: The Journal of Crisis Intervention and Suicide Prevention	12	251	3.0	419
4	European Psychiatry	11	243	7.8	16

5	Journal of Adolescent Health	10	228	7.89	457
6	Australian and New Zealand Journal of Psychiatry	8	185	5.59	292
7	International Journal of Circumpolar Health	8	175	1.94	105
8	Injury Prevention	7	135	3.8	16
9	International Journal of Environmental Research and Public Health	7	132	4.61	105
10	American Journal of Community Psychology	6	120	4.02	264

The Most Prolific Co-authors

Between the years of 1993 and 2023, 1497 different co-authors with a distribution between 1-6 documents were identified. The most influential authors were determined based on Lotka's law, which indicated that the number of the most prolific authors should be less than 39 (square root of 1497). The 39th author had three papers, and because the following 20 authors also had three papers; 59 authors with three or more publications were identified as the most prolific co-authors and presented in Figure 3. In addition, it was found that Jo Robinson, James Allen, Eleanor Bailey, and Christensen Helen were the most important figures in the field in terms of the number of studies done. Figure 1 depicts the 59 most prolific co-authors.
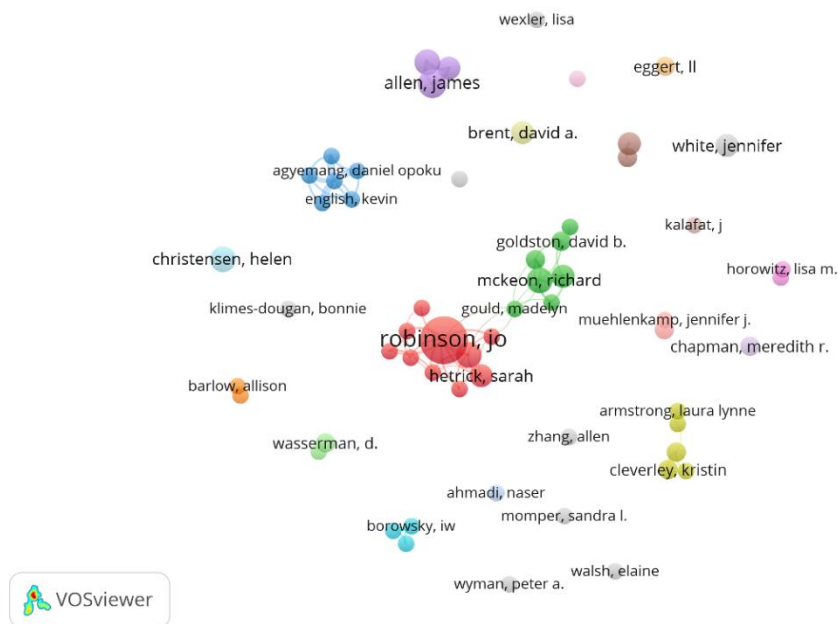
Figure 3. The most prolific 59 co-authors

When it comes to the number of citations, the most influential figures were Madelyn S. Gould, followed by David A. Brent and David Shaffer (the analysis was conducted by including only the first authors of cited documents. Other authors were not considered in co-citation analysis). The results are presented in Figure 4.
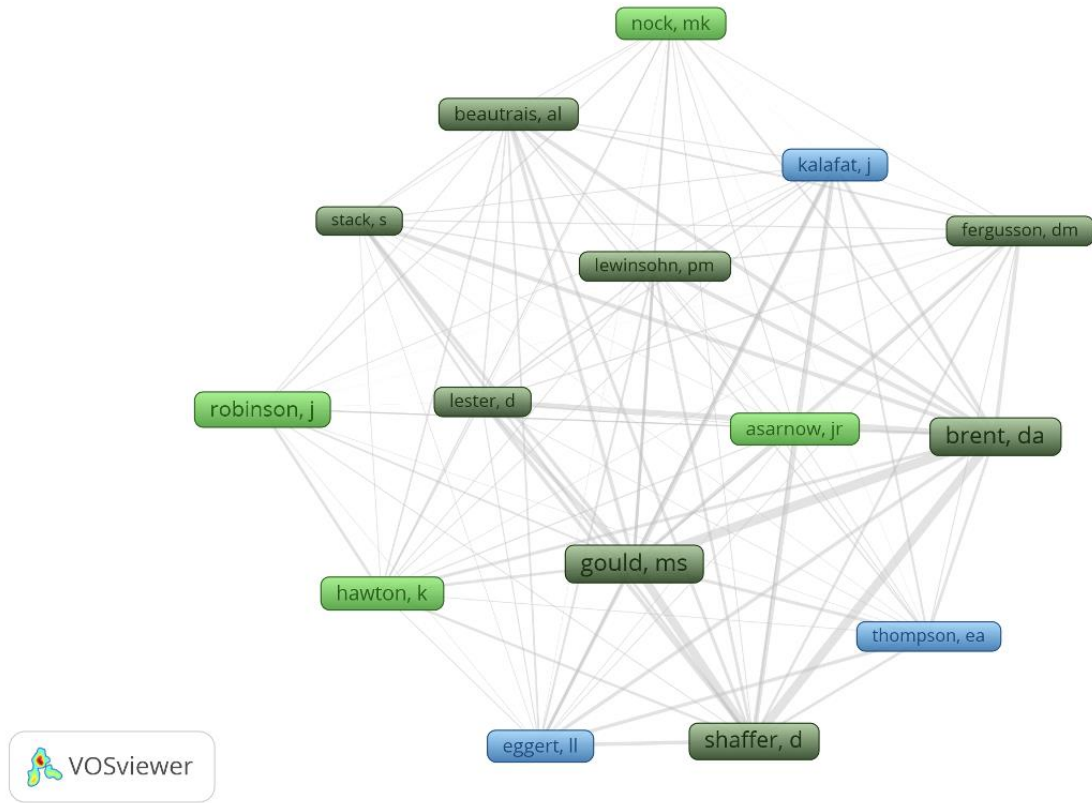
Figure 4. The most cited 15 authors

Keywords

A total of 640 keywords were found. In terms of the keywords, "suicide" (114 occurrences), "suicide prevention" (66 occurrences), "youth" (52 occurrences), "prevention" (47 occurrences) and "mental health" (32 occurrences) were the most frequently used. Zipf's law was applied to limit the number of keywords to be visually depicted in the WosViewer. A total of 25 keywords (square root of 640) were identified. Figure 5 demonstrates the most frequently used author keywords and their associations in the set of articles.
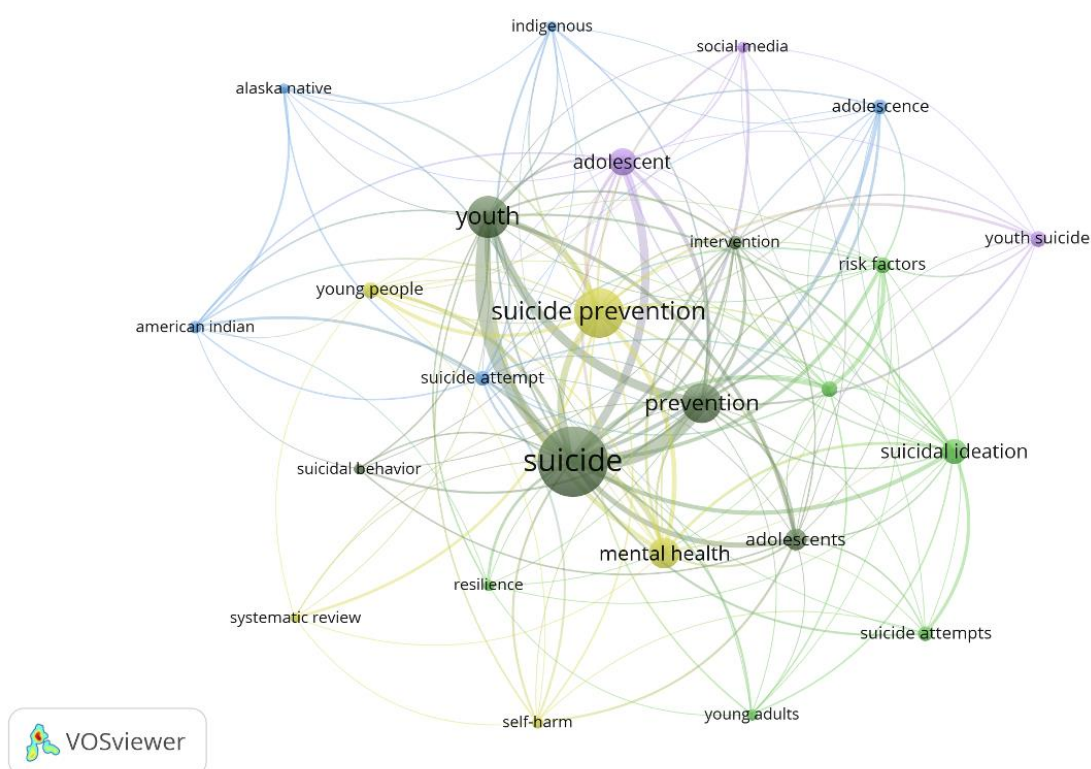
Figure 5. Most frequently used 25 keywords

DISCUSSION

The current bibliometric study analyzed the 451 documents published within the 30-year period (from 1993 to 2023) on suicide prevention and resilience among youth in the Web of Science database. Among 451 documents covering the topic, research articles (60.09%, n = 273) constituted the majority of the publications. During the 30-year period, there was an exponential growth in the number of publications, increasing from 3 to 34 with an exponential growth of 8.43%, with 2022 being the period of the highest productivity (n = 52, 11.53%). This increase was steady, indicating that there were no substantial decreases in the number of studies published. Therefore, it is apparent that the topic of suicide prevention and resilience has been a focus of research over the years. After a quick glance at the graph regarding the number of documents published by year, there was a breaking point such that the number of works has undergone a considerable increase after 2018. In fact, 51.44% (n = 232) of the publications belonged to the last five years (2018-2023). This increase can partly be attributable to the unexpected rising trend in suicide rates that reached its peak in 2018 (14.2 per 100.000) (Garnett & Curtin, 2023). Thus, this alarming situation might have prompted scholars to obtain more thorough information about the nature of suicide prevention.

To the researcher's knowledge, there is only one study aiming to investigate research trends in suicide prevention through bibliometric analysis, although the focus of the research was on the general population, without placing special importance on youth. The findings derived from the current study are similar to the one concluded in the other bibliometric study aiming to investigate suicide prevention and resilience (e.g., Suarez-Soto et al., 2023). Thus, it can be speculated that the results regarding the number of documents and citations are valid irrespective of the sample studied.

The number of catalogs for the analyzed documents was 48. The categories of psychology and psychiatry constituted the overwhelming majority (n= 353, 78.27%). Following that, the categories of public environment, occupational health, multidisciplinary psychology, pediatrics, and general internal medicine were the remaining prominent categories that included at least 30 documents or more. The 10 most-cited papers belonged to the psychology and/or psychiatry category. This variety in the research areas was not surprising, as suicide is the outcome of intricate psychological, biological, and sociological factors (O'Connor et al., 2019). Therefore, it is almost imperative to integrate the outcomes of different disciplines to provide a more comprehensive perspective in understanding this phenomenon and to develop and tailor the prevention efforts accordingly.

In general, suicide prevention emerges as a growing research field in terms of bibliometric analysis as scientific production yields an increasing trend. Although defined as a global health problem, only 48 countries contributed to the publications. One reason behind this result might be related to taboo and stigma regarding the concept of suicide, as reported by several studies (Katz et al., 2016; Sheehan et al., 2017). One of the most striking findings is that suicide prevention research is clearly dominated by developed countries, representing almost 90% of publications. Additionally, an overwhelming majority of the publications were in English. Considering the fact that 80% of the completed suicides take place in low and middle-income countries (WHO, 2023), it seems that there is a wide disparity between the countries where suicide prevention is mostly studied and the completed suicides take place.

The geographical distribution of the scientific products depicts an erratic picture characterized by the non-existence of particular regions, such as Africa and the Middle East (except for Turkey). This might be related to the lack of funding available or the language barriers authors experience in those countries. The other explanation could be related to stigma towards talking/researching about the concept of suicide in Middle Eastern and African

countries, as it is believed that talking about it would make individuals more inclined to have those thoughts (Cwik et al., 2015) and believers of Abrahamic religions such as Islam (almost 95% of the entire population in the Middle East) clearly restricts the act of suicide (Shoib et al., 2022), which might refrain individuals from discussing it. This, in return, might explain why there is a scarcity of studies in particular regions. However, talking or asking about the concept of suicide was not found to be responsible for an increase in suicidal thoughts in a variety of samples (Dazzi et al., 2014). A similar trend can be detected in other bibliometric studies (e.g., Cardinal, 2008; Suarez-Soto et al., 2022) where it was concluded that there is a scarcity of studies in particular regions (e.g., low-income countries, Middle Eastern region) regarding suicide prevention.

Several limitations are worth elaborating on. Firstly, the current study's findings are solely dependent on the results of WoS indexing and its processing tools. Therefore, further studies can be conducted by utilizing different databases such as Scopus, PubMed, or Proquest. Secondly, the validity of the current research is dependent on the search algorithm determined.

IMPLICATIONS

Given that suicide is considered to be a serious public health problem, the efforts contributing to suicide prevention hold special importance. This is particularly important among youth, as suicide remains among the top leading causes of death in certain developmental periods such as young adulthood. Therefore, it is important for scholars and practitioners to take a broader glance at the current state of literature regarding suicide prevention. With this respect, the results of the current study serve the purpose of examining the broader landscape of existing literature, including the most prolific authors, publications, and journals concerning suicide prevention. Additionally, the inferences made within the scope of the present study point out the need for studies to be conducted in underdeveloped and developing countries as there is a paucity in empirical information derived. Therefore, such an attempt would provide benefit to the field of suicide research to move forward. Although the number of studies has undergone a sharp growth and is believed to continue to pile up in the near future, it is evident that suicide prevention research still needs progress as most of the studies were conducted with samples from high-income countries, which is one challenge that scholars could particularly be aware of as it hampers the external validity.

CONCLUSION

Some primary conclusions can be drawn from the current study. First up, it is apparent that studies in suicide prevention and resilience among youth demonstrated a trend characterized by exponential growth over 30 years, indicating that there is a steady increase in interest in this topic. Secondly, developed countries, the USA, Australia, and Canada in particular, seem to be the most productive countries based on the number of publications and citations, although it is evident that most of the completed suicides occur in low and/or low-middle-income countries. Thirdly, most of the publications belonged to the fields of Psychology and Psychiatry.

Suicide is a preventable cause of death, and suicide prevention and resilience among youth seem to be an active research area, as proved by the considerable number of publications and citations yielded within a 30-year period. To reach better outcomes in terms of prevention and intervention, it is imperative to conduct extensive investigations related to the nature of suicidality. Therefore, the findings derived from the current study can be regarded as an effort to enrich existing literature on suicide prevention.

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Genişletilmiş Özet

Giriş

İntihar, intihar düşünceleri, intihar teşebbüsü ve tamamlanmış intiharları kapsayan geniş bir kavramdır. Tamamlanmış intiharların yılda bir milyon can kaybına yol açan küresel bir sağlık sorunu olduğu yaygın olarak kabul edilmektedir (Dünya Sağlık Örgütü [DSÖ], 2021) ve ön yargı, eksik raporlama ve yanlış sınıflandırma nedeniyle gerçek rakamların elde edilen istatistiklerden çok daha yüksek olduğu (%50'ye kadar) tahmin edilmektedir (Katz ve ark., 2016). İntihar, yıllar boyunca, özellikle beliren yetişkinlik ya da genç yetişkinlik (15-29 yaş arası) dönemlerinde ilk üç ölüm sebebi içerisinde gösterildiği için bu gelişimsel evrelerde daha ciddi bir sağlık sorunu olarak ortaya çıkmaktadır. Tüm bunlara rağmen, intihar, uygun zamanda, kanıta-dayalı ve düşük bütçeli gerçekleştirilen müdahalelerle önlenebilir bir ölüm sebebi olarak görülmektedir (DSÖ, 2023). İntiharı önleme, DSÖ tarafından tüm ülkelere yönelik yapılan çağrıda "global bir halk sağlığı sorunu" olarak tanımlanmış olup diğer ülkelerin de bu tanımı benimsemeleri gerektiği belirtilmiştir (DSÖ, 2023). Bibliyometrik analiz yoluyla, yıla göre yapılan araştırma sayısı ve trendler, konu ile ilgili yayın yapan ve atıf alan araştırmacılar, araştırma konusu ile ilgili yayın yapılan dergiler, atıf alan makaleler, sık kullanılan anahtar kelimeler, yayın ve iş birliği yapılan ülkeler, çalışmaların yapıldığı alanlar gibi birçok özelliğe göre gruplandırma yapılabilmektedir (Zhang et al., 2020). Literatürde, gençlerde intiharı önleme ve psikolojik sağlamlığa ilişkin yapılan bibliyometrik çalışmaların sayıca az olduğu gözlemlenmiştir (Astraud, 2021). Bu çalışmanın temel amacı, 30 yıllık süreçte gençler arasında intiharı önleme ve psikolojik sağlamlık üzerine yapılan yıllık yayın eğilimlerini araştırmaktır.

Yöntem

Bu çalışma, 1993-2023 yıllarını kapsayan 30 yıllık periyotta intiharı önleme ve psikolojik sağlamlık ile ilgili yapılan çalışmaların incelenmesi ve betimlenmesi amacıyla bibliyometrik analiz yöntemi kullanılarak gerçekleştirilmiştir. Bu kapsamda, Web of Science (WoS) veri tabanında yer alan 1993-2023 yılları arasında yayınlanan çalışmalar araştırmaya dahil edilmiştir. Araştırma, "suicid* AND (youth OR young* OR emerging adult*) AND (protect* OR prevent* OR resilien*)" algoritması kullanılarak gerçekleştirilmiş ve toplam 451 makaleye ulaşılmıştır. Verilerin analizinde VOSViewer programından ve WoS veri tabanının varsayılan ara yüzünden yararlanılmıştır. Ulaşılan çalışmaların yıllara, çalışma yapılan bilim alanlarına, dergilere, atıf sayısına, ülke bazlı bilimsel üretkenliklerine ve iş birliklerine, en fazla atıf alan makalelere, en sık kullanılan anahtar kelimelere göre dağılımına ulaşılmıştır.

Bulgular

Çalışmaların büyük çoğunluğunu araştırma makalelerinin, onları takiben derleme ve konferans özetlerinin oluşturduğu bulgusuna ulaşılmıştır. 1993-2023 yılları arasında gerçekleştirilen yayın sayısında 4 kat artış gözlenmiş olup makale başına ortalama atıf sayısı 18,01 olarak bulunmuştur. Toplam 451 çalışma içerisinden 139 çalışma ise hiç atıf almamıştır. Belirtilen yıllar arasında yapılan çalışma sayısında belirgin bir düşüş gözlenmemiştir. Çalışmaların büyük çoğunluğu psikoloji ve psikiyatri bilim alanlarına ait olup, gelişmiş ülkelerde ve İngilizce olarak yayımlanmıştır. Konu alanına yönelik en fazla çalışma Suicide and Life-Threatening Behavior dergisinde yayınlanmıştır. En fazla atıf alan makale M.S. Gould ve diğerleri tarafından yazılan "Youth suicide risk and preventive interventions: A review of the past 10 years" adlı makaledir. Ülke bazındaki analizlerde ise en çok çalışma yapılan, en çok atıf alan ve iş birliğine en açık ülke ABD olarak belirlenmiştir. Son olarak, 30 yıllık süreçte en fazla yayın yapılan yılın 2018 yılı olduğu ve mevcut yayınların yarısından fazlasının 2018-2023 yılları arasında yapıldığı belirlenmiştir. Bunun sebeplerinden biri olarak tamamlanmış intiharlar açısından (her 100.000 kişide 14.2 kişi) en yüksek rakamlara ulaşılan yılın 2018 yılı olmasının (Garnett & Curtin, 2023) araştırmacıları intiharı önleme ve psikolojik sağlamlık üzerine çalışmalarını teşvik etmesi olarak görülebilir.

Tartışma ve Sonuç

Bu araştırma bulgularından yola çıkılarak ulaşılabilecek bazı temel sonuçlar vardır. İlk olarak, gençler arasında intiharı önleme ve dayanıklılık konusundaki çalışmaların 30 yıl boyunca üstel bir artış ile karakterize edilen bir eğilim gösterdiği açıktır, bu da bu konuya olan ilgide istikrarlı bir artış olduğunu göstermektedir. İkinci olarak, tamamlanmış intiharların büyük kısmının düşük ve/veya düşük-orta gelirli ülkelerde meydana geldiği bilinmesine rağmen, özellikle ABD, Avustralya ve Kanada gibi gelişmiş ülkeler, yayın sayısı ve atıflara göre en üretken ülkeler olarak görünmektedir. Üçünü olarak ise, alanda yapılan çalışmaların büyük çoğunluğu psikoloji ve psikiyatri alanlarına ait olsa da toplamda 48 farklı çalışma alanı olduğuna yönelik bulgu, intiharın çeşitli biyolojik, psikolojik ve sosyolojik faktörlerden etkilendiği (O'Connor vd., 2019) önermesiyle desteklenmektedir.

DSÖ'nün intiharı küresel bir sağlık sorunu olarak tanımlamasına ve bütün ülkeleri intiharı önleme konusunda harekete geçirmeye yönelik çağrısına rağmen yapılan yayınlara sadece 48 ülke katkıda bulunmuştur. Bunun nedenlerinden biri, bazı çalışmalarda belirtildiği gibi intihar kavramına ilişkin tabu, önyargı ve damgalamalar olabilir (Katz vd., 2016; Sheehan vd., 2017). Bu çalışmada rastlanılan çarpıcı bulgulardan bir diğeri de intiharı önlemeye

yönelik yapılan çalışmaların %90'ının gelişmiş kategoride yer alan ülkelerde yapılması, fakat tamamlanmış intiharların %80'ini oluşturan gelişmekte ve az gelişmiş ülkelerin ise (DSÖ, 2023) bu alandaki katkısının sınırlı olduğudur. Bu durum, mevcut fonların yetersizliği veya bu ülkelerde yaşayan araştırmacıların dil engelleriyle ilgili olabilir. Diğer bir açıklama ise, Orta Doğu ve Afrika ülkelerinde intihar kavramı hakkında konuşmanın/araştırma yapmanın damgalanması ile ilgili olabilir. Zira, bu konu hakkında konuşmanın bireyleri bu tür düşüncelere sahip olmaya daha meyilli hale getireceğine yönelik hatalı bir inanç mevcut olup (Cwik vd., 2015), bu inancın yanlış olduğu çeşitli çalışmalarla kanıtlanmıştır (Dazzi vd., 2014).

Bu çalışmanın bazı sınırlılıkları mevcuttur. Mevcut bulgular yalnızca WoS veri tabanına bağlı çalışmaları kapsamaktadır. Benzer ya da farklı anahtar kelimelerin yer aldığı bir çalışma, Scopus, ProQuest ya da Pubmed gibi diğer veri tabanlarını kapsayacak şekilde planlanabilir. Elde edilen bulgular, sadece mevcut araştırma için belirlenen algoritmaya bağlı olarak ulaşılan veriden elde edilmiştir. Dolayısıyla, farklı algoritmalar kullanılarak oluşturulan konu alanı, dergi ya da yıllara yönelik analizler gerçekleştirilebilir.

Öneriler

İntihar, genç/beliren yetişkinlik gibi belirli gelişim dönemlerinde önde gelen ölüm nedenleri arasında yer aldığından, genç örneklemler kullanılarak gerçekleştirilen çalışmalar özellikle değerli hale gelmektedir. Bu nedenle, akademisyenler ve uygulamacılar için gençler arasında intiharın önlenmesine ilişkin mevcut literatürün durumuna daha geniş bir açıdan bakabilmek önem taşımaktadır. Bu bağlamda, mevcut çalışmanın sonuçları, intiharı önlemeye ilişkin en üretken yazarlar, yayınlar ve dergiler de dahil olmak üzere mevcut literatürün durumunu inceleme amacına hizmet etmektedir. Gençler arasında intiharı önlemeye yönelik gerçekleştirilen çalışmaların sayısının son 30 yıl içerisinde ciddi bir artış göstermiş olduğu ve yakın gelecekte de artmaya devam edeceği düşünülse de, bu çalışmaların çoğu gelişmiş ülkelerden oluşan örneklemlerle yürütüldüğü için intiharı önleme araştırmalarının özellikle gelişmekte olan ve az gelişmiş ülkelerde hala ilerlemeye ihtiyacı olduğu açıktır. Bu, araştırmacılar için özellikle farkında olunması gereken bir sınırlılıktır.

THE EFFECT OF INTELLIGENCE GAMES ON 5TH GRADE STUDENTS' MATHEMATICS ATTITUDES AND ACADEMIC ACHIEVEMENT

Mehmet ALYANAK[*], **Ali ÖZKAYA**[**]

Abstract

This study examines the impact of intelligence games on the mathematics attitudes and academic achievement of secondary school students. The study was conducted with fifth-grade students of a public secondary school in the centre of a province in the Mediterranean region. It employed a quasi-experimental design with pre-test and post-test control groups. In the experimental group, mathematics lessons were conducted with an integrated approach to teaching mathematics incorporating intelligence games, while in the control group, mathematics lessons were conducted in accordance with the Ministry of Education's Mathematics Curriculum. The Mathematics Achievement Test and the Mathematics Attitude Scale were employed as data collection instruments. The data were analysed using the SPSS statistical package programme. The results demonstrated that the mathematics attitudes and academic achievement of the students in the experimental group exhibited a positive change.

Key words: Intelligence games, mathematics attitude, academic achievement, secondary school students

ZEKÂ OYUNLARININ 5. SINIF ÖĞRENCİLERİNİN MATEMATİK TUTUMLARI VE AKADEMİK BAŞARILARI ÜZERİNDEKİ ETKİSİ

Özet

Bu çalışma zekâ oyunlarının ortaokul öğrencilerinin matematik tutumlarına ve akademik başarılarına etkisini incelemektedir. Araştırma, Akdeniz bölgesinde yer alan bir ilin merkezinde bulunan bir devlet ortaokulunun 5. sınıf öğrencileriyle gerçekleştirilmiş olup, ön test ve son test kontrol gruplu yarı deneysel desene dayanmaktadır. Deney grubunda matematik dersleri zekâ oyunlarının entegre edildiği matematik öğretimi ile yürütülürken, kontrol grubunda matematik dersleri Millî Eğitim Bakanlığı Matematik Ders Programı çerçevesinde işlenmeye devam etmiştir. Veri toplama araçları olarak Matematik Başarı Testi ve Matematik Tutum Ölçeği kullanılmıştır. Elde edilen veriler SPSS istatistik paket programıyla analiz edildiğinde çıkan

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* *Teacher, Ministry of National Education, Antalya, Türkiye, m.alyanak82@gmail.com, 0000-0002-3757-1056*

** *Assoc. Prof. Dr., Akdeniz University, Antalya, Türkiye, aliozkaya@akdeniz.edu.tr, 0000-0002-6401-1839*

sonuçlar deney grubundaki öğrencilerin matematik tutumlarında ve akademik başarılarında olumlu değişiklikler olduğunu göstermiştir.

Anahtar kelimeler: Zekâ oyunları, matematik tutumu, akademik başarı, ortaokul öğrencileri

INTRODUCTION

Mathematics education is a critical area that has a significant impact on students' academic achievement and interests. According to the mathematics teaching programme, the skills that students are expected to develop are the ability to understand mathematics and use it in daily life, to be entrepreneurial, to think independently and make decisions, and to self-regulate (Ministry of National Education [MoNE], 2018). The importance of mathematics education in helping students acquire these and similar skills plays a critical role in developing students' competencies and potential for lifelong learning at the next grade level (Fuson et al., 2005).

Skills such as using mathematical knowledge, determining strategies, and solving problems, which are the skills that traditional learning environments are insufficient to provide students with, can be provided by game-based active learning environments (Pilten, 2008). During play, children tend to express their existing potential in a natural way (Huizinga, 1955). The child takes responsibility and risk in the game, makes decisions on his/her own, evaluates how effective his/her decisions are, and discovers his/her intuitive characteristics in cases where he/she is undecided. In the end, the child will either win and experience the pleasure of a successful struggle on, or he/she will cope with the feeling of losing and become ready not to be discouraged in the face of negative results that he/she will encounter in real life (Sutton-Smith, 1997). In addition, since the atmosphere created during play is suitable for reflecting feelings and thoughts, it is possible to reveal the characteristics of the child (Pellegrini & Smith, 1998). Teachers, families, and friends have more information about the child (Koçyiğit et al., 2007).

Intelligence games are educational tools that develop skills such as problem solving, creative and critical thinking in students. These games facilitate the understanding of abstract concepts and enrich students' interactions with mathematics. Research in the international literature has shown that interest in mathematics learning increases with intelligence games and that these games stimulate positive attitudes towards mathematics (Çağır & Oruç, 2020; White & McCoy, 2019). Sala et al. (2015) found that playing chess, an intelligence game, improved students' mathematical problem solving skills and that there was a strong relationship between chess practice and mathematics scores. Secondary school students achieved higher maths proficiency when using games compared to traditional paper and pencil methods (Chang et al., 2015). In intelligence games, it is aimed to improve the child's ability to work by

competing individually or as a team and to develop a positive attitude towards problem solving (MoNE Intelligence Games Curriculum, 2013).

Attitude towards mathematics is the positive or negative tendency that students develop towards mathematics course and all kinds of activities related to mathematics. Research shows that students' attitudes towards mathematics significantly affect their academic achievement (Öztürk & Korkmaz, 2020). Randel et al. (1992) stated in their study that games develop positive attitudes by providing students with a motivating environment and that these attitudes increase academic performance and enable them to better understand mathematical knowledge. Usta et al. (2018) stated that game-based mathematics teaching has a positive effect on learning. The study by Charles et al. (2009) emphasises how increased engagement in the learning environment can affect achievement. These findings support that positive attitudes can increase student achievement. It was found that the intelligence games course significantly improved maths attitudes; this shows that intelligence games improve problem solving, developing different perspectives and fast, accurate decision-making skills. (Özkaya, 2017). Attitudes, which are psychological structures that cannot be directly observed and measured (Aşkar, 1986) and categorised within affective behaviours, play a major role in whether mathematics is liked or disliked by students (Çoban, 1989). In this context, research in mathematics education plays an important role in understanding and developing students' relationship with mathematics (National Council of Teachers of Mathematics [NCTM], 2000). Effective management of the mathematics learning process, especially at the 5th grade level, which is the beginning of secondary school, can shape students' attitudes towards mathematics and make their relationship with mathematics more positive in the following years (Stipek et al., 2001).

This study stems from the fact that improving students' attitudes towards mathematics and increasing their mathematics achievement is a constant quest. A limited number of studies focusing on the use of intelligence games, which stand out as an effective and innovative method in overcoming the difficulties encountered by students in mathematics learning, have entered the literature. This study differs from the studies in this field and aims to fill the gap in the literature by focusing on fifth grade students.

Purpose of the Research
The aim of this study is to examine how intelligence games influence the attitudes of fifth-grade students towards mathematics and their academic

achievement in mathematics classes. To address this aim, the research questions were developed as follows:

1. What are the consequences of engaging in mathematical intelligence games on the attitudes of fifth-grade students towards mathematics?
2. What is the impact of engaging in intelligence games on the mathematics achievement of fifth-grade students?

In order to address the primary issues previously outlined, the following sub-problems were identified and subsequently addressed.

1.1. Does the difference in pretest positive and negative attitude scores between the experimental and control groups towards mathematics courses reach a statistically significant level?

1.2. Is there a significant difference between the post-test and pre-test scores of the experimental and control groups in terms of their positive and negative attitudes towards the mathematics course?

2.1. Does the pretest academic achievement score of the experimental group differ significantly from that of the control group?

2.2. Does the difference in academic achievement scores the experimental and control groups in the post-test and pre-test periods, significantly?

METHOD

The present study will assess the attitudes towards mathematics and academic achievement of two groups. Following the implementation of the game-playing experiment within the experimental group, the study will ascertain whether there is a discernible disparity between the two groups in terms of both attitude scores and academic achievement mean scores. For this reason, the study was designed with a quasi-experimental design, with an experimental-control group. Such designs permit a comparative analysis of the interactions and results observed between the experimental group and the control group (Shadish et al., 2002).

Population and Sample

The research population comprised all fifth-grade students studying in the city centre of Antalya. The sample for the research was selected from a group of fifth-grade students studying in a public secondary school in Antalya city centre. The school was selected as it met the requisite number of students and socioeconomic diversity for the research, with the sample drawn from a convenience sample. Two distinct branches were designated as the experimental group and the control group, respectively. The experimental

group participated in a mathematics learning programme that incorporated intelligence games, whereas the control group followed the standard curriculum prescribed by the Ministry of National Education (MoNE), conducted in public secondary schools, which did not include the use of brain teasers. The objective was to provide a clear basis for comparison with the experimental group that participated in brain teaser-based activities. Prior to the administration of the pre-tests, two classes were randomly selected from the four classes in the fifth grade of the school where the sample was selected. One class was designated as the experimental group, while the other was designated as the control group. This was done to ensure that the initial conditions between the two groups were comparable. Group equivalence was determined through the administration of pretests and the collection of demographic information from the selected participants, which is presented in Table 1.

Table 1. Demographic Information of Participants

Groups	Gender	N	Total
experiment	m	15	25
	f	10	
control	m	12	25
	f	13	

Table 1 indicates that a total of 50 participants were involved in the study, comprising 25 individuals in the experimental group and 25 in the control group. Of the participants in the experimental group, 15 were female and 10 were male, while in the control group, 12 were female and 13 were male.

Data Collection Tools

The Mathematics Attitude Scale, developed by Önal (2013), was employed to assess students' attitudes towards mathematics. The scale was designed to comprise 22 items, including factors of interest (10 items), anxiety (5 items), study (4 items) and necessity (5 items). The items are presented on a five-point Likert scale, ranging from "Strongly Agree" to "Strongly Disagree." Furthermore, the four-factor structure of the scale was corroborated by confirmatory factor analysis. The internal consistency coefficient of the scale was found to be .90, indicating that it is a reliable instrument.

In order to ascertain the academic level in mathematics, a mathematics achievement test was devised by the researchers in accordance with the test development principles proposed by Cohen et al. (2007). The test comprises 12 items selected from a pool of 30 questions taken from MoNE textbooks based on the fourth and fifth grade mathematics curriculum. The test content was designed to assess a wide range of mathematical skills, including natural

numbers, fractions and decimal notation from the fifth grade curriculum, and measurement and geometry from the fourth grade curriculum. The selection of these topics was intended to ensure that the test reflects both current and prior year learning, thereby increasing its content validity. This approach is supported by the educational assessment literature, which emphasises the importance of aligning tests with educational standards and students' current levels of understanding in order to accurately measure educational outcomes (Cohen et al., 2007; Popham, 2010). The selection process was undertaken with the intention of encompassing students' mathematical thinking, problem-solving, and logical reasoning abilities. The test was administered to a sample of 50 students. The difficulty indices of the test items were employed to ascertain the optimal difficulty level of the test for the students. The reliability of the test was evaluated using the Cronbach's Alpha coefficient, which yielded a value of 0.82. The content validity of the test was ensured by consulting with experts in the field of mathematics education and analysing the curriculum.

Data Collection Process
The data collection process included both pre-test and post-test procedures for the students. The academic achievement test and attitude scale pre-tests for the mathematics course were administered to both the experimental and control groups. Subsequently, one class hour per week was allotted for the implementation of intelligence games activities in the experimental group. The eight-week experiment involved the implementation of the following games: The games included were Mangala, Checkers, Pentago and Chess. A two-week period was allotted for each game. Furthermore, digital versions of these games were introduced, and students were encouraged to engage in intelligence games rather than non-pedagogical games on their mobile devices. As a non-compulsory activity, students in the experimental group participated in the construction of mangala pits in the school garden and the delineation of checkers squares, which were then played with pebbles. During this period, the control group students continued their lessons within the scope of the Ministry of National Education (MoNE) secondary school mathematics curriculum. The post-test was administered at the conclusion of the experimental period. The experiment was conducted during mathematics lessons that were supported by the use of intelligence games. The changes in the students' mathematical knowledge levels and attitudes were quantified. During the research process, informed consent was obtained from the students and their parents. The participants were provided with comprehensive information regarding the objectives, methodology, and voluntary nature of the study. Furthermore, participants were encouraged to raise any queries or concerns with the researchers (American Psychological Association [APA], 2010). The

confidentiality of the participants was rigorously safeguarded throughout the data collection and analysis phase. The data collection process was designed and conducted in such a way that the identities of the participants were not disclosed. In the reporting of the findings, no information that could identify the participants was disclosed. At each stage of the research, the researchers took the necessary precautions to mitigate any potential risks to the participants.

Data Analysis

The data were analysed using the SPSS statistical program, a statistical analysis tool frequently used in social sciences research (Field, 2013). The data collected in the study were subjected to basic statistical analysis and hypothesis testing. In order to ascertain the significance of the differences between the mean scores of the experimental and control groups, an independent two-sample t-test was employed to analyse the achievement test results. This test is a standard method used to determine whether the differences between the mean scores of two independent groups are statistically significant (Leech et al., 2014). For the data collected from the Mathematics Attitude Scale, the scores of the items belonging to positive and negative attitudes in the scale were analysed separately. The obtained scores were employed in order to analyse the differences in attitudes between the experimental and control groups. The objective of this analysis was to evaluate the extent to which intelligence games were effective in influencing students' attitudes towards mathematics courses. Furthermore, during the data analysis, the assumption of normal distribution for achievement and attitude scale scores was tested, and the necessary statistical tests were applied until the appropriateness of the analysis was ensured (Pallant, 2020).

Limitations

It should be noted that the findings of this study may not be generalizable or interpreted in the same way in other contexts due to a number of factors that may influence the results. The study was conducted on a sample of fifth-grade students from a public secondary school situated in the city centre of a Mediterranean region. It should be noted that students residing in different provinces may not possess the same characteristics as those in this sample. Consequently, the generalisation of the results to different student groups or to different geographical regions may be limited (Creswell, 2014).

In accordance with the research plan, the implementation period of the intelligence games was limited to eight weeks. This period may not be sufficient to examine the long-term effects of the games on students (Slavin, 2018).

It is important to note that the study did not consider certain environmental factors that may influence students' mathematics achievement and attitudes towards mathematics. These include the family and social environment. These factors may influence students' learning processes and attitudes, and thus these and similar shortcomings should be considered in the interpretation and generalisation of the findings (Gay et al., 2012).

It is crucial to take these limitations into account when interpreting the research findings and when planning and conducting future studies.

Ethics Committee Approval

This research was conducted in accordance with the ethical standards set forth by the Akdeniz University Social and Human Sciences Scientific Research and Publication Ethics Committee (decision dated 13 April 2023 and numbered 194). At each stage of the research, the ethical standards set out by the board were adhered to, and the principles of research ethics were not breached.

FINDINGS

Findings Related to the Effect of Intelligence Games on 5th Grade Students' Attitude towards Mathematics

A Mathematics Attitude Scale was employed to ascertain the baseline levels of the experimental and control groups.

Table 2. Independent two sample t-test for the positive and negative attitude scores of the experimental and control groups towards mathematics before the experiment

Attitude Type	Groups	N	$\overline{x}$	Ss	t	p
positive	experiment	25	2,22	0,59	-0,74	0,46
	control	25	3,11	0,62		
negative	experiment	25	3,11	0,73	-0,78	0,44
	control	25	3,27	0,73		

The results of the independent two-sample t-test, as presented in Table 2, indicate that there was no statistically significant difference between the two groups with respect to both positive and negative attitudes. The t-value for positive attitudes was -0.743 (p = 0.461), while the t-value for negative attitudes was -0.777 (p = 0.441). The results indicate that at the outset of the study, the experimental and control groups exhibited comparable levels of positive and

negative attitudes towards the mathematics course. In other words, the two groups exhibited comparable levels of attitudes prior to the commencement of the mathematics lessons supported by intelligence games. This is an appropriate starting point for evaluating the effect of intelligence games on mathematics achievement. This allows us to conclude that the attitudinal change observed in the study is differentiated based on initial attitudes. Both groups exhibited lower initial positive attitudes and higher initial negative attitudes. This provides a basis for analysing whether positive attitudes increase or negative attitudes decrease at the conclusion of the experiment.

Table 3 presents the changes in attitudes towards mathematics courses between the pretest and post-test scores of the experimental and control groups. The aforementioned scores and other findings were obtained as a result of the analysis conducted using a dependent samples t-test.

Table 3. Dependent samples t-test for the post-test- pre-test score difference of the positive and negative attitudes of the groups

Attitude Type	Groups	N	$\bar{x}$	Ss	r	t	p
positive	experiment pre-test	25	2,22	0,59	-0,12	8,25	0,00
	experiment post-test	25	3,74	0,65			
negative	experiment pre-test	25	3,11	0,73	-0,05	-3,76	0,00
	experiment post-test	25	2,36	0,64			
positive	control pre-test	25	2,35	0,62	0,14	-2,00	0,06
	control post-test	25	2,01	0,68			
negative	control pre-test	25	3,27	0,73	-0,45	0,75	0,46
	control post-test	25	3,53	1,28			

The mean score of positive attitudes in the experimental group increased from 2.22 to 3.74 in the post-test, indicating a statistically significant increase (t = 8.246, p = 0.001). The mean score of negative attitudes decreased from 3.11 to 2.36 in the post-test compared to the pre-test, representing a significant decrease (t = -3.756, p = 0.001).

The results of the study indicate that students in the experimental group exhibited an increase in positive attitudes and a decrease in negative attitudes

following participation in mathematics lessons supported by brain teasers. This evidence is significant in demonstrating that the incorporation of intelligence games can positively influence students' attitudes towards mathematics lessons. In particular, the increase of 1.52 points out of 5 in positive attitudes may be indicative of an increase in students' interest and excitement towards mathematics lessons. Concurrently, the decline in the mean scores of negative attitudes indicates that previous reservations or concerns about the mathematics course may have diminished.

The mean score of positive attitudes for the control group, which was 3.35 in the pre-test analysis, decreased to 2.01 in the post-test. This change was not statistically significant, with a borderline value of $p = 0.057$. In other words, the mathematics attitudes of the control group students did not undergo any discernible change as a result of the experiment. The mean negative attitude score increased from 3.27 in the pre-test to 3.53 in the post-test. This change was also not statistically significant ($p = 0.461$). When the score changes in the control group are compared with those in the experimental group, a different picture emerges. The scores are presented in Figure 1 in the form of bar graphs. There was a slight decrease in positive attitude scores and a slight increase in negative attitude scores, although this change was not statistically significant. The findings indicate that the implementation of intelligence games has a significant impact on the mathematics attitudes of students in the experimental group. The impact of the intervention is observed to be positive and statistically significant, whereas no statistically significant change is observed in the control group.

These findings suggest that intelligence games may be a valuable educational tool for mathematics educators.
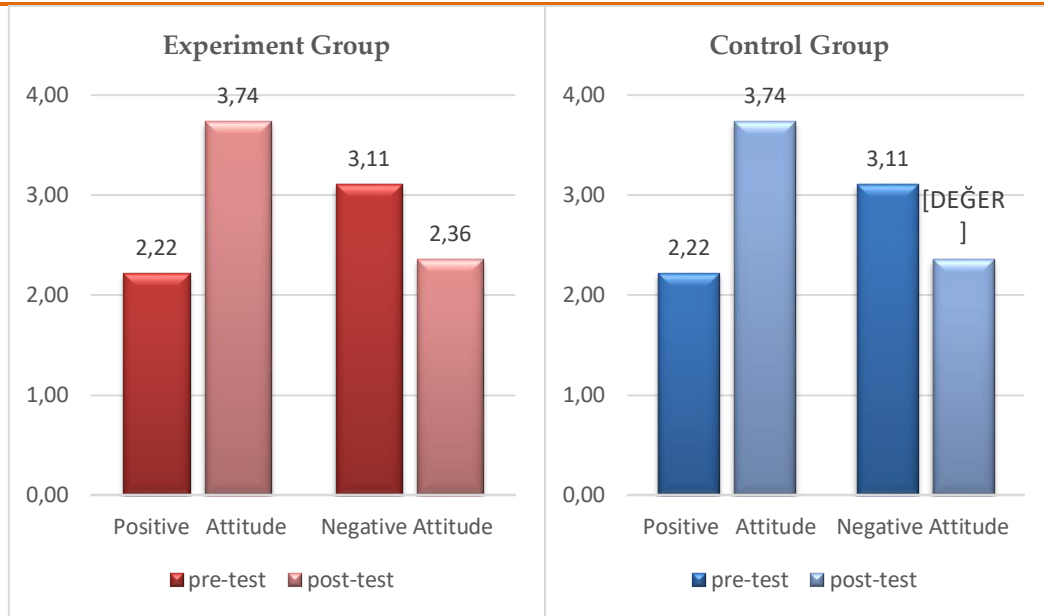
Figure 1. Graphs of Attitude Changes Among the Groups

Findings Related to the Effect of Intelligence Games on Academic Achievement in Mathematics Course

A mathematical achievement test was administered to the experimental and control groups in order to ascertain their initial levels of mathematical ability. The results of the test are presented in Table 4.

Table 4. Independent two sample t-test of math achievement scores of the pre-experimental groups

Groups	N	$\overline{x}$	Ss	t	p
experiment	25	36,68	11,54	0,74	0,94
control	25	36,34	19,38		

The results of the independent two-sample t-test indicated that there was no statistically significant difference between the two groups in terms of their maths achievement scores. The significance level t-value was 0.74, while the p-value was 0.94. The results indicate that the experimental and control groups exhibit comparable levels of mathematical achievement. At this juncture, the comparable achievement scores between the groups provide a foundation for evaluating the impact of intelligence games on mathematical achievement. The comparable level of preparedness is of great importance for the more accurate delineation of the impact of the intelligence games implemented in the experimental group on academic performance in mathematics.

Table 5. Dependent samples t-test for the difference between the math achievement scores of the experimental and control groups before and after the experiment

Groups	Test Type	N	$\bar{x}$	Ss	r	t	p
experiment	pre-test	25	36,68	11,54	0,29	2,69	0,01
	post-test	25	48,02	21,29			
control	pre-test	25	36,34	19,38	0,38	0,72	0,48
	post-test	25	39,01	12,44			

The arithmetic mean of the pre-test achievement score for the 25 experimental group students was 36.68, with a standard deviation of 11.54. Conversely, the arithmetic mean of the post-test was 48.02, with a standard deviation of 21.29. The arithmetic mean of the pretest score applied to the control group, which included the same number of students as the experimental group, was 36.34 with a standard deviation of 19.38. The mean of the post-test was 39.01, with a standard deviation of 12.44.

As demonstrated in Table 4, the dependent samples t-test revealed a statistically significant increase in the post-test mathematics achievement scores of the experimental group in comparison to the pretest (t=2.69, p=0.01). This increase in achievement is indicative of the positive impact of intelligence games on the mathematics performance of students in the experimental group. Conversely, the t-test results of the control group demonstrated that there was no statistically significant change between the pre-test and post-test scores (t=0.72, p=0.48).

These findings indicate that intelligence games can be an effective method for improving the mathematics achievement of fifth grade students. The significant increase in the post-test achievement scores of the experimental group in comparison to the pre-test, coupled with the fact that the change in the scores of the control group was not statistically significant, provides compelling evidence that the increase in the scores of the experimental group is a direct result of the use of intelligence games in mathematics lessons.

The results of this study provide educators with evidence that intelligence games can be an invaluable addition to mathematics education and highlight the potential of such participatory activities to enhance student achievement.

DISCUSSION AND CONCLUSION

The results of the analysis indicated an increase in the mean score of positive attitudes towards mathematics among students in the experimental group, while there was a significant decrease in the mean score of negative attitudes. Concomitantly, there was an enhancement in the mathematical achievement scores of the students in this group. In the control group, there was no statistically significant difference between the pre-test and post-test mean scores in attitudes towards mathematics and mathematics academic achievement scores. These findings suggest that intelligence games may have a positive effect on student attitudes and academic achievement in the fifth grade mathematics course.

Upon examination of the existing literature, these results are supported, and there is evidence that intelligence games can increase student achievement. In Demirel's (2015) study, it was demonstrated that the integration of intelligence games into course activities was associated with an increase in students' academic achievement. In their 2023 study, Çağan and Usta demonstrated that students in secondary school demonstrated enhanced academic achievement when intelligence games were integrated into the teaching method. Orak et al. (2016) reported that the integration of intelligence games in elementary school mathematics lessons was associated with an increase in academic achievement. In a study by Çevik et al. (2016), it was demonstrated that the Tower of Hanoi intelligence game positively affected academic achievement and attitudes in mathematics courses among students with mild intellectual disabilities. Mavridis et al. (2017) demonstrated that online flexible games had a positive effect on mathematics attitude and improved learning outcomes compared to traditional methods. Akinsola et al. (2007) demonstrated that a simulation-game environment was conducive to improving mathematics attitude and mathematics academic achievement. Bottino et al. (2013) and Mubaslat (2012) demonstrated that intelligence games have a positive effect on academic achievement. In addition to the aforementioned studies, there are other studies that emphasise the positive effects of intelligence games in various educational settings. For example, a study by Caponetto et al. (2014) demonstrated that intelligence games were efficacious in enhancing problem-solving abilities in students. Furthermore, Francisco and Maher (2011) reported that lessons taught through activities supported by intelligence games and puzzles improved students' mathematical thinking skills.

Such studies indicate that brain teasers, in addition to serving as a means of reinforcing knowledge, can also enhance students' creative problem-solving

and critical thinking abilities. The findings of this study are consistent with those of previous research, indicating that educators and policymakers should consider the potential benefits of integrating intelligence games into the Grade 5 mathematics learning process. Such integration can facilitate the development of a positive relationship with mathematics and enhance academic achievement.

The results of the study showed that the use of intelligence games in mathematics lessons improved students' mathematics attitudes and academic achievement. Therefore, the use of intelligence games in mathematics lessons should be encouraged more frequently. The scope of the research should be expanded and the effects of intelligence games on students of different age groups should be examined. This would provide a better understanding of the impact of intelligence games on students' learning and offer insights into how these games can be applied to students at different levels of education.

The study's overall evaluation indicates that the use of intelligence games has a significant impact on enhancing fifth grade students' attitudes towards mathematics and their academic performance. The findings of the study may prompt educators and researchers in the field of mathematics education to explore methods that enhance the interactivity and student-centredness of learning processes. One such method is the integration of intelligence games into mathematics courses, which has the potential to enhance students' interest and achievement. This study paves the way for further research to elucidate the role and value of intelligence games in mathematics education.

RECOMMENDATIONS

The findings of this study indicate that the integration of intelligence games into the fifth grade mathematics curriculum has a positive impact on student performance. Consequently;

1. It is of the utmost importance to enhance the functionality of these games within the school environment.
2. It is recommended that training programmes be developed to instruct educators on the appropriate integration of intelligence games into lesson plans.
3. The provision of guidelines for teachers and student activity resources should facilitate the adaptation of these games to the curriculum.
4. It is recommended that digital applications and online platforms be created to assist students in developing their mathematical skills through the use of intelligence games, and that the accessibility of these games be enhanced.

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Genişletilmiş Özet

Giriş

Matematik eğitimi, öğrencilerin akademik başarıları ve ilgileri üzerinde önemli bir etkiye sahip olan kritik bir alandır. Matematik öğretimi programına göre öğrencilerde geliştirilmek istenen, matematiği anlayıp günlük hayatta kullanabilme, girişimci olma, bağımsız düşünüp karar verebilme ve öz düzenleme gibi becerilerdir (Millî Eğitim Bakanlığı [MEB], 2018). Geleneksel öğrenme ortamlarının öğrencilere kazandırmakta yetersiz olduğu yetiler olan, matematiksel bilgileri kullanabilme, strateji belirleme ve karşılaşılan problemleri çözme gibi beceriler; oyun temelli aktif öğrenme ortamları ile sağlanabilmektedir (Pilten, 2008). Oyun oynama sırasında çocuklar mevcut potansiyellerini tabii bir şekilde dışa vurmaya meyilli olurlar (Huizinga, 1955). Bunun yanı sıra, oyun esnasında oluşan atmosfer, duygu ve düşünceleri yansıtmaya müsait olduğundan çocuğun sahip olduğu özelliklerin ortaya çıkması olasıdır (Pellegrini & Smith, 1998). Öğretmenler, aileler ve arkadaşları çocuk ile ilgili daha fazla bilgiye sahip olurlar (Koçyiğit vd., 2007). Matematik tutumu, matematik dersine ve matematikle ilgili her türlü aktiviteye karşı öğrencinin geliştirdiği olumlu veya olumsuz eğilimdir. Araştırmalar, öğrencilerin matematiğe yönelik tutumlarının, akademik başarılarını önemli ölçüde etkilediğini ortaya koymaktadır (Öztürk & Korkmaz, 2020). Duyuşsal nitelikte olan davranışlar içerisinde kategorize edilen, doğrudan gözlenip ölçülemeyen psikolojik yapılar olan tutumların (Aşkar, 1986), matematik dersinin öğrenciler tarafından sevilip sevilmemesinde rolü büyüktür (Çoban, 1989). Bu bağlamda, matematik eğitimi alanında yapılan araştırmalar, öğrencilerin matematikle olan ilişkisini anlamak ve geliştirmek için önemli bir rol oynamaktadır (National Council of Teachers of Mathematics [NCTM], 2000). Özellikle ortaokulun başlangıç sınıfı olan 5. sınıf seviyesinde, matematik öğrenme sürecinin etkili bir şekilde yönetilmesi, öğrencilerin matematik tutumlarını şekillendirebilir ve ilerleyen yıllarda matematikle olan ilişkilerini daha olumlu ya da daha olumsuz duruma getirebilir. (Stipek vd., 2001). Öğrencilerin matematik öğreniminde karşılaştıkları güçlüklerin aşılmasında etkili ve yenilikçi bir yöntem olarak öne çıkan zeka oyunlarının matematik dersinde kullanımına odaklanan sınırlı sayıda çalışma literatüre girmiştir. Bu çalışma, özellikle beşinci sınıf öğrencileri üzerinde gerçekleştirilerek bu alandaki çalışmalardan farklılaşmakta ve literatürdeki boşluğu doldurmayı hedeflemektedir.

Araştırmanın amacı, zekâ oyunlarının 5. sınıf öğrencilerinin matematik tutumlarına ve matematik dersindeki akademik başarılarına etkisini incelemektir. Araştırmanın problem cümlesi; zekâ oyunları oynamanın 5. sınıf

öğrencilerinin matematik tutumuma ve akademik başarısına etkisi nedir? olarak belirlenmiştir.

Yöntem

Bu çalışmada deney-kontrol gruplu yarı deneysel desende tasarlanmıştır. Araştırma evreni Antalya il merkezinde öğrenim gören tüm 5. Sınıf öğrencilerinden oluşmakta olup araştırmanın örneklemi Antalya ilindeki bir ortaokulun 5. Sınıf öğrencilerinden seçilmiştir. Deney grubu, zekâ oyunlarıyla desteklenen bir matematik öğrenme programına dahil edilirken, kontrol grubunda dersler MEB İlköğretim Matematik Öğretim Programı çerçevesinde derslere devam edilmiştir. Her grup 25'er öğrenci içerecek olup araştırma 50 öğrenci ile yürütülmüştür.

Öğrencilerin matematik dersine karşı tutumlarını ölçmek için Önal (2013) tarafından geliştirilen ve eğitim araştırmalarında sıkça kullanılan Matematik Tutum Ölçeği kullanılmıştır. Matematikteki akademik düzeyin belirlenmesi için ise araştırmacılar tarafından hazırlanan Matematik Başarı Testi kullanılmıştır. Başarı testi ile tutum ölçeğinin ön testleri, deney grubu ve kontrol grubuna uygulandıktan sonra deney grubunda ders sonlarında haftada 1 ders saati zekâ oyunları etkinlikleri düzenlenmiştir. Sekiz haftalık deney sürecinde "Mangala", "Dama", "Pentago" ve "Satranç" oyunları oynanmıştır. Her oyun için iki haftalık bir zaman dilimi ayrılmıştır. Ayrıca öğrenciler bu oyunların dijital versiyonlarını telefon ve tabletlerine yükleyip evde aileleriyle oynamışlardır. Yine serbest aktivite olarak da okul bahçesinin topraklı zemininde mangala çukurları açılarak ve dama kareleri çizilerek çakıl taşlarıyla bu oyunlar deney grubu öğrencilerine oynatılmıştır. Deney sürecinin sonunda uygulanan son test ise, zekâ oyunlarıyla desteklenmiş matematik derslerinin sonunda uygulanmış ve öğrencilerin matematik bilgi düzeyleri ile tutumlarındaki değişimler ölçmüştür. Veriler SPSS istatistik programı kullanılarak analiz edilmiştir.

Bulgular

Yapılan analizde deney grubunun matematik dersine yönelik olumlu tutumlarında anlamlı bir artışı görülürken olumsuz tutumlarındaki düşüş de anlamlı olmuştur. Kontrol grubunda ise olumlu ve olumsuz tutumlardaki değişimler istatistiksel olarak anlamlı olmamıştır. Başarı testinin son test – ön test puan farkı analizinde de deney grubunun puan farkı istatistiksel olarak anlamlı iken kontrol grubunun puan değişimi anlamlı olmamıştır.

Tartışma, Sonuç ve Öneriler

Araştırmada elde edilen bulgular, zekâ oyunlarının 5. Sınıf matematik dersinde öğrenci tutumları ve akademik başarı üzerinde olumlu yönde bir etkisi

olduğunu göstermektedir. Literatür incelendiğinde de bu sonuçlar desteklenmekte ve zekâ oyunlarının öğrenci başarısını artırabileceğine dair başka kanıtlara da rastlanmaktadır. Demirel (2015) çalışmasında, zekâ oyunlarının entegre edildiği ders etkinliklerinin öğrencilerin akademik başarılarını artırdığını belirtilmiştir. Orak ve diğerleri (2016), ilkokul matematik derslerinde zekâ oyunları kullanmanın akademik başarıyı artırdığını raporlamışlardır. White and McCoy (2019) found that game-based learning improved primary school students' academic achievement in mathematics and their attitudes towards mathematics. In their research, they stated that these games improved problem solving skills and changed their attitudes towards mathematics positively.

Bottino ve ark., (2013) ile Mubaslat (2012), zekâ oyunlarının akademik başarı üzerinde olumlu bir etkiye sahip olduğunu göstermişlerdir. Araştırma sonuçları, zekâ oyunlarının matematik derslerinde kullanımının öğrencilerin matematik tutumlarını ve akademik başarılarını iyileştirdiğini göstermiştir. Bu nedenle, zekâ oyunlarının matematik derslerinde kullanılması daha sık teşvik edilmelidir. Yapılan araştırmaların kapsamı genişletilmeli ve zekâ oyunlarının farklı yaş gruplarındaki öğrenciler üzerinde de etkileri incelenmelidir.

EXAMINING THE RELATIONSHIP BETWEEN HIGH SCHOOL STUDENTS' PERCEPTION OF SCHOOL CLIMATE AND THEIR CRITICAL THINKING DISPOSITION[*]

Durmuş Ziya GÖRÜR[**], Birsel AYBEK[***]

Abstract

Critical thinking skills is thought that it is important to structure the elements in the school climate in a way that will support students' participation in the process, find the opportunity to think and criticize in acquiring critical thinking skills. Based on this reason, this study aimed to determine whether there is a relationship between high school students' perception of school climate and critical thinking disposition. Relational scanning model, was used in the research. The sample of the study was determined by stratified sampling method. "Delaware School Climate Student Scale" and "UF/EMI Critical Thinking Tendency Scale" were used as data collection tools in the research. The data obtained in the study were analyzed with t-test, ANOVA and Pearson correlation coefficients. According to the results of the research, a significant and positive relationship was found between the perception of school climate and the tendency to critical thinking.

Key words: Thinking, critical thinking, school climate

LİSE ÖĞRENCİLERİNİN OKUL İKLİMİ ALGISI İLE ELEŞTİREL DÜŞÜNME EĞİLİMİ ARASINDAKİ İLİŞKİNİN İNCELENMESİ

Özet

Eleştirel düşünme becerisini kazanmada okul ikliminde yer alan öğeler, öğrencilerin sürece katılımını destekleyecek, kendilerini özgürce ifade edebilecek, düşünme fırsatı bulup eleştiri yapabilecek şekilde yapılandırılmasının önemli olduğu düşünülmektedir. Bu gerekçeden hareketle bu araştırmada lise öğrencilerinin okul iklimi algısı ile eleştirel düşünme eğilimi arasında bir ilişki olup olmadığının belirlenmesi amaçlanmıştır. Bu nedenle araştırma tarama modellerinden ilişkisel tarama modeli ile gerçekleştirilmiştir. Araştırmanın örneklemi, 2022-2023 eğitim öğretim yılında Hatay'da öğrenim görmekte olan 11. ve 12. sınıf öğrencileri arasından tabakalı örnekleme yöntemi ile belirlenmiştir. Araştırmada veri toplama aracı olarak "Delaware Okul İklimi Öğrenci Ölçeği" ile "UF/EMI Eleştirel Düşünme Eğilimi Ölçeği" kullanılmıştır. Araştırmada elde edilen veriler t-testi, ANOVA ve Pearson korelasyon katsayıları ile analiz edilmiştir. Araştırma sonuçlarına göre okul iklimi algısı ile eleştirel düşünme eğilimi arasında anlamlı ve olumlu bir ilişki bulunmuştur.

Anahtar kelimeler: Düşünme, eleştirel düşünme, okul iklimi

INTRODUCTION

One of the distinguishing features of humans from other living beings is thinking. Thinking is directly related to human existence in the world (Robson, 2006) and is the most fundamental among the resources humans possess (De Bono, 1999). It is a characteristic that begins with human birth and can be developed throughout life (Fisher, 2005). The process of thinking encompasses various meanings such as comprehension, perception, understanding, imagining, decision-making, judgment, reasoning, reflection, inspiration, intuition, demonstration, exploration, and designing (Türker, 2006). In this context, thinking is a mental process that involves conscious comparison, analysis, synthesis, and other mental activities such as reasoning, deduction, remembering, desiring, doubting, feeling, grasping, and understanding (Cevizci, 1996).

Some people habitually treat thinking as an ordinary activity and do not give it due importance. Thinking carried out in this manner tends to be left unattended, aimless, scattered, incomplete, and simplistic. On the contrary, some people increase the quality of thinking by developing their own way of thinking. Our work, what we produce and the quality of our daily lives depend on the quality of our thoughts. In other words, our life is an indicator of our thoughts. While low quality thinking negatively affects the quality of life and causes loss of money and time, qualified thinking enables the goal to be achieved faster. In short, the way to progress and achieve mental independence is through training of thinking.

Many thinkers and scientists (Ennis, 1996; Halpern, 2014) have stated that individuals must have critical thinking skills in order to adapt to the globalizing world, transfer the education they receive into their lives, and look at events with common sense. According to Şahinel (2002), critical thinking is defined as self-controlled and disciplined thinking towards a way or field of thought. According to Paul (1991), critical thinking is defined as relying on observation and knowledge to reach conclusions. Additionally, İpşiroğlu (2002) states that the most developed form of thinking is critical thinking. Because critical thinking means thinking in depth and objectively, without obsession. As seen above, there are many different definitions of critical thinking. However, when all definitions are examined, it can be said that critical thinking is effectively obtaining, comparing and evaluating information.

The basis of critical thinking is asking questions. It is accepted that one of the methods that develop critical thinking is questioning. Thinking begins with

asking questions about a topic or problem. It is important that the questions are qualified, not superficial, and encourage thinking in order to discuss the issues and problems in detail. According to Türkmen (2014), individuals with critical thinking skills are individuals who are curious, ask questions, do not accept what is presented as it is presented, can make inferences by analysis and synthesis, can base their ideas on evidence, and are open to new ideas.

In order to develop critical thinking skills, critical listening, critical reading, critical speaking and writing skills must also be developed. Critical listening refers to an active understanding process by passing the information received through a mental filter. Thanks to critical reading, a relationship is established between the message the text wants to convey and real life. Critical speaking and writing shows the ability of a person to present new perspectives on facts and events from an objective perspective (Bağcı and Şahbaz, 2012).

It can be observed that in recent years, the critical thinking skill has begun to be more debated and valued in the field of education. This is primarily based on changing conventional perceptions regarding the nature of knowledge, how learning occurs, and the roles of students and teachers in the classroom (Özden, 2005). According to the behaviorist approach, learning is seen as the process of forming stimulus-response connections, disregarding the human mind, emotions, and thoughts, which are not measurable or observable. With advancing technology, experimental studies have allowed for the examination of the brain, weakening the assumptions of the behaviorist approach. Nowadays, knowledge is defined not as objective but as a phenomenon occurring in the human mind. Therefore, there is a growing need for efforts to enhance critical thinking skills in the field of education.

Among the significant aims of education is to enhance students' higher-order thinking skills such as problem-solving, creativity, and critical thinking. In this context, various thinking education programs are being developed to teach students advanced thinking skills and fundamental thinking techniques. Thus, the intention is to first enhance students' thinking skills and then indirectly guide their future and life. According to Nickerson (1988), when developing thinking skills, attention should be paid to aspects such as curiosity, skepticism, tolerance, and respect for truth. This is because respecting all perspectives and thoroughly thinking before taking action by gathering enough information are crucial for developing a mental skill.

The issue of developing thinking skills has become a significant concern for many countries. Studies indicate that students fail to develop their thinking

skills adequately, leading to various difficulties and challenges. This situation is continuously addressed from primary education to university level. Research suggests that attending school for 12 years does not necessarily lead to the development of thinking skills (Nickerson, 1988). Similarly, a study conducted at the college level by McMillan (1987) and Pascarella (1989) found that attending college helps improve critical thinking skills but falls short in fully developing them. In line with this conclusion, Welfel (1982) also found in his research that reflective thinking skills increased among college students but still remained at a low level.

All schools are institutions established to achieve a common goal, but the environment in which they operate can vary. This distinctive feature of schools is referred to as the climate (Akbaba and Erdoğan, 2014). According to Dağlı (2018), school climate is how individuals in the school, including students, teachers, and all staff, express how they feel about themselves and their relationship with others in the school, based on personal or experiential characteristics. In short, school climate is the emotion that affects the entire school. The various structures established by schools not only influence students' perception of the school but also determine the attitudes they will adopt in society due to serving the process of socialization in schools. The way students perceive the school is important in determining their behavior, attitudes, and tendencies within the school. However, the influence of the school is not limited to the school itself. What happens in school, the relational, behavioral, and mental structures within the school, also have an impact beyond school.

A positive school climate, which provides a healthier working environment for teachers, is a prerequisite for creating a better learning environment for students as well. A positive school climate increases teachers' job satisfaction and level of dedication. It is known that a healthy school climate is associated with less alienation and higher student achievement. When previous studies on school climate are examined, it is found that academic achievement, school adaptation, participation in class activities, peer attachment, school and class orderliness are achieved with a positive school climate. On the other hand, a negative or unhealthy school climate leads to low job satisfaction, dissatisfaction, and lack of creativity and adaptation. In schools with a negative climate, insufficient importance is given to students and individuals, there is a rigid and authoritarian structure, communication is limited, and interaction is low.

Based on the aforementioned statements, it can be said that school communication environments and school climate provide an opportunity for the acquisition of skills and values intended for students (Balcı and Yanpar-Yelken, 2010). Therefore, it is considered important that the elements in the school climate are structured in a way that supports students' participation in the process, enables them to express themselves freely, and provides opportunities for critical thinking and criticism, in order to acquire and apply critical thinking skills in life. Based on this rationale, this research aimed to determine whether there is a relationship between high school students' perception of school climate and their tendency toward critical thinking. In line with this aim, the following questions were addressed in the research:

- What are the perceptions of high school students towards the school climate?
- Do high school students' school climate perceptions differ significantly in terms of gender, grade level and school type?
- What is the level of critical thinking tendency of high school students?
- Does the critical thinking tendency of high school students differ significantly in terms of gender, grade level and school type?
- Is there a statistically significant relationship between high school students' school climate perceptions and critical thinking tendencies?

METHODOLOGY

Model of the Research

This research, aiming to explain whether there is a relationship between high school students' perception of school climate and their tendency toward critical thinking, utilized the correlational survey model, which is one of the general survey models. Studies conducted using general survey models aim to obtain a general idea about the population through research conducted on the entire population or a sample taken from the population.

Using general survey models, both singular surveys and correlational surveys can be conducted. In most studies, surveys are designed to provide both singular and correlational results. The correlational survey model attempts to determine whether there is a joint variation between at least two variables and, if so, to determine its degree (Karasar, 2005).

Population – Sample

The population of this research consists of 11th and 12th-grade students studying in Hatay during the academic year 2022-2023. To determine the

sample of the research, the method of stratified sampling, one of the non-probability sampling methods, was used. Stratified sampling is a sampling technique that involves identifying subgroups in the population and ensuring their representation in the sample according to their proportions in the population. Stratified sampling is also used when it is desired to compare the subgroups, selecting an equal number of samples from each subgroup. In short, the purpose of stratified sampling is to ensure the representation of relevant subgroups (Gay, 1987).

In this study conducted within the scope of school climate, it was thought that collecting data from different types of schools would yield better results; therefore, each type of school was considered as a subgroup. In this context, a total of 218 students from vocational high schools, Anatolian high schools, social sciences high schools, and science high schools located in the central districts of Hatay, comprising 11th and 12th-grade students, form the sample of the study. The information about the students included in the sample is provided in Table 1.

Table 1. Information about students

Veriables	Subdimension	f	%
Gender	Male	123	56.4
	Female	95	43.6
Grade	11	116	53.2
	12	102	46.8
School type	Science High School	57	26.1
	Social Science High School	57	26.1
	Anatolian High School	68	31.2
	Vocational High School	36	16.5

As seen in Table 1, 123 (56.4%) of the students participating in the research are male and 95 (43.6%) are female. In terms of grade level, 116 (53.2%) are 11th grade students and 102 (46.8%) are 12th grade students. When examined in terms of school type, 57 (26.1%) are science high school students, 57 (26.1%) are social sciences high school students, 68 (31.2%) are anatolian high school students and 36 (16.5%) are vocational high school students.

Data Collection Tools
In the research, two scales were used as data collection tools. To measure students' perception of school climate, the "Delaware School Climate Student Scale," adapted by Durnalı and Filiz (2019), was used. To measure critical thinking tendency, the "UF/EMI Critical Thinking Tendency Scale," adapted by Ertaş-Kılıç and Şen (2014), was utilized.

Delaware School Climate Student Scale

The Delaware School Climate Student Scale is a scale developed in a 4-point Likert format, consisting of a total of 17 items with sub-dimensions including "teacher-student relationships," "student-student relationships," "interest in school," and "fairness of school rules." Adapted by Durnalı and Filiz (2019), the scale's Cronbach's Alpha coefficients were found to be .80 for the dimension of teacher-student relationships, .67 for student-student relationships, .73 for interest in school, .73 for fairness of school rules, and .84 for the overall scale. In the scope of this research, the collected data yielded Cronbach's Alpha coefficients as follows: .73 for the dimension of teacher-student relationships, .80 for student-student relationships, .78 for interest in school, .77 for fairness of school rules, and .82 for the overall scale.

UF/EMI Critical Thinking Disposition Scale

The UF/EMI Critical Thinking Tendency Scale is a scale developed in a 5-point Likert format, consisting of a total of 25 items with sub-dimensions including "participation," "cognitive maturity," and "innovation." Adapted by Ertaş-Kılıç and Şen (2014), the scale's Cronbach's Alpha coefficients were calculated as .91 for the overall scale, .88 for the participation sub-dimension, .70 for the cognitive maturity sub-dimension, and .73 for the innovation sub-dimension. In the scope of this research, the collected data yielded Cronbach's Alpha coefficients as follows: .90 for the overall scale, .83 for the participation sub-dimension, .71 for the cognitive maturity sub-dimension, and .73 for the innovation sub-dimension.

Analysis of Data

Since the data obtained in the research was quantitative, IBM SPSS Statistics 26.00 (Statistical Package for Social Sciences) program was used in its analysis. First, it was analyzed whether the data met the normality assumption and the results are given in Table 2.

Table 2. Normality test results

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Critical Thinking	.057	218	.083	.986	218	.035
School Climate	.047	218	.200	.992	218	.279

Table 2 presents the results of the normality test for critical thinking and school climate. The significance value for school climate was found to be .279 (p > .05), indicating that there is no significant difference from normal distribution. Thus, the data related to school climate are normally distributed. However, when

looking at the significance value for critical thinking, it was found to be .035 (p < .05), indicating a significant difference from normal distribution. Therefore, the data for critical thinking do not show a normal distribution according to the Shapiro-Wilk test results.

However, in social sciences, determining whether the data meet the assumption of normality can also involve considering skewness and kurtosis values, as it is relatively more difficult to meet the normality assumption compared to other fields. According to Tabachnick and Fidell (2013), if these values fall between -1.5 and +1.5, it indicates that the data are normally distributed. The skewness and kurtosis values for critical thinking and school climate were calculated as follows: -.344, .974 and -.112, -.335 respectively, showing that all values fall within the range of -1 to +1. Thus, it is concluded that both critical thinking and school climate data are normally distributed, and parametric tests were used for analysis.

Descriptive statistics were used to determine students' perception of school climate and critical thinking tendency, while t-test and ANOVA analyses were employed to examine whether there were significant differences in variables such as gender and school type. Pearson correlation coefficient was utilized to investigate the relationship between school climate and critical thinking tendency.

FINDINGS

In this section, the data collected from the students was analyzed and presented in line with the research questions.

Findings Regarding High School Students' Perception Levels Towards School Climate

Descriptive statistics on teacher-student relations, inter-student relations, interest in school, fairness of school rules and the school climate as a whole are given in Table 3.

Table 3. Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Teacher and student relations	218	1.00	4.00	2.95	.502
Relations between students	218	1.00	4.00	2.62	.604
Interest in school	218	1.00	4.00	2.90	.732
Fairness of school rules	218	1.00	4.00	2.62	.684
School climate	218	1.71	3.76	2.80	.418

Table 3 shows the minimum and maximum values, arithmetic means and standard deviations of teacher and student relations, inter-student relations, interest in the school, the fairness of school rules and the school climate as a whole. When the averages were examined, the average of the teacher-student relationship was 2.95, the relationship between students was 2.62, the interest in the school was 2.90, the fairness of the school rules was 2.62, and the average of the school climate as a whole was 2.80.

Findings on Whether High School Students' Perceptions of School Climate Vary According to Various Variables

The analysis of students' school climate perceptions by gender is given in Table 4 below.

Table 4. Analysis of school climate perceptions by gender

	Gender	N	Mean	Std. Deviation	Std. Error Mean	t	p
School	Male	123	47.43	7.41	.668	-.779	.437
Climate	Fenale	95	48.18	6.74	.692		

As seen in Table 4, it was found that there was no significant difference between male and female students' school climate perceptions (t= -.779, p>.05).

The analysis of students' school climate perceptions by grade level is given in Table 5 below.

Table 5. Analysis of school climate perceptions by grade level

	Class	N	Mean	Std. Deviation	Std. Error Mean	t	p
School	11	116	46.87	6.924	.642	-1.96	.051
Climate	12	102	48.76	7.245	.717		

As seen in Table 5, it was found that there was no significant difference between the school climate perceptions of 11th and 12th grade students (t= -1.96, p>.05).

The analysis of students' school climate perceptions by school type is given in Table 6 below.

Table 6. Analysis of school climate perceptions by school type

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	427.40	3	142.46	2.88	.037

Within Groups	10582.19	214	49.44
Total	11009.59	217	

When Table 6 is examined, it is seen that students' perceptions of school climate differ significantly according to school types (F(3-214)=2.88, p<.05). In order to determine which school types this difference occurs between, Tukey analysis, one of the post-hoc tests, was applied since the group variances were distributed homogeneously. Analysis results are given in Table 7 below.

Tablo 7. Tukey HSD

(I) school type	(J) school type	Mean Difference (I-J)	Std. Error	Sig.
Science High School	Social science High School	-2.66	1.31	.182
	Anatolian High School	.841	1.26	.910
	Vocational High School	.358	1.49	.995
Social Science High School	Science High School	2.66	1.31	.182
	Anatolian High School	3.50*	1.26	.030
	Vocational High School	3.02	1.49	.184
Anatolian High School	Science High School	-.841	1.26	.910
	Social Science High School	-3.50*	1.26	.030
	Vocational High School	-.483	1.44	.987
Vocational High School	Science High School	-.358	1.49	.995
	Social Science High School	-3.02	1.49	.184
	Anatolian High School	.483	1.44	.987

*. The mean difference is significant at the 0.05 level.

When examining Table 7, it can be observed that pairwise comparisons of school types are conducted. Upon reviewing the comparisons, it is understood that the school types that create a significant difference in school climate are social sciences high school and Anatolian high school. Since the difference is in favor of social sciences high school, it can be said that the perception of school climate among social sciences high school students is significantly higher than that of Anatolian high school students.

Findings Regarding the Critical Thinking Disposition Level of High School Students

The descriptive statistics for critical thinking tendencies, including the dimensions of participation, cognitive maturity, innovation, and overall, are provided in Table 8 below.

Table 8. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Participation	218	1.55	5.00	3.88	.612

Cognitive maturity	218	1.29	5.00	3.87	.635
Innovation	218	1.29	5.00	3.82	.663
Tendency to think critically	218	1.40	5.00	3.86	.573

Table 8 gives the minimum and maximum values, arithmetic means and standard deviations of participation, cognitive maturity, innovation and critical thinking tendency. When the averages are examined, participation is 3.88; cognitive maturity 3.87; innovativeness was found to be 3.82 and the average of critical thinking tendency as a whole was 3.86.

Findings on Whether High School Students' Critical Thinking Tendency Differs According to Various Variables

The analysis of students' critical thinking tendencies by gender is given in Table 9 below.

Table 9. Analysis of critical thinking tendencies by gender

	Gender	N	Mean	Std. Deviation	Std. Error Mean	t	p
Critical Thinking	Male	123	95.54	15.30	1.37	-1.28	.201
	Female	95	98.05	12.91	1.32		

As seen in Table 9, it was found that there was no significant difference between the critical thinking tendencies of male and female students (t= -1.28, p>.05).

The analysis of students' critical thinking tendencies by grade level is given in Table 10 below.

Table 10. Analysis of critical thinking tendencies by grade level

	Class	N	Mean	Std. Deviation	Std. Error Mean	t	p
Critical Thinking	11	116	97.40	14.39	1.33	.843	.400
	12	102	95.76	14.27	1.41		

As seen in Table 10, it was found that there was no significant difference between the critical thinking tendencies of 11th and 12th grade students (t= .843, p>.05).

The analysis of students' critical thinking tendencies according to school type is presented in Table 11.

Table 11. Analysis of Critical Thinking Dispositions by School Type

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3391.12	3	1130.37	5.87	.001
Within Groups	41187.24	214	192.46		

Total	44578.37	217	

When Table 11 is examined, it is seen that students' critical thinking tendencies differ significantly according to school types (F(3-214)=5.87, p<.05). In order to determine which school types this difference occurs between, Games-Howell analysis, one of the post-hoc tests, was applied since the group variances were not distributed homogeneously. Analysis results are given in Table 12 below.

Tablo 12. Games-Howell

(I) school type	(J) school type	Mean Difference (I-J)	Std. Error	Sig.
Science High School	Social Science High School	2.03	2.33	.819
	Anatolian High School	4.22	2.28	.256
	Vocational High School	11.92*	3.55	.008
Social science High School	Science High School	-2.03	2.33	.819
	Anatolian High School	2.18	2.28	.774
	Vocational High School	9.89*	3.55	.036
Anatolian High School	Science High School	-4.22	2.28	.256
	Social Science High School	-2.18	2.28	.774
	Vocational High School	7.70	3.51	.139
Vocational High School	Science High School	-11.92*	3.55	.008
	Social Science High School	-9.89*	3.55	.036
	Anatolian High School	-7.70	3.51	.139

*. The mean difference is significant at the 0.05 level.

When Table 12 is examined, it is seen that pairwise comparisons of school types are made. Considering the comparisons made, it is understood that the school types that create a significant difference in critical thinking tendency according to school types are science high schools, social sciences high schools and vocational high schools. Since the difference is against vocational high schools, it can be said that the critical thinking tendency of science high school and social sciences high school students is significantly higher than vocational high school students.

Examining the Relationship Between School Climate Perception and Critical Thinking Tendency

Pearson correlation analysis was conducted to determine whether there was a relationship between high school students' perception of school climate and their critical thinking tendencies. The analysis results are shown in Table 13 below.

Table 13. The relationship between school climate perception and critical thinking tendency

	Mean	Std. Deviation	N	Pearson	p
School Climate	47.76	7.12	218	.144	.033
Critical Thinking	96.63	14.33	218		

According to the results of the Pearson correlation analysis, a significant and positive relationship was found between school climate perception and critical thinking (r = .144, p <.05).

DISCUSSION AND CONCLUSION

This research was conducted with 218 students studying in Hatay to determine the relationship between high school students' school climate perception and critical thinking tendency. According to the results of the research, it was found that the students generally found the climate of the schools they attended positive (2.80). When we look at the arithmetic averages of the sub-dimensions of school climate, they are listed from highest to lowest as teacher and student relations (2.95), interest in the school (2.90), followed by relations between students (2.62) and fairness of school rules (2.62) with the same average.

The school climate perceived by students does not differ significantly according to gender and grade level. Contrary to this study, in the study conducted by Doğan (2012), students' opinions about the "inter-student relations" dimension show significant differences according to the gender variable. Male students have a higher positive perception of relationships between students than female students. Another finding that emerged in this study is that when the school climate was examined by school type, it was determined that there was a differentiation in favor of social sciences high schools. In other words, it was found that social sciences high school students' school climate perception was more positive than Anatolian high school students. In Katıer's (2019) study with teachers, he concluded that school type creates a significant difference in the perception of school climate, parallel to the result in this study.

At the same time, one of the important findings of this research is that the critical thinking tendencies of high school students are generally high (3.86). When we look at the arithmetic averages of the sub-dimensions of critical thinking tendency, although the scores are close to each other, they can be listed from highest to lowest as participation (3.88), cognitive maturity (3.87) and innovation (3.82).

In addition, another result of this study is that students' critical thinking tendencies do not differ significantly according to gender and grade level. Contrary to this result, Ay and Akgöl (2008) concluded that female students have more critical thinking power than male students. Another finding is that when critical thinking tendency is examined according to school type, there is a differentiation against vocational high schools. In other words, it was determined that the critical thinking tendencies of science high school and social science high school students were significantly higher than vocational high school students.

Finally, another important finding emerging from this study is the significant and positive relationship between school climate perception and critical thinking tendency. According to Nosich (2018), critical thinking consists of components such as purpose, relevant questions, assumptions, implications, information, concepts, conclusions, and perspectives. In addition to these components, context and alternatives are also considered components of critical thinking. The significant relationship found in this study between students' perception of school climate and their critical thinking tendencies can be explained by the presence of components such as context and perspective in critical thinking. Schools with a positive school climate may enhance students' critical thinking tendencies by providing a context that supports different perspectives.

Based on the findings of this study, it is essential to create a positive climate in schools to improve students' critical thinking skills. Therefore, activities aimed at improving relationships among students and between students and teachers can be conducted. Additionally, care should be taken to ensure fairness in the establishment and implementation of school rules. As understood from the results of this study, one of the areas perceived more negatively in the school climate by students compared to other dimensions is the fairness of school rules.

This study, aimed at determining the relationship between high school students' perception of school climate and their critical thinking tendency, was conducted using quantitative methods through scales. By employing mixed methods, more detailed findings regarding the variables can be obtained.

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Genişletilmiş Özet

Giriş

Eleştirel düşünme becerisinin, son yıllarda eğitim alanında tartışılmaya ve önemsenmeye başlandığı görülmektedir. Bunun temelini; bilginin doğası, öğrenmenin nasıl gerçekleştiği, öğrenci ve öğretmenin sınıf ortamındaki rollerine ilişkin alışılmış yargıların değişmesi oluşturmaktadır (Özden, 2005). Davranışçı yaklaşıma göre öğrenme, etki–tepki bağı oluşturma süreci olarak ele alınmakta, ölçümü ve gözlemi mümkün olmayan insan zihni, duyguları ve düşüncesi önemsenmemektedir. Gelişen teknolojiyle beraber yapılan deneysel çalışmalar beynin incelenmesine imkân vermiş ve davranışçı yaklaşımın varsayımları zayıflamıştır. Günümüzde bilgi nesnel olarak değil, insanın zihninde gerçekleşen olgu olarak tanımlanmaktadır. Bu nedenle eleştirel düşünme becerilerinin geliştirilmesine yönelik çalışmaların eğitim alanında yapılması gerektiği gündeme gelmiştir.

Okulların hepsi ortak bir amaca ulaşmak için kurulmuş kurumlardır fakat amaçlarını gerçekleştirirken içinde bulundukları ortam birbirinden ayrı olabilir. Okulların ayırıcı özelliği olan bu durum iklim olarak adlandırılır (Akbaba ve Erdoğan, 2014). Dağlı 'ya (2018) göre okul iklimi okulda bulunan öğrenciler, öğretmenler ve tüm çalışanların kişisel veya tecrübeye dayalı özellikleriyle ilişkili olarak, okuldaki bireylerle ve okulun kendisiyle ilgili kendilerini nasıl hissettiklerini ifade eder. Kısacası okul iklimi okulun tamamına tesir eden duygudur. Okulların kurmuş oldukları çeşitli yapılar, öğrencilerin zihinlerindeki okul algısını etkilemekle birlikte okulların toplumsallaşma sürecine hizmet etmesi nedeniyle öğrencilerin toplumda alacakları tavırları da belirlemektedir. Öğrencilerin okulu algılama biçimi, okul içindeki davranış, tutum ve eğilimlerini belirlemek açısından önemlidir. Fakat okulun etkisi yalnızca okulla sınırlı değildir. Okulda olanlar, okuldaki ilişkisel, davranışsal ve zihinsel yapılanma okul sonrasında da etkilerini göstermektedir.

Yukarda bahsedilen ifadelerden yola çıkarak okul içi iletişim ortamları ve okul iklimi öğrencilere kazandırılması düşünülen beceri ve değerler için bir fırsat oluşturmaktadır (Balcı ve Yanpar-Yelken, 2010). Bu nedenle okul ikliminde yer alan öğelerin, öğrencilerin sürece katılımını destekleyecek, kendilerini özgürce ifade edebilecek, düşünme fırsatı bulup eleştiri yapabilecek şekilde yapılandırılması eleştirel düşünme becerisini kazanma ve hayata aktarma açısından önemli olduğu düşünülmektedir. Bu gerekçeden hareket edilerek bu araştırmada lise öğrencilerinin okul iklimi algısı ile eleştirel düşünme eğilimi arasında bir ilişki olup olmadığının belirlenmesi amaçlanmıştır.

Yöntem

Lise öğrencilerinin okul iklimi algısı ile eleştirel düşünme eğilimi arasında bir ilişki olup olmadığını açıklamaya çalışan bu araştırmada genel tarama modellerinden ilişkisel tarama modeli kullanılmıştır. Bu araştırmanın evrenini 2022-2023 eğitim öğretim yılında Hatay'da öğrenim görmekte olan 11. ve 12. sınıf öğrencileri oluşturmaktadır. Araştırmanın örneklemini belirlemek amacıyla seçkisiz örnekleme yöntemlerinden tabakalı örnekleme yöntemi kullanılmıştır. Hatay'ın merkez ilçelerinde yer alan meslek lisesi, anadolu lisesi, sosyal bilimler lisesi ve fen lisesinde öğrenim gören 11. ve 12. sınıf öğrencilerinden oluşan toplam 218 öğrenci çalışmanın örneklemini oluşturmaktadır.

Araştırmada veri toplama aracı olarak 2 adet ölçek kullanılmıştır. Öğrencilerin, okul iklimi algısını ölçebilmek için Durnalı ve Filiz (2019)'in uyarlama çalışmasını yaptığı "Delaware Okul İklimi Öğrenci Ölçeği" ile eleştirel düşünme eğilimini ölçebilmek için Ertaş-Kılıç ve Şen (2014)'in uyarladığı "UF/EMI Eleştirel Düşünme Eğilimi Ölçeği" kullanılmıştır. Araştırmada elde edilen verilerin analizinde okul iklimi algısı ve eleştirel düşünme eğiliminin belirlenmesinde betimsel istatistiklerden; cinsiyet, okul türü gibi değişkenler açısından anlamlı farklılık olup olmadığına bakılırken t-testi ve ANOVA analizlerden; okul iklimi ile eleştirel düşünme eğilimi arasında ilişki olup olmadığını incelemek için Pearson korelasyon katsayısından yararlanılmıştır.

Bulgular

Lise öğrencilerinin okul iklimine yönelik algı düzeyleri ile ilgili bulgulara bakıldığında öğretmen ve öğrencileri ilişkisi 2.95, öğrenciler arası ilişkiler 2.62, okula olan ilgi, 2.90, okul kurallarının adilliği 2.62 ve bütün olarak okul ikliminin ortalaması ise 2.80 bulunmuştur.

Lise öğrencilerinin eleştirel düşünme eğilimi düzeyine yönelik bulgulara bakıldığında katılım 3.88; bilişsel olgunluk 3.87; yenilikçilik 3.82 ve bütün olarak eleştirel düşünme eğiliminin ortalaması ise 3.86 olarak bulunmuştur.

Okul iklimi algısı ve eleştirel düşünme eğilimi arasındaki ilişkiye bakıldığında okul iklimi algısı ile eleştirel düşünme arasında anlamlı ve olumlu bir ilişki bulunmuştur (r =.144, p<.05).

Tartışma ve Sonuç

Öğrencilerin algıladıkları okul iklimi, cinsiyet ve sınıf düzeyine göre anlamlı bir şekilde farklılaşmamaktadır. Bu çalışmanın aksine Doğan (2012)'nin yaptığı çalışmada öğrencilerin "öğrenciler arası ilişkiler" boyutu hakkındaki görüşleri

cinsiyet değişkenine göre anlamlı farklılıklar göstermektedir. Erkek öğrencilerin, öğrenciler arasında kurulan ilişkileri, kız öğrencilere göre olumlu algılama düzeyi daha yüksektir. Yine bu çalışmada ortaya çıkan bir başka bulgu ise, okul iklimi okul türüne göre incelendiğinde sosyal bilimler lisesi lehine bir farklılaşma olduğu tespit edilmiştir. Bir başka deyişle Sosyal bilimler lisesi öğrencilerinin okul iklimi algısının anadolu lisesi öğrencilerine göre daha olumlu olduğu bulunmuştur. Katıer (2019)'in öğretmenlerle yaptığı çalışmada, bu çalışmadaki sonuca paralel olarak okul türünün okul iklimi algısında anlamlı bir farklılık yarattığı sonucuna ulaşmıştır.

Bunun yanında öğrencilerin eleştirel düşünme eğilimlerinin cinsiyet ve sınıf düzeyine göre anlamlı bir şekilde farklılaşmadığı bu çalışmada ortaya çıkan bir başka sonuçtur. Bu sonucun aksine Ay ve Akgöl (2008) kız öğrencilerin eleştirel düşünme gücünün erkek öğrencilere göre daha fazla olduğu sonucuna ulaşmıştır. Başka bir bulgu ise eleştirel düşünme eğilimi okul türüne göre incelendiğinde meslek lisesi aleyhinde bir farklılaşmanın olmasıdır. Bir başka deyişle Fen lisesi ve sosyal bilimler lisesi öğrencilerinin eleştirel düşünme eğilimlerinin meslek lisesi öğrencilerine göre anlamlı bir şekilde daha yüksek olduğu saptanmıştır.

Son olarak bu çalışmada ortaya çıkan önemli bir bulgu da, okul iklimi algısı ile eleştirel düşünme eğilimi arasında anlamlı ve olumlu bir ilişkinin bulunmasıdır. Nosich (2018)'e göre eleştirel düşünmenin amaç, konuyla alakalı soru, varsayımlar, uygulamalar ve sonuçları, bilgi, kavramlar, sonuçlar ve yorumları, bakış açısı gibi bileşenleri vardır. Bu bileşenlere ek olarak bağlam ve alternatifler de eleştirel düşünmenin bileşenlerinden kabul edilir. Bu çalışmadan elden edilen sonuca göre öğrencilerin okul iklimi algısı ile eleştirel düşünme eğilimleri arasında anlamlı bir ilişkinin bulunması eleştirel düşünmenin bağlam ve bakış açısı gibi bileşenlerinin olması ile açıklanabilir. Olumlu okul iklimine sahip olan okulların öğrencilerin eleştirel düşünme eğilimlerini destekleyecek bir bağlam sunması ve farklı bakış açılarını desteklemesi yönüyle eleştirel düşünme eğilimlerini arttırdıkları söylenebilir.