

## **The Role of School Climate in Physical Education: Scientometric Analysis**

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**Abstract:** By analyzing author keywords, visualizing citation patterns, and assessing the effectiveness of research on school climate in physical education, this study attempts to provide a thorough picture of the descriptive aspects of publications. ScientoPy software was utilized in the study to examine the quantity of publications, top research areas, most proactive authors, author keywords, well-liked sources, and institutional data. This study used 350 entries from the Scopus database and followed data reconciliation. Growing trends in school climate research and physical education are shown by the Scopus database. With 19 published documents, “Physical Education and Sport Pedagogy” is recognized as the most active scientific resource. The term “physical education” has become more well-liked. Physical education, motivational climate, motivation, physical activity, and achievement goal theory were the top five search terms in this survey. The primary research fields, keywords, connected studies, and most esteemed organizations and researchers in school climate research and physical education have been identified by this study. The study also offers a global perspective on the current hot themes of physical education and school climate to readers and scholars in the future. Additionally, it provides a variety of analyses to assist in organizing data in order to develop theory and put into practice rigorous school climate research and physical education.

**Keywords:** Role of School Climate, Physical Education, Scientometric Analysis

### **A. Introduction**

Different microsystems, including homes and schools, influence key developmental outcomes for children (O'Malley et al., 2015). It has been acknowledged that the school climate offers a chance to raise student achievement, lower problem behavior, and lower dropout rates (Wang & Degol, 2016). Numerous empirical researches employ school environment as a predictor or outcome variable. It is described by theoretical conceptions, operational definitions, and taxonomies (Rudasill et al., 2018). School climate is a term used to describe the social and physical environment of a school and is typically operationalized as an amalgamation of staff and student behavior and perceptions (Voight & Nation, 2016). Academic success will remain the primary indicator of a student's and a school's performance (Daily et al., 2019). The

“quality and character of school life” is the school atmosphere (Grazia & Molinari, 2021).

This definition should include three more elements. It is a comprehensive and complex construct that includes academic experience, relationships, security, and institutional context, among other components (Wang & Degol, 2016). Additionally, it influences a number of outcomes, including academic success (Berkowitz et al., 2017), the psychological health of children and instructors (Aldridge & McChesney, 2018; Kutsyuruba et al., 2015), and fewer incidents of bullying, misbehavior, and abuse (Reaves et al., 2018; Steffgen et al., 2013). Last but not least, it is a flexible, workable, data-driven tool that can be altered through intervention (Voight & Nation, 2016; Wang & Degol, 2016) and that can assist both successful and failing schools in fostering student achievement and wellbeing (Thapa et al., 2013). Generally speaking, school environment shows up as an effective entry point to encourage student and teacher self-reflection, which ultimately leads to school transformation and improvement (Grazia & Molinari, 2021).

The quality of instruction and student learning, school community interactions, school administration, and the institutional and structural aspects of the learning environment all contribute to the school climate (Wang & Degol, 2016). A closer look at this literature, nevertheless, exposes considerable conceptual and theoretical ambiguity. In particular, to direct future empirical research, a clear, thorough, and comprehensive framework for the study of school atmosphere is still required (Rudasill et al., 2018). Social identification and school atmosphere are crucial elements that can raise student achievement (Maxwell et al., 2017). A viable strategy for preventing social and behavioral issues is to improve school atmosphere (Gage et al., 2016).

This study uses a scientometric review to give a complete picture of school climate and physical education in recognition of the importance of school climate and physical education research. Science-based or scientometric reviews of studies on physical education and school atmosphere are still lacking. Previous researchers have been drawn to scientometric or bibliometric reviews of general bibliometric analysis with a focus on augmented and virtual reality in physical education (Calabuig-Moreno et al., 2020), physical education as a component of adaptive education in secondary school age (Pehoiu & Savu, 2017), and student motivation in physical education (Hernández et al., 2019). However, just one database—Scopus—is used in this review. As a result, the ScientoPy program and information from the Scopus database were used to conduct the scientometric evaluation in this study. A Python tool for temporal scientometric analysis is called ScientoPy. We can use temporal analysis to determine when a new phenomenon first appears and when it starts to become a hot topic or issue (Ruiz-Rosero et al., 2017).

The current study seeks to: identify significant publishing growth and research fields; conduct an analysis of the author's keywords and significant school climate research in physical education; and identify significant sources and institutions in the field of school climate. By giving readers and potential researchers an overview of the research being done, the authors think that this article adds to a greater understanding of current trends in school climate research in physical education.

## **B. Methods**

Based on information from the renowned database, Scopus, this study uses scientometric methodology to examine recent developments and trends in school climate research in physical education. The importance of peer review in scientific projects to identify potential barriers and directions is also emphasized. This metaphor also relates to the purpose of this study, which is to assess the influence of publications, disciplines, authors, sources, and institutions on countries using selected databases except magazines and newspapers listed in Scopus were not selected.

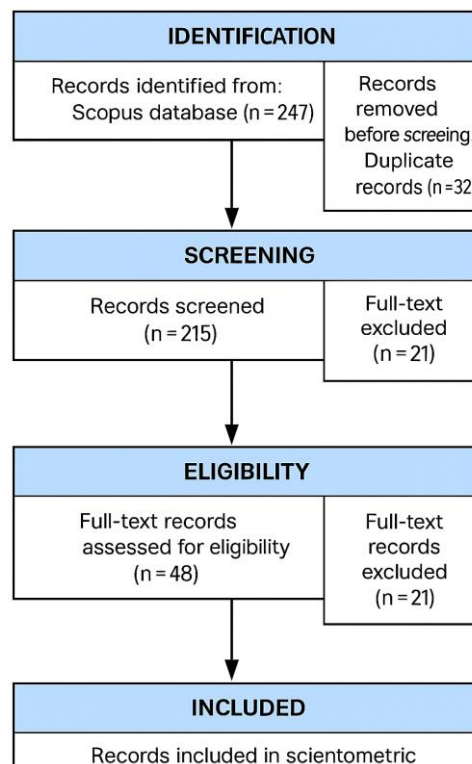
Due to the abundance of studies that have been published in practically all areas of knowledge, bibliometric reviews are growing in popularity as a research method (Aziz et al., 2022). For instance, the term "scientometric" refers to a quantitative method of examining the progress of science (Su & Lee, 2010). Using large-scale academic datasets, it is used to map knowledge structure and evolution, assess the impact of research, and comprehend the citation process (Zhong et al., 2019). A scientometric analysis can be a useful source of information while doing a systematic review, especially when current and pertinent systematic reviews are difficult to find (Chen & Song, 2019).

Using ScientoPy, scientometric analysis of the school climate in physical education was conducted for this study. ScientoPy is a software system for keeping track of the most significant research areas, authors, nations, and publications that are relevant to them. It is a free and open-source scientometric analysis tool built on Python that may remove bias in certain articles (Ruiz-Rosero et al., 2017). ScientoPy is capable of performing the following tasks: (i) gaining access to the Clarivate Web of Science and Scopus databases; (ii) sorting publications by document type; (iii) finding and removing duplicate documents; (iv) creating graphs that show the evolution of the most popular topics; (v) creating a graph showing the evolution of selected items in a topic; (vi) identifying popular topics by looking at the average growth rate (AGR); and (vii) calculating

### *Retrieval Data*

On September 13, 2022, the metadata for the current study was retrieved from the Scopus database using an institutional subscription. Finding the appropriate

keywords, associated information, and analytical objectives is the first step in the data retrieval process. Using keywords based on TITLE-ABS-KEY: (“school\* climate\*” OR “school\*” AND “climate\*”) AND (“physical education”), metadata for learning about school climate and physical education were gathered. The search is widened by the use of (\*). It recognizes each publication that contains all derivations of fundamental concepts in the title, abstract, or keyword, as well as different word ends and spellings. Flowcharts are used to find, assess, and submit papers for the evaluation of our scientometric data. PRISMA The process of gathering documents from Scopus is shown in Figure 1 and will be further examined.

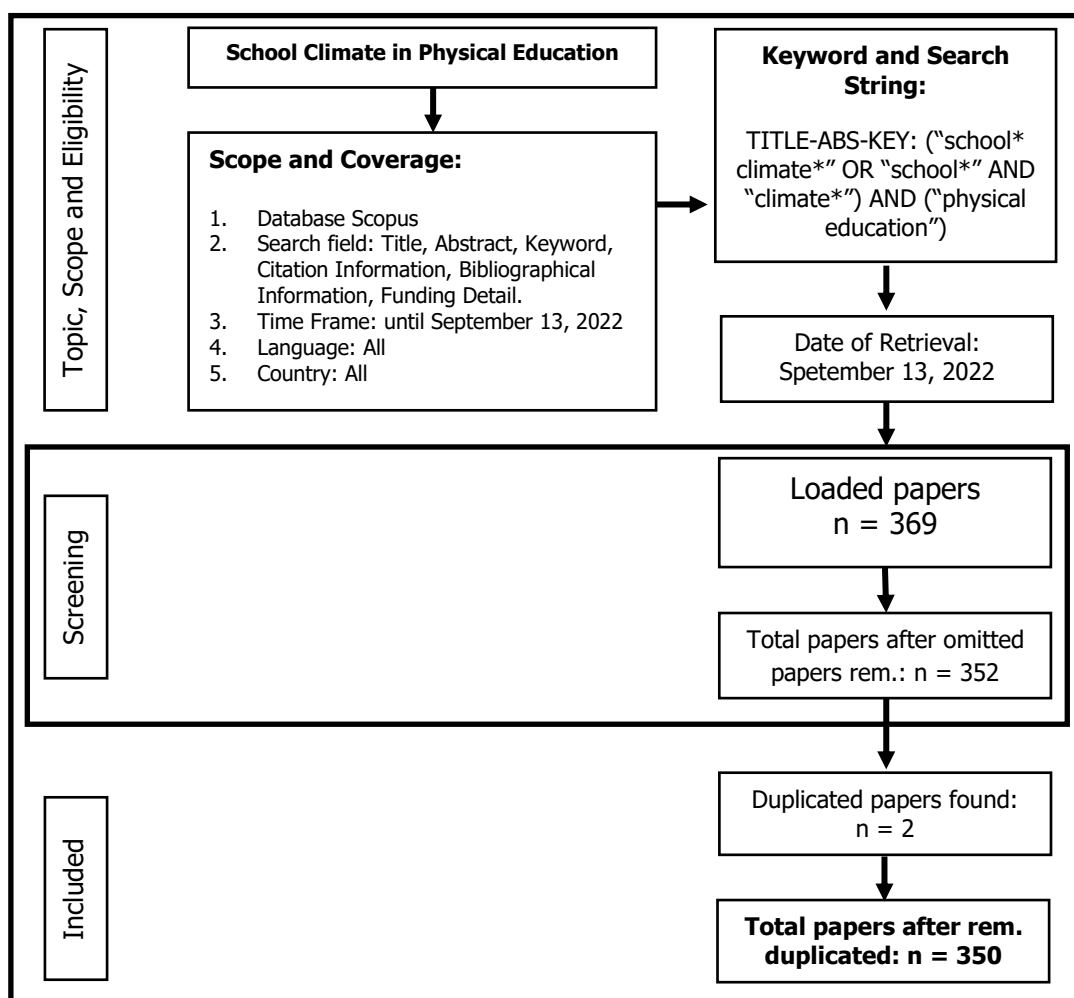


### *Data Structuring and Management*

The data from the repossessions used in this study underwent pre-processing. The following sorts of documents are used by ScientoPy at present time to handle data: I conference papers; (ii) articles; (iii) reviews; and (iv) papers (Ruiz-Rosero et al., 2017). ooks, book series, and letters are the main outputs of this research. Additionally, ScientoPy normalizes author names during the pre-processing stage by removing periods, commas, and special characters from metadata retrieved from both databases and the Scopus database, replacing them with semicolons for metadata retrieved from the Scopus database, and removing duplicate samples with the same title and author (Pabon et al., 2020).

Table 1’s preprocessed short table displays all the documents loaded for each database along with the removal of any duplicate records. The ScientoPy pre-

processing script prepares the Scopus documents, starting with loading documents and ending with eliminating duplicate documents, based on table 1. 369 papers and entries added from the Scopus database are included in the raw source dataset used in this study. The automatic classification of ScientoPy publications as conference papers, articles, reviews, proceedings papers, and press articles has resulted in 352 papers, of which this research has published 17. This study used 350 distinct entries from the Scopus database after data reconciliation, with 2 duplicate papers deleted. It's likely that some of the total number of documents shown in the previous section on dataset assignment are duplicates in the database, meaning they appear in both databases (Sofyan et al., 2022).



**Figure 1. Flowchart Showing the Method Used to Obtain Data**

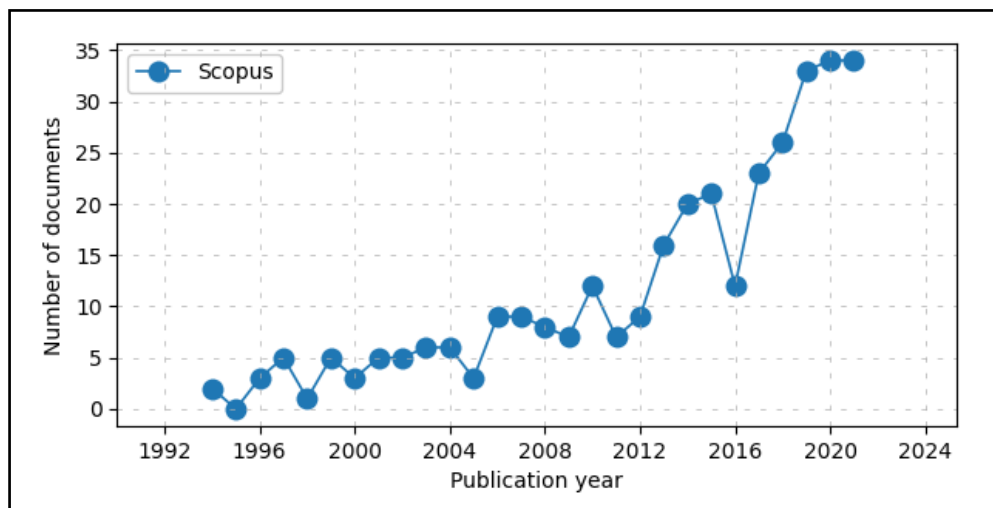
**Table 1. Preprocessing Brief**

Info	Number	Percentage
Loaded papers	369	
Omitted papers by document type	17	4.6%
Total papers after omitted papers removed	352	
Loaded papers from Scopus	352	100.0%
Duplicated removal results:		
Duplicated papers found	2	0.6%
Removed duplicated papers from Scopus	2	0.6%
Duplicated documents with different cited by	1	50.0%
Total papers after rem. dupl.	350	
Papers from Scopus	350	100.0%

### C. Results and Discussion

#### *Publication growth base on Scopus database*

The evolution of sports nutrition publications across both databases is depicted in Figure 2. This shows the remarkable direction in which this field has grown significantly since 2000. In addition, the percentage of documents published in the last five years (2017 to 2021) has increased, namely 2017 ( 23 documents, 7.09%), 2018 (26 documents, 8.02%), 2019 (33 documents, 10.18%), and 2020–2021 (34 documents, 10.49%).



**Figure 2. Publication Growth**

#### *Leading Scientific Sources*

Typically, a “source” is a journal, conference materials, or a book. The top 10 sources are listed in Table 2 according to the quantity of articles that were published between

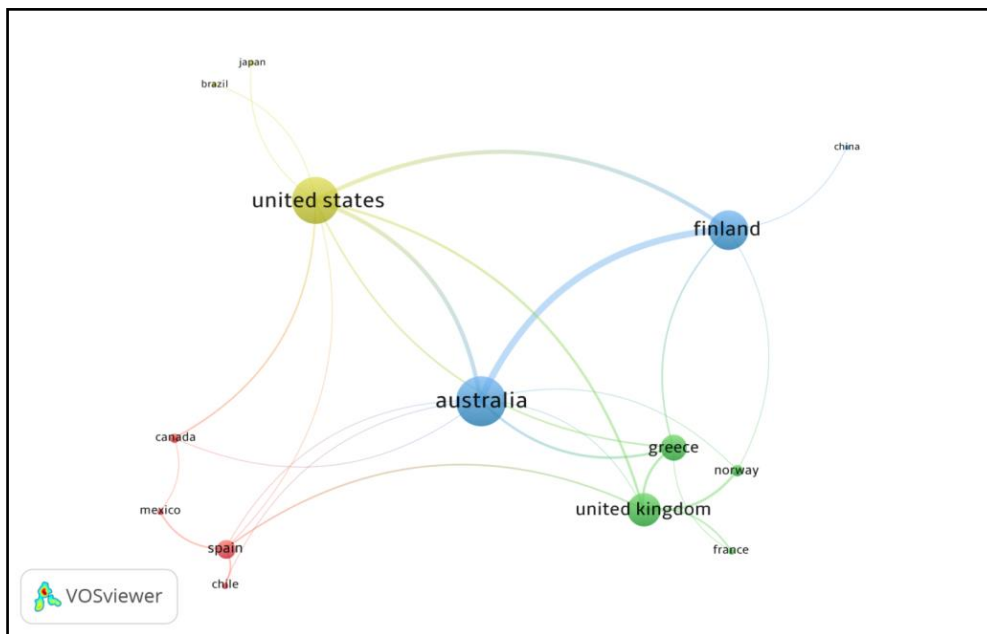
1990 and 2021. Ruiz-Rosero et al. (2017), advice's to use ScientoPy's default parameters was followed to produce the findings.

**Table 2. The Top Ten Active Sources**

Rank	Source Title	Total	AGR	ADY	PDLY	H Index
1	Physical Education and Sport Pedagogy	19	01.05	03.00	31.06	11
2	European Physical Education Review	14	-0.5	00.05	07.01	12
3	Research Quarterly for Exercise and Sport	14	00.00	01.00	14.03	9
4	Retos	14	01.00	03.00	42.09	7
5	Psychology of Sport and Exercise	12	-0.5	01.00	16.07	11
6	International Journal of Environmental Research and Public Health	10	01.05	04.05	90.00.	4
7	Journal of Teaching in Physical Education	10	-0.5	00.00	00.00	9
8	Sport, Education and Society	9	00.00	01.00	22.02	7
9	Frontiers in Psychology	8	00.00	02.00	50.00	5
10	Perceptual and Motor Skills	8	00.00	00.00	00.00	7

**Most Country**

Figure 3 shows the network visualization based on the total link strength of countries entering the threshold.



**Figure 3. Network Visualization Base on Total Link Strength**

Of the 47 countries that publish a lot about school climate in physical education learning, with a minimum number of five documents owned by each country and a number of zero citations (default setting), 18 countries have found that meet the threshold. Spain is the most productive country in publishing academic manuscripts

for its authors, with a total of 70 documents. Followed by the United States in second place and the United Kingdom in third place, with 63 and 43 documents published, respectively. However, Australia is the country with the largest total link strength of 21. Followed by the United States, Finland, the United Kingdom, and Greece, respectively, with a total link strength of 20, 17, 14, and 11. Meanwhile, the United Kingdom leads in terms of the number of citations obtained, with a total of 2700 citations. followed by the United States, with 1835 citations in second place. In third, fourth, and fifth positions are Greece (970 citations), Spain (738 citations), and Australia (491 citations).

### *Author*

Figure 4 represents the top 30 authors by number of publications on school climate research in physical education learning in the Scopus database. The thickness of the words describes the higher frequencies. That is, the thicker and bigger the work, the more it has been published. In this study, Baena-Extremera A is recognized as a proactive author with 13 publications. Granero-Gallegos A, in second place with 12 publications, and Ntoumanis N., in third place with 10 publications. Based on the results expanded by the authors in ScientoPy, the article written by Standage M., Duda J.L., and Ntoumanis N. in 2005, entitled "A test of self-determination theory in school physical education" received 573 citations. Investigating the article shows that the results of their research provide support for the theory of self-determination and strengthen the application of the framework to the context of physical education in schools. Furthermore, the results of their study mostly found support for the invariance of the motivational processes espoused by cross-gender self-determination theory.

With a total of 547 citations, the article written by Standage M., Duda J.L., and Ntoumanis N. (2003) with the title "A model of contextual motivation in physical education: Using constructs from self-determination and achievement goal theories to predict physical activity intentions" is ranked as the second most cited article. This study investigated the articles showing the motivational responses of 328 high school students. This study tested a model of student motivation in physical education that combines the constructs of goal attainment and self-determination theory. Structural equation modeling analysis supports a model in which a climate favoring autonomy and lower perceptions of a mastery climate positively impact the hypothesized mediating variables (i.e., autonomy, competence, and relatedness) to induce self-determined motivation. Self-determined motivation was found to predict positively, whereas amotivation was a negative predictor of leisure time physical activity intentions.

Ntoumanis, N. and Biddle, Stuart J. H. ranked third with 293 citations. His article entitled "A Review of the Motivational Climate in Physical Activity" was published in 1999. A critical review of research on the motivational impact of different

psychological climates on physical activity. Motivational, cognitive, affective, and behavioral outcomes are considered in sports, school physical education, and sports. We conducted a deeper investigation into their work, and we can conclude from their work that the mastery motivation climate is associated with more adaptive motivational patterns, while the performance climate is associated with less adaptive or maladaptive motivational and affective responses.



**Figure 4. Word Cloud Base on Most Author**

### ***Keyword analysis***

Author keywords are the terms that the author selects to precisely describe the information in the document. Author keywords make crucial passages in the paper easier to find for future readers and scholars. Many electronic search engines, databases, and journal websites employ the keyword author to locate pertinent papers. In this situation, ScientoPy could use the author's keywords to follow the development of the research question or search thesis.

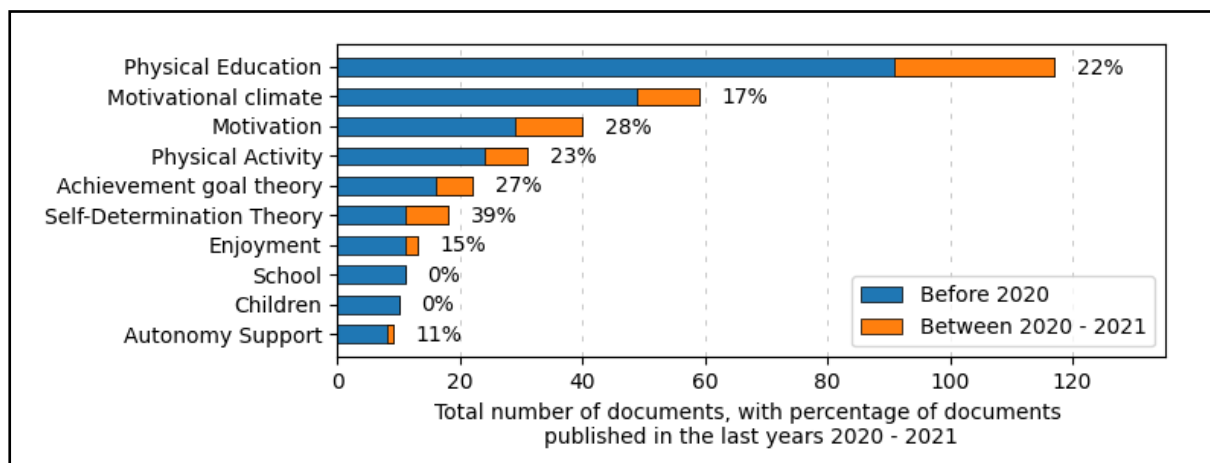
The author's primary keywords from his earlier study on the school climate and physical education learning are examined in this part. Based on the author's keywords, research trends are discovered to complete the workflow. Similar terms with British and American spellings, as well as keywords in the single and plural, have been suggested to be combined. This manual exercise promotes data organization and prevents term duplication, producing more reliable findings.

The 10 keywords from the prior research are depicted in Figure 5. Physical education, motivational climate, motivation, physical activity, and achievement goal theory were the top five most utilized keywords. ScientoPy allows us to view an infinite number of keywords, even if Figure 3 only shows the top 10 terms. The proportion of documents issued in prior years (2020–2021) is also shown in Figure 5

as a gauge of relative increase. According to this statistic, “Self-Determination Theory” comes in sixth place overall but has the highest PDLY (38.09%).

The most famous keyword in this research is “physical education.” This keyword is in 117 articles. Using ScientoPy’s extended results, we can check related publications by the author’s keywords. The publication with the highest number of citations for this term is entitled “Perceived motivational climate and intrinsic motivation in school physical education classes,” written by Goudas, M., & Biddle, S. (1994), published by the *European Journal of Psychology of Education*, in volume 9, number 3, and on pages 241-250, which has a total of 149 citations.

The second keyword, “Motivational Climate”, was found in 59 articles. The publication with the highest number of citations for this term, entitled “Predictors of intrinsic motivation among adolescent students in physical education,” written by Ferrer-Caja, E., & Weiss, M. R. (2000), received 216 citations. For the keyword “Motivation”, there are 40 articles with the highest number of citations, as many as 293 contained in the article written by Ntoumanis, N., & Biddle, S. J., 1999, entitled “A Review of Motivational Climate in Physical Activity”.

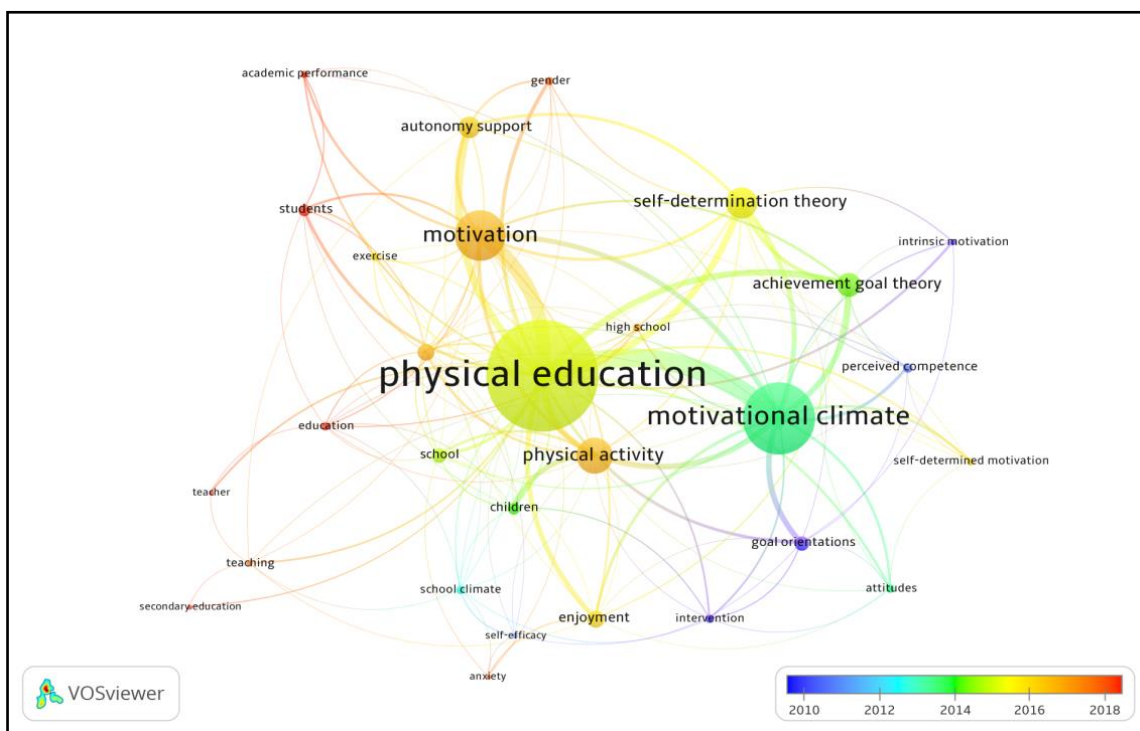


**Figure 5. The Top 10 Authors’ Keywords on School Climate in Learning Physical Education**

In order to find themes or subjects that are pertinent to the school atmosphere in physical education learning, this study uses cluster mapping to examine the co-occurrence of the author’s keywords. ScientoPy was used to provide preprocessing on the dataset, which consisted of Scopus and WOS metadata, before vosviewer was used to produce a network map. The study also maps the co-occurrence of the writers’ terms using a thesaurus file. For merging related terms, spelling variants, and singular or plural terms, thesaurus files are crucial.

Of the 751 keywords that are widely used by authorities related to the school climate in physical education learning, with a minimum number of five documents owned

by each author and a number of zero citations (default setting), 29 keywords were found that met the threshold. “Physical education” is the keyword with the greatest total link strength, which is 169 and 122 times. “Motivational climate” is in second place with a total link strength of 62 and 109 times. Meanwhile, the two keywords have a link strength of 31. The keywords in 2010 as keywords used in previous research were marked by blue stains, including: “intrinsic motivation”, “perceived competence”, “goal orientations”, “intervention”, and “goal orientations,” “self-efficacy”. Meanwhile, the latest keywords used by the authors and appearing in the range of 2018 are shown in red, including: “academic performance”, “students”, “education”, “teacher”, “secondary education”, and “anxiety”.



**Figure 6. Overlay Visualization Base on Author's Keyword**

## D. Conclusions

This scientometric review's primary goal is to assess the global development of school climate research in physical education. Recently, the terms “school\* climate\*” OR “school\*” AND “climate\*” AND “physical education” were searched in the Scopus database. A search of the database produced 369 papers. Publications are automatically classified by ScientoPy as conference papers, reviews, papers, or press stories. 17 publications were thus left out of the study. Following data reconciliation, this study looked at 350 distinct items in the Scopus database and deleted 2 duplicate articles. The search strings that were used to conduct this study are mostly to blame for its limitations. The text's metadata was retrieved using the keywords “school\* climate\*” OR “school\*” AND “climate\*” AND “physical education.” The debate

might change slightly if more keywords were utilized. But this analysis is merely a beginning point that can be expanded upon by more thorough research, such a scope review or an organized literature review. These results enable the construction of a theoretical framework, the mapping of the state-of-the-art, and the rapid identification of research gaps. Additionally, it has been predicted that the study's findings will encourage the formation of new, more pertinent concepts and ideas as a result of keyword analysis, enable more effective dissemination and communication of scientific works related to school climate research in physical education, and stimulate the development of new ideas. This study is anticipated to serve as a starting point for future work in the development of school climate research and education on subjects like school climate and student achievement, the effect of school climate on physical endurance, as well as an in-depth examination of some themes or issues raised in this study.

### **E. Acknowledgement**

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