Thematic density and methodological trends in peer bullying theses in Turkey: A text mining study

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Abstract. In this study, English abstracts of 424 master's and doctoral theses on peer bullying in Turkey, which included the term peer bullying in their abstracts, were examined using Latent Dirichlet Allocation, a text mining method. In order to conduct an in-depth examination of theses written on peer bullying, English stopwords, general concepts on peer bullying, and academic research concepts were excluded from the analysis and text mining was applied. Four Topics were reached as a result of the analysis. Topic-1, which constitutes approximately 32% of the studies, consists of studies focusing on emotional problems of individuals and cyberbullying. Topic-2, which constitutes approximately 26% of the studies, is qualitative studies investigating bullying based on ethnic and cultural differences and their solutions in the classroom and on the basis of school administrators. Topic-3, which constitutes approximately 17% of the theses, is studies focusing on clinical/psychological problems and risks that cause peer bullying and occur as a result of bullying. Topic-4, which constitutes approximately 25% of the studies, is the studies focusing on the differences in demographic dimensions of peer bullying. Correlation analysis was conducted to examine the relationships between the Topics and positive relationships were reached. The results obtained show that peer bullying is a concept that should be examined not only individually but also socially.

Keywords: Peer, bullying, text mining

Introduction

Peer bullying is a recurring process in which individuals are subjected to physical or verbal violence due to the lack of power balance between individuals, especially in social environments such as schools (Nishina 2004). This phenomenon is not only related to personal characteristics, but also to interpersonal social relations, group dynamics, and the cultural norms of the society in which the person lives (Bradshaw & Johnson 2011). Bullying acts occur in the form of direct and indirect actions such as mocking and threatening, as well as physical attacks by the bully against the victim (Hong & Espelage 2012). Peer bullying behaviors, which begin to be observed especially in childhood and adolescence, can have long-term effects on the lives and psychological development of individuals (Hunter et al., 2007).

It can be seen that peer bullying is evaluated according to the Ecological System Theory, which is formed by the combination of many interactions that occur at the individual, family, school and social levels (Hong & Espelage, 2012). For this reason, in addition to examining the situation of bullying individually, it should also be examined as a systematic relationship problem between individuals (Lambe et al., 2019). According to Duffy & Nesdale (2009), the concept of bullying is a concept that is examined and explained in line with approaches such as social learning theory, social identity theory and social ecological models. In order to understand bullying, it is important to understand the dynamics of the group the individual is in and the role of the individual within the group (Salmivalli, 2010). Studies

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on bullying show that the action is not only between the victim and the bully, but also the supportive, intervening and observing roles are extremely important (Rosen et al., 2020). Therefore, the concept of bullying should be examined as a social phenomenon within society and intervention should be made at the group level for groups where bullying occurs.

Current studies on bullying focus on issues such as individuals' resistance to bullying and peer advocacy for individuals who are bullied within a group, and are expanding the field of study (Healey, 2003). In addition, research has shown that individuals' emotional levels of coping with bullying and their skills in social relationships are extremely important in protecting themselves from bullies (Postigo et al., 2013).

In recent years, studies in this area have gained great importance, especially with the increase in the number of peer bullying that occurs in schools in Türkiye. The meta-analysis review applied to studies in the field of peer bullying in Turkey suggests that individuals in high school are bullied or bullied at least twice a year (Talu & Gümüş, 2022). This situation, together with today's developing world and technology, has allowed peer bullying to be transferred to digital environments and has created a new concept of peer bullying examined under the title of "cyber bullying". Studies reveal that bullying in digital environments has become an extremely important problem. In addition, findings show that cyber bullying is more common among high school students in adolescence (Ercan & Özcebe, 2020; Topçu et al., 2013).

Studies conducted among primary school students in Turkey emphasize that the level and frequency of individuals being subjected to peer bullying vary depending on demographic characteristics. In particular, the gender of the individual, having low academic success, socio-economic level and birth order are extremely effective in individuals being subjected to peer bullying or doing bullying (Şahin & Sarı, 2010; Ayhan et al., 2019). When studies on the effect of gender on peer bullying are examined, it is revealed that girls are indirectly bullied, while bullying is more directly applied to boys (Arslan et al., 2011). In addition, peer bullying has been found to be associated with health-related factors such as obesity and low self-esteem (Ercan & Özcebe, 2020).

Bayraktar (2012) in his study, as a result of the structural equation modeling he established to determine the variables that are effective in explaining bullying behavior, revealed that administrative elements of education such as teacher attitudes and school climate and individuals' relationships with their peers are extremely important. He also revealed that there is a negative relationship between children's academic motivation levels and bullying tendencies (Ayhan et al., 2019).

It is seen that studies on preventing peer bullying in schools are not sufficient, and especially teachers and school administrations have a lack of knowledge on this issue (Rodop et al., 2022). In recent years, an increasing number of studies have shown that psychological variables such as emotional regulation skills and self-compassion are important in predicting bullying behaviors (Özen, 2023). These findings show that peer bullying in Turkey is a multidimensional problem shaped by the interaction of both individual and contextual variables, and that prevention studies should be designed by taking these dimensions into account.

The increase in the number of postgraduate theses on peer bullying in Turkey shows that the knowledge base in the field has expanded significantly. However, systematic analysis of this growing literature has become quite difficult with classical methods (Yang et al., 2023). At this point, text mining stands out as an indispensable tool for extracting meaningful information from large data sets (Ferreira-Mello et al., 2019).

Text mining provides great convenience in identifying research trends and topics by automating processes such as topic modeling, extraction of key concepts and content classification on text data in theses (Bayer et al., 2010). Especially algorithms such as Latent Dirichlet Allocation (LDA) are frequently preferred in educational research and allow the discovery of hidden topics in thesis abstracts (Benedict, 2019).

The reviews show that text mining can be successfully integrated in the field of education, especially in text source selection, determination of analysis techniques and obtaining their structures (Yang et al., 2023). In addition, the most commonly used techniques in educational text mining applications are document clustering, document classification and information extraction (Upshall, 2014). These methods allow the systematic grouping and analysis of data obtained from thesis abstracts (Spatiotis et al., 2018).

Another important point is that text mining allows not only information extraction but also the examination of thesis content (Zhang et al., 2015). In this way, it is possible to monitor dynamic changes such as which concepts or methods come to the fore in certain years. Research also shows that natural language processing (NLP) tools play an important role in the pre-processing steps of text mining processes, especially the importance of these tools for language originality and context extraction (Grobelnik et al., 2002).

As a result, the use of text mining techniques is essential for systematically addressing peer bullying-themed theses in Turkey, in terms of exploring the literature and creating new research opportunities (Kobayashi et al., 2018).

The increase in the number of theses on peer bullying in Turkey has created the need for a systematic and comprehensive review in the literature. However, traditional methods are insufficient to analyze the general trends, concepts used and methodological approaches of these theses in a holistic manner. Therefore, text mining techniques come to the fore (Yang et al., 2023).

The aim of this study is to analyze the themes, concepts and methods in theses on peer bullying prepared in Turkey using text mining and to create a general conceptual map (Salloum et al., 2018). In addition, it provides a methodological framework on how text mining techniques can be used in educational research (Lee et al., 2014). In this direction, the research questions of the study are determined as follows;

1. What are the main themes and concepts that stand out in theses on peer bullying in Turkey?
2. In which conceptual areas are the identified themes distributed and what kind of a pattern does this distribution exhibit?
3. What is the distribution of the methodological preferences (quantitative, qualitative, mixed) of the theses examined?
4. What is the distribution of the theses in terms of number over the years and are there any periods of significant increase or decrease?
5. Which academic disciplines do theses on peer bullying focus on?

The effectiveness of the text mining methods used in the study in the analysis of education and social sciences literature is also supported by previous studies (Delen & Crossland, 2008). In conclusion, this study aims to contribute to understanding the current status of peer bullying research in Turkey, determining their conceptual density, and providing systematic suggestions for future studies.

Methodology

This research was conducted using a mixed methods approach with data-transformation variant of convergent parallel design based on functionalist paradigm for quatitative phase and interpretive paradigm for qualitative phase (Gunbayi, 2020a; Gunbayi, 2020b). Mixed methods is a research design in which quantitative and qualitative data collection and analysis techniques are used together in order to examine a research problem in a more comprehensive and holistic way (Creswell & Plano Clark, 2018; Teddlie & Tashakkori, 2009).

The quantitative dimension of the research focused on analyzing thematic data obtained from thesis abstracts using the Latent Dirichlet Allocation (LDA) method and examining the relationships between

these themes using correlation analysis. In this way, the structural patterns that emerged in theses on peer bullying were described through numerical data (Mimno et al., 2011; Blei, Ng & Jordan, 2003).

The qualitative dimension of the research was carried out with the document analysis method, which includes systematic examination of the content of theses. Document analysis is a qualitative data analysis technique that aims to extract meaningful content from written materials (Bowen, 2009; O'Leary & Hunt, 2014; Rapley, 2018). In this context, the findings regarding the conceptual themes, key concepts and methodological preferences of postgraduate theses addressing the subject of peer bullying in Turkey were evaluated qualitatively.

Sampling and data collection

In order to examine the concept of peer bullying in postgraduate theses conducted in Turkey, the term "peer bullying" was written in the abstract field in the detailed search section of the YÖKTEZ website and 429 master's and doctoral theses were reached. The English titles, publication years, author names and English summaries of the theses were taken from the data set created for the text mining application. Since there were no English summaries for five theses, these studies were removed from the data set and text mining application was performed for 424 theses. The distribution and areas of the theses determined for the research by year are given in Figure 1.
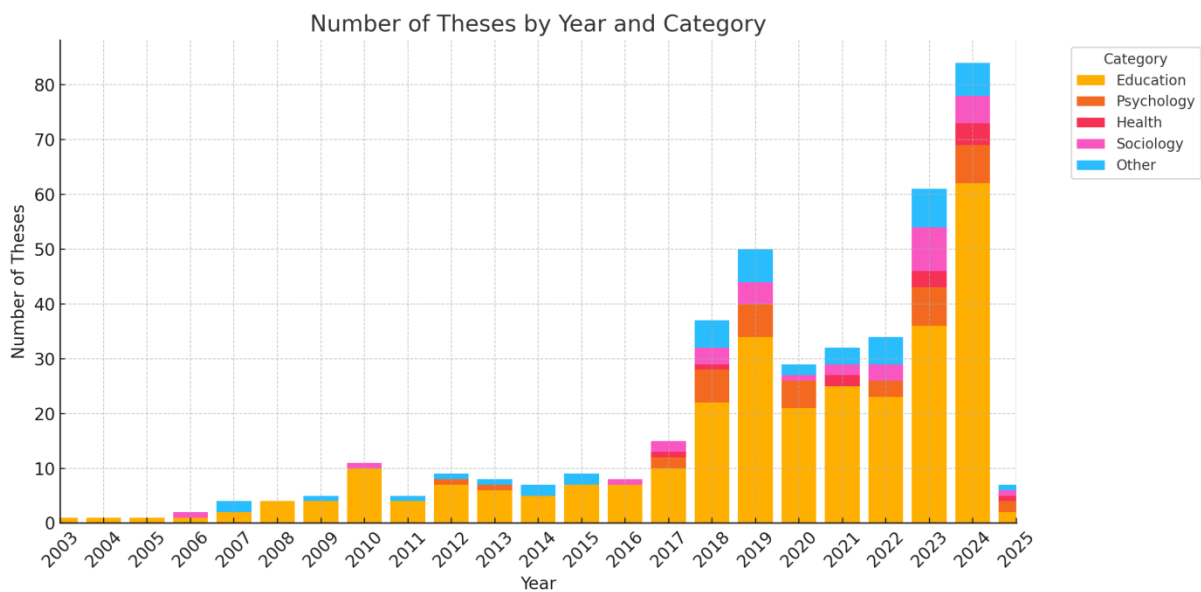

Figure 1. Distribution of peer bullying theses by year and field

When Figure 1 is examined, it is observed that the number of studies on peer bullying has increased in recent years. In addition, it was observed that approximately 70% of the studies were written in the field of education (n=295), 9.4% in the field of psychology (n=40), 2.8% in the field of health (n=12), 7.5% in the field of sociology (n=32) and 10.6% in other fields (n=45). It is an extremely important finding that most of the peer bullying studies were conducted in the field of education. It is thought that the decrease in peer bullying studies between 2019 and 2020-2023 is due to the COVID-19 pandemic. The frequency of peer bullying studies continued to increase with normalization after 2022.
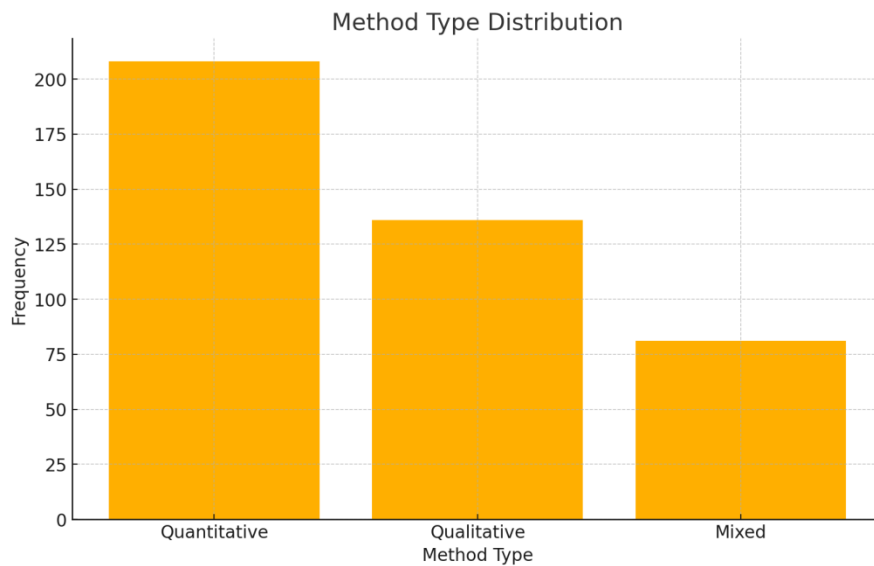
Figure 2. Distribution of peer bullying theses according to methods

When the methods of the studies on peer bullying were examined, it was observed that 49% of the studies were written using quantitative (n=208) methods, 32% were written using qualitative (n= 136) methods, and 19.1% were written using mixed (n=81) methods. The frequent use of quantitative methods in peer bullying studies stands out as an important finding.

The text mining study was implemented in the R (2023) package program. The "dplyr" (Wickham et al., 2023) package was used for operations such as selection, counting and filtering on the data, and the "stingr" (Wickham, 2023) package was used for cleaning punctuation marks in the text and editing text characters. For the LDA application, the "tm" (Feinerer & Hornik, 2025), "tidytext" (Silge & Robinson, 2016) and "topicmodels" (Grun & Hornik, 2024) packages were used to examine and visualize the data as DTM.

Before starting the text mining application, it is of vital importance to preprocess the data. For this process, first, English stop words were separated with the "tidytext" package. Then, methodological expressions such as "scale", "data", "method" were removed from the analysis in order to better understand the structure in the thesis abstracts. In addition, concepts such as "bullying", "victim", "students" related to peer bullying and concepts such as "significant", "difference" and "found" commonly used in research were removed from the analysis. Since these words are used in all studies, they cause an indistinguishable noise in the established models. In this case, it prevents the concept of peer bullying from being examined in depth. In order to better understand this situation, the word cloud created based on word frequency before the words were removed is given in Figure 3.

Figure 3. Word cloud of all words

When the words for the model including all words are examined, it is seen that the main words of the subject of peer bullying such as "bullying", "students" and "children", methodological words such as "group", "levels" and "experimentel" and general usage words such as "significant", "according" and "found" have very high frequencies and therefore create noise that causes difficulty in understanding the underlying themes of peer bullying. After removing these words from the analysis, the text pre-processing was completed and the latent themes were determined with Latent Dirichlet Allocation (LDA).

While establishing the LDA model, models with different topic numbers between k=2 and k=6 were tested to determine the number of topics and perplexity and coherence values were compared for each model (Mimno et al., 2011). The number of topics was determined as four as the model that gave the most appropriate "k" number. Document-Term Matrix was created for the topics and 20 words with the highest β value were determined for each topic to better understand the topics.

In order to examine the relationships between the themes, exponential transformation was applied to the β log-likelihood coefficients of each word in the themes to obtain the "ϕ" matrix showing the absolute probability distributions of the words in each theme (Blei et al., 2003). In the analysis; the equation; "$\phi_{ij} = \Pr(term_j | topic_i)$" was used to interpret the topic vector for each word (Heinrich, 2005). Then, Pearson correlation was calculated between the topic-word density vectors.

Validity and reliability of the research

In this study, various precautions were taken at both methodological and analytical levels to ensure the validity of the data and the reliability of the findings. Validity refers to the collection of data appropriate to the research purpose of the study and the correct answering of the research questions by the obtained results. In this context, the fact that the data were obtained from a reliable and verifiable source such as the YÖK Thesis Center increased the internal validity of the study (Noble & Smith, 2015; Morse et al., 2002; Creswell & Creswell, 2017). In addition, the clear reporting of the methods used in the analysis process and the transparency of the analysis steps also contributed to the provision of external validity (Shenton, 2004).

Reliability refers to the consistency of research results and the possibility of obtaining similar results when repeated. In this context, the document analysis used in the examination of thesis abstracts allowed for the systematic evaluation of structured written data and ensured integrity in data analysis (Morgan, 2022; O'Leary & Hunt 2014; Lincoln & Guba, 1985). In addition, the application of numerical methods such as LDA and correlation analyses strengthened analytical reliability by testing the statistical consistency of structural relationships between themes.

Findings

The results regarding the distribution of publications in the themes created to examine the issue of peer bullying are given in figure 4.
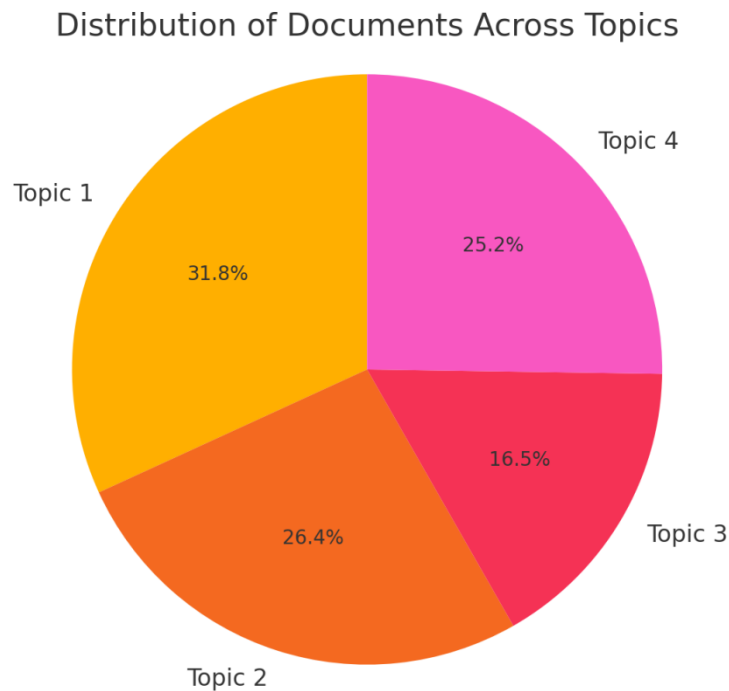

Figure 4. Distribution of theses regarding themes

When looking at figure 4 in order to examine the findings regarding the distribution of theses written on peer bullying according to topics, it was observed that 31.8% of the studies were effective in the formation of topic-1 (n=135), 26.4% in topic-2 (n=112), 16.5% in topic-3 (n=70) and 25.2% in topic-4 (n=107). Word clouds containing the 20 words that made the highest contribution to the formation of topics are given in the range of figures 5-8.
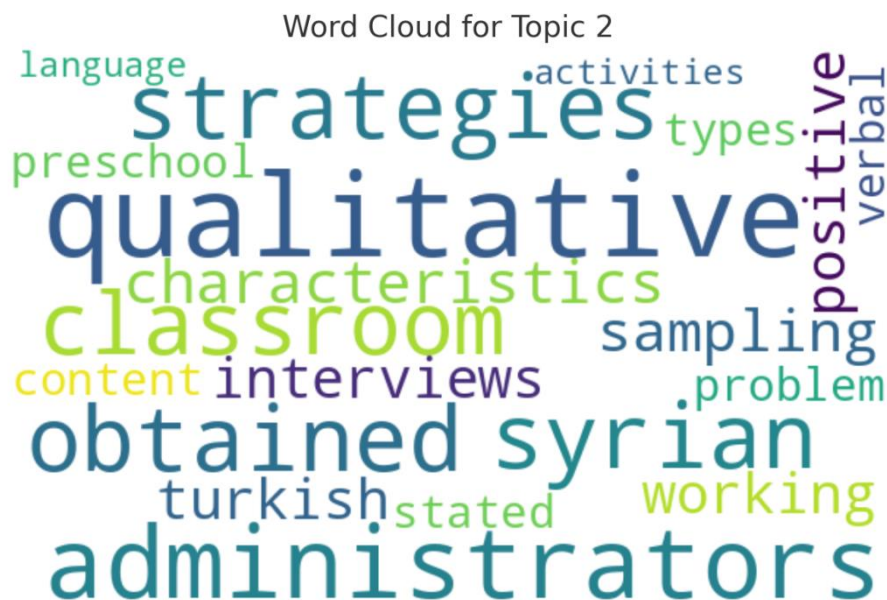
Figure 5. Word cloud regarding the most effective words in the formation of topic-1 (20 words)

When figure 5 is examined, it is seen that the words that contribute the most to the formation of topic-1 are words such as "skills", "self", "adolescent", "emotional", "cyber", "anxiety". In this context, the theme reveals the emotional expressions that peer bullying elicits in adolescent individuals. In this context, it shows the skills, tendencies and concerns they reveal. It also reveals the relationship between cyberbullying and the emotions that emerge.

Figure 6. Word cloud regarding the most effective words in the formation of topic -2 (20 words)

When figure 6 is examined, it is seen that the words that contribute the most to the formation of topic-2 are words such as "qualitative", "administrators", "syrian", "strategies" and "classrom". When the topic that emerged in this context is examined, it shows that the studies conducted mainly address the situation of peer bullying being based on ethnic origins. In addition, it can be said that these studies consist of

qualitative studies where the classroom environment is kept in the foreground and the reactions of school administrators and the strategies they implement are examined.
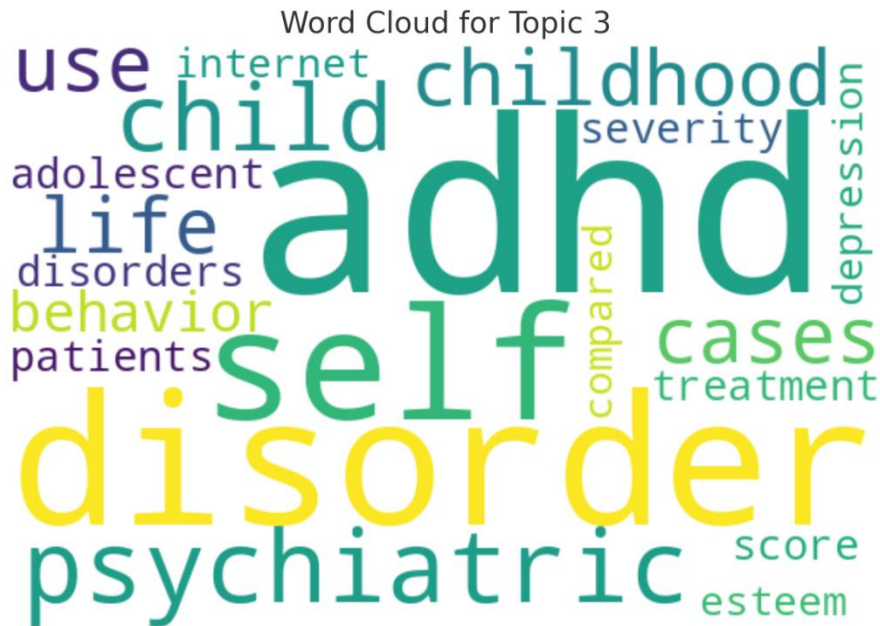

Figure 7. Word cloud regarding the most effective words in the formation of topic -3 (20 words)

When figure 7 is examined, it is seen that the words that contribute the most to the formation of topic-3 are words such as "adhd", "disorder", "psychiatric", "depression" and "classrom". In this context, it can be said that the topic that emerged focuses on psychiatric problems caused by peer bullying. In addition, in these studies, the effects of psychological problems on the individual's life and behavior were studied in a clinical-psychological context.
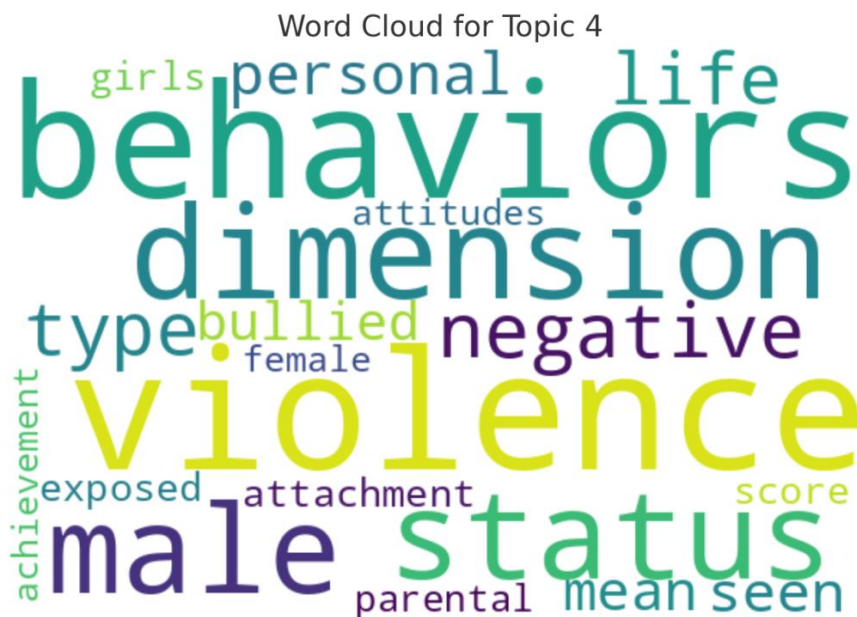

Figure 8. Word cloud regarding the most effective words in the formation of topic -4 (20 words)

When figure 8 is examined, it is seen that the words that make the highest contribution to the formation of topic-4 are words such as "behaviors", "dimension", "violence", "male", "female", "status" and

"parental". In this context, it can be said that the thesis studies that are effective in the formation of the topic are the studies that examine peer bullying in terms of demographic variables. The studies are studies that examine peer bullying through concepts such as gender, family structure and in-group role. The heat map of the Pearson correlation analysis results conducted to examine the relationships between the themes is given in figure 9.
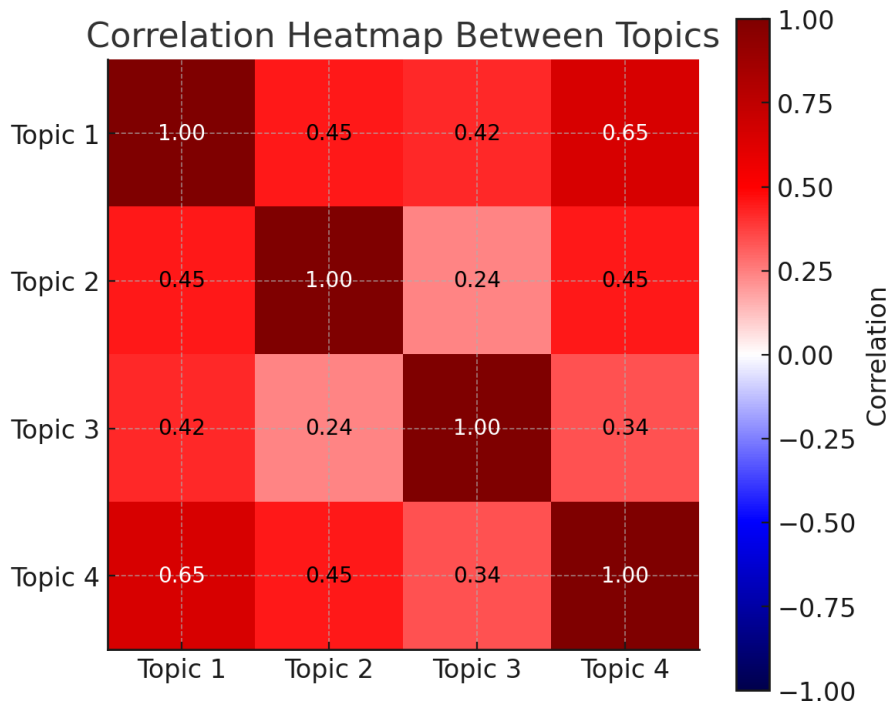

Figure 9. Heat map of relationships between topics

When figure 9 is examined, it is seen that all topics have a statistically significant and positive correlation with each other. When the correlations between the topics are examined, a moderate relationship (r=0.45) was found between topic-1 and topic-2, a moderate relationship (r=0.42) between topic-1 and topic-3 and a strong relationship (r=0.65) between topic-1 and topic-4. A weak relationship (r=0.24) was found between topic-2 and topic-3 and a moderate relationship (r=0.45) between topic-2 and topic-4. A weak relationship (r=0.34) was found between topic-3 and topic-4.

Discussion, Conclusion and Recommendations

As a result of the text mining study conducted for the purpose of the research, 424 master's and doctoral theses written in Turkey and containing the concept of peer bullying in their abstracts were examined under four topics. The topics reached as a result of LDA used for the text mining study were examined in the context of individuals' psychological states and types of peer bullying, bullying status originating from ethnic and cultural factors and its examination in the classroom and administrative sense, psychiatric clinical findings based on peer bullying and peer bullying status in the context of demographic variables.

Thesis studies on peer bullying, which are effective in the formation of the first topic, focus on the emotional problems of individuals who are subjected to peer bullying and the self-efficacy skills they have while struggling with this peer bullying. In addition, the fact that one of the prominent words in the theses is cyber bullying reveals that the way bullying is implemented is extremely important in addition to its effects and consequences. These findings are similar to studies that reveal that peer bullying will cause emotional problems such as low self-esteem, anxiety and depression in individuals (Postigo et al., 2013; Arslan et al., 2011; Hunter et al., 2007). In addition, it is emphasized in studies

that cyber bullying is especially widespread among adolescents studying in high school and that digital environments enable new forms of bullying (Topçu et al., 2013; Ercan & Özcebe, 2020).

Thesis studies on peer bullying, which were effective in the formation of the second topic, were the studies in which the classroom studies and administrative activities of the school were examined with qualitative methods in the fight against peer bullying. In addition, the words "Syrian" and "Turkish", which were effective in the emergence of this topic, also reveal that peer bullying is caused by ethnic differences. This finding is similar to the studies suggesting that problems based on cultural and ethnic differences in schools in multicultural societies can cause peer bullying (Salmivalli, 2010; Duffy & Nesdale, 2009).

It has been observed that thesis studies on peer bullying, which are effective in the formation of the third topic, examine psychiatric disorders that cause or may occur as a result of peer bullying. In this context, the concept of peer bullying has been studied in terms of psychiatric problems such as attention deficit and hyperactivity disorder (ADHD) and depression. The existence of psychological problems observed in the emergence and result of peer bullying has also been revealed in clinical studies (Hong & Espelage, 2012; Bradshaw & Johnson, 2011).

Thesis studies on peer bullying, which are effective in the formation of the fourth topic, focus on the differences and emergence of peer bullying according to demographic variables. In this context, how and in what way the act of bullying occurs according to demographic variables is extremely effective in the formation of the topic. Studies have shown that bullying is based more on direct physical interventions in male students, while it is based on indirect actions such as insults, gossip and isolation in female students. These findings are consistent with the results of studies investigating bullying based on demographic variables (Şahin & Sarı, 2010; Arslan et al., 2011).

When thesis studies on peer bullying are examined, it is observed that quantitative methods are mostly used in the studies. It is seen that the use of qualitative and mixed methods is less preferred compared to quantitative methods. This finding is parallel to the studies that reach the conclusion that quantitative research is still heavily preferred in educational research (Yıldırım & Morgül., 2013). Due to the fact that the concept of peer bullying includes many variables of individuals and the society they live in, it is emphasized in the literature that this problem should be investigated more with qualitative methods (Lambe et al., 2019).

The determination of statistically significant correlations between the topics that emerged with the use of text mining methods in the research findings reveals the interconnected and multidimensional structure of peer bullying concepts examined in the theses that constitute the topics. It was observed that the highest relationship between the topics was between topic-1, which examined the emotional problems and cyber bullying experienced due to peer bullying, and topic-4, which examined the differences of peer bullying according to demographic variables. The lowest relationship was between topic-2, which included practices carried out to solve peer bullying in schools and studies on peer bullying arising from ethnic-cultural differences, and topic-3, which included studies focusing on psychological disorders that may cause peer bullying or emerge after bullying. In this context, the concept of peer bullying is a phenomenon that should be examined not only as an individual action but also in terms of its social status and group structure within the dynamics of society (Salmivalli, 2010; Delen & Crossland, 2008).

This study has revealed general trends in peer bullying theses in Türkiye and analyzed thematic patterns. Future studies should examine the individual and contextual aspects of bullying in depth with more widespread use of qualitative methods. In addition, interdisciplinary studies focusing on issues such as cultural diversity, types of digital bullying, and teacher intervention strategies should be encouraged. Education policies, school-based prevention programs, and teacher training processes should be restructured based on the findings of this research; digital analysis methods such as text mining should be used more effectively.

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Conflicts of Interest

No conflict of interest has been declared by the author

Author Contribution

Alper Tosun and Alper Sinan conceived the idea for this manuscript and contributed to the writing and editing of the review. Alper Tosun: data curation, writing, conceptualization and methodology, Alper Sinan: supervision, writing-reviewing and editing.

Declaration of Competing Interest

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Ethics Approval

In the writing process of the study titled "**Thematic density and methodological trends in peer bullying theses in Turkey: A text mining study**", the rules of scientific, ethical and citation were followed; it was undertaken by the author of this study that no falsification was made on the collected data. "Journal of Action Qualitative & Mixed Methods Research and Editor" had no responsibility for all ethical violations to be encountered, and all responsibility belongs to the author and that the study was not submitted for evaluation to any other academic publishing environment.

Institutional review board (IRB) approval

Institutional Review Board (IRB) approval of this research is not required.

Data Availability Statement

Anonymized data from this study can be made available on request from alpertosun.003@gmail.com