

Unveiling Transformation of School Violence and its Connection to Domestic Violence After COVID-19: A Data Mining Analysis of Naver Knowledge-iN

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Abstract: This study aimed to scrutinize transformation of school violence in the wake of COVID-19 by investigating posts on Naver Knowledge-iN. We expected that the pattern of school violence to be significantly changed after COVID-19 as students were detached from schools and the use of digital devices was increased. Our focus was split between two demographic groups (before and after COVID-19). We collected data from Knowledge-iN by tracking posts with hashtags #청소년학교폭력 (teenage school violence) and #학폭 (school violence). We analyzed crawled data by visualizing word frequency ranking, relation matrix, and network graphs. Visualizations revealed that students were more likely to be exposed to domestic violence and that the role of the school had changed as students spent more time at home than in school. Furthermore, school violence and sexual crimes changed their forms due to increase of digital device usage. Overall, this research provides valuable insights into the changing landscape of school and domestic violence in the context of COVID-19, calling for educational institutions to take proactive measures in developing a support system for students vulnerable to violence both within the school's boundaries and beyond.

Keywords: Naver Knowledge-iN; School Violence; Domestic Violence; Covid-19; Textom

1. Introduction

One of the biggest changes is the increased usage of digital devices and increased digital crimes via social media. According to the research held in 2021 by the Korean Ministry of Gender Equality and Family, 13.2% increase in teenagers with a "high risk of internet addiction" compared to 2020 as online classes are activated, and the use of various media contents is increased after COVID-19 [1]. A report by the Korea Ministry of Education describes that the total number of sex crimes against children and adolescents is declining. Still, digital sex crimes similar to the "Nth room case" have jumped more than 60% in a year compared to 2019 [2]. Moreover, as remote and bi-weekly classes were operated, the activities of adolescents staying in a limited living space were reduced, so the psychological confusion and anxiety of adolescents seemed significantly high [3]. Increased online classes allowed students to spend more time at home and students became more vulnerable to domestic violence and child abuse. However, the disconnection of people due to COVID-19 created an environment in which crimes are easily concealed, and victims have difficulty reaching out for help. Furthermore, school violence outside school increased from 24.3% to 40.6% from 2019 to 2021 [4].

Hence, this research has utilized data mining of Naver Knowledge-iN posts to analyze the changes in school violence after COVID-19. We aimed to (1) explore the context of the discourse of school violence from the direct parties related to school violence and (2) compare the school violence discourse before and after the pandemic. To address this, we collected user-generated data of Naver Knowledge-iN posts that contained #청소년학교폭력 and #학폭. After conducting data mining with Textom, we visualized the data mining

results to word frequency ranking, relation matrix, and network graphs, and compared the data visualization before and after COVID-19.

2. Materials and Methods

This research aims to examine how school violence patterns have changed in the new environment for students after COVID-19 by data mining the questions related to school violence posted on Naver Knowledge-iN. It is an open source service, where users can freely post questions to get answers from other internet users. From its start in 2002, Naver Knowledge-iN reached 32 million users in 2022, showing steep growth in its platform during the pandemic [5]. Naver Knowledge-iN is also a relevant platform for adolescents. In 2022, Naver officially reported that 56% of Naver Knowledge-iN users are teenagers and people in their 20s. Since the posts are user-generated data we can analyze the discourse of the people directly involved in school violence, victims, parents of the victims, or even the perpetrators of school violence.

Liu [6] explains that more effective utilization of user-generated data is possible through data mining. Liu defines data mining as “the process of discovering interesting and useful patterns, structures, and other valuable information from large amounts of data.”. More specifically, the meaning of the texts can be analyzed through their keywords. By mapping “these linguistic units into the appropriate entities in a knowledge base,” it is possible to “obtain the fine-grained information” [7]. Furthermore, as access to a large amount of data is possible “with the rapid development of Web 2.0,” user-generated data from the web “provide new opportunities and challenges for knowledge harvesting” [7]. Therefore, discovering the hidden patterns and structure within the user-generated data offers a new perspective on user activity.

Escura et al. employed data mining techniques on abstracts obtained from Web of Science and Scopus databases, utilizing the keywords “school violence” and “school bullying.” The mined data underwent including pre-processing, word frequency analysis, co-occurrence analysis, topic modeling, and trend analysis. The outcomes revealed that the primary research topics focused on defining, categorizing, understanding the consequences, identifying influencing factors, and proposing strategies to address school violence and bullying. The analysis also highlighted a consistent and noteworthy upward trajectory in research activities related to school violence and bullying since the 1990s. However, further investigation, particularly in the domain of monitoring and evaluation, is imperative. Furthermore, the findings underscored the significant impact of relational and social factors, such as family and peer relationships, as well as the influence of environmental and contextual factors on the occurrence and dynamics of school violence [8].

Moreover, while it has become difficult for schools to supervise school violence after COVID-19, user data from an internet platform offers a new approach to investigating the status quo of school violence. An official survey on school violence, which was held twice a year, was conducted only once in 2020, and online classes made it difficult to conduct research. Thus, we deduced that Knowledge-iN questions would contain data missing in the official surveys from schools and the Ministry of Education after the pandemic. Our team has collected data from pre-pandemic and post-pandemic eras and organized the crawled data to analyze the change in word usage after the pandemic. As two years have passed since the first outbreak of COVID-19 in 2020, we have both set the term of the pre-pandemic and post-pandemic era as two years. We have conducted the research based on the premise that significant change in discourse on the subject matter reflects the actual change of it. More specifically, our team has tried to analyze the change in school violence by analyzing the change in adolescents’ word usage related to school violence.

The data collection, analysis, and visualization were conducted through the big data analysis solution called Textom. In the data collection process, we first set the target population into two groups, setting the term before and after COVID-19: from January 1st, 2018 to January 1st 2020, and from January 2nd, 2020 to January 1st, 2022. Then, we used two keywords, #청소년학교폭력 and #학폭, to find the question posts we were looking for from the title and content of Naver Knowledge-iN post.

Based on the two keywords, about 2000 articles were collected within each group (Fig 1a and 1b). Among the collected posts, the text containing keywords such as #양홍원, #영비, #청소년상담학과, #지도사, #추천, #추천서 were removed from the extraction. Yang Hong-won (#양홍원) and Young-bi (#영비) are South Korean rappers who committed school violence, and because they are not related to the topic we want to analyze, we excluded them. Also, we removed the term recommendations (#추천) and recommendation (#추천서) letters since articles include this keyword has a large number of counseling articles for college entrance (#대학입시상담글). In addition, duplicate posts were removed based on their content and URL.

학폭위 진행 중인 사건 학폭 실태조사 학교폭력 실태조사할 때 학폭위가 진행 중이거나 끝난 사건은 쓰면 안되는 건가요? 제가 지금 학폭위 진행 중인데 저한테 학폭담당 선생님이 진행 중이나 끝난 사건은 쓰면 안된다고 말하셨는데 문항 중에 기간 내에 학교폭력을 당한 적이 있던 이런 내용이 있는데 쓰면 안된다고 해서 다 알고... https://kin.naver.com/qna/detail.naver?d1id=66d81dId=66d2088dDocId=602088dDocId=3015731188qb=7ZWZ7Y+t8enc=utf8§ion=kin.ext&rank=4226&search_sort=0&spq=1 문항은 통계자료로 쓰기로 상한 이유가. 써도 되고 안써도 큰 문제는 없습니다. 다만 신고하는 부분에는 사실 마세요. अच्छ이 써봐야 한 학교에서 조사하고 처리를 하게됩니다. 그런데 그것을 이미 하고 있으므로 상한 이유가 없는 것이지요. 오히려 썼다가는 더 혼란만 가질수있습니다. 체크문항은... naver kin 2018-01-01 2019-01-01

언제까지 학폭 개악이 있었어요. 매년 학교에서 학폭실태조사를 하잖아요. 그런데 거기에 어떤 애가 더 이름을 쓴 거예요. 개를 사고 할거요. A는 좀 겹쳐요? 그런건가요. 근데 제가 거 저한테 붙는게 안알아줬다고 거가 따들림 거라고 썼다 하잖아요. 그래서 학폭처리에 썰한테요... https://kin.naver.com/qna/detail.naver?d1id=116d1dId=110701dId=314669649qb=7ZWZ7Y+t8enc=utf8§ion=kin.ext&rank=423&search_sort=0&spq=1 학폭위 안열리면 생기부에 기록 안돼요! naver kin 2018-01-01 2019-01-01

1학기때 학폭도 하고 그다음 많이쳤는데... 공교로 임원제로 갈뻔하면 안될까요? 참고로 지금 제갈상하는 임원제는 사립이예요... https://kin.naver.com/qna/detail.naver?d1id=66d81dId=66d2088dDocId=1104126dDocId=3891987286qb=7ZWZ7Y+t8enc=utf8§ion=kin.ext&rank=425&search_sort=0&spq=1 공교라 진짜서 멀리있는데 간지여하면 집가게요 학교를 갈수있는거로 아는데 공교나 가고싶은 학교가 붙어있거나 둘다 관내이거나 이런경우는 없는거로 압니다 아 공교면 갈수도 있을텐데요 그냥 자리넘으면 무용하고있는 중1인데요 학폭가면 예고 못가나요..? https://kin.naver.com/qna/detail.naver?d1id=206d1dId=20016dDocId=313819615qb=7ZWZ7Y+t8enc=utf8§ion=kin.ext&rank=430&search_sort=0&spq=1 갈수 있어요 naver kin 2018-01-01 2019-01-01

학폭 피해자가 전학 가기를 원할때 같은 공공중 학교로 전학갈 수 있나요? https://kin.naver.com/qna/detail.naver?d1id=66d81dId=602088dDocId=388184491qb=7ZWZ7Y+t8enc=utf8§ion=kin.ext&rank=431&search_sort=0&spq=1 네 다른학교 가깝면 멀리 갈수있어요 naver kin 2018-01-01 2019-01-01

학폭위원회 질문요!! 학폭위원회는 어떡해 시작하나요? 누구한테 말해야시작하나요? 피해자가 전학을 가는경우도 있나요? https://kin.naver.com/qna/detail.naver?d1id=66d81dId=602088dDocId=293142916qb=7ZWZ7Y+t8enc=utf8§ion=kin.ext&rank=434&search_sort=0&spq=1 학교폭력 위원회는 학폭위 담당선생님이나 담당선생님한테 말씀드리고 피해자의 의사에따라 열고 안열고를 결정합니다. 그리고 피해자가 전학을 예가요, 그런 학교요면 신고 가능합니다. (신고는 교육청에서) naver kin 2018-01-01 2019-01-01

어떤 애가 학폭도 아닌데 학폭위를 연다고 협박하네! 만약에 진짜 열면 어떻게 되나요? 막 고소해서 거짓인가 밝혀지면 명예훼손으로 맞고소 하잖아요. 혹시 학폭위도 그런거 있나요? 내공 90여점요 금해요 https://kin.naver.com/qna/detail.naver?d1id=66d81dId=602088dDocId=313696967qb=7ZWZ7Y+t8enc=utf8§ion=kin.ext&rank=437&search_sort=0&spq=1 학폭위는 연다고 할부도 못덜걸요 학폭위는 주로 선생님들이 저서서...그리고 고소갈것은 없을것요 만약 열면 정학처분같은게 발을가하면 naver kin 2018-01-01 2019-01-01

저를 학폭한 애랑 싸우 마지못해요... 근데 제가 졸업전에 학폭을 당했었는데 그때 그 애랑 같은 학교 배정 받았는데 계속 마주치네요. 근데 저는 개네 마주칠 때마다 너무 힘듭니다. 점점 무더져라고 할때쯤 또 마주치고 다시 학교 진짜 마지못했습니다. 다른 반이긴한데 너무 잘 마주치네요. 제가 할 수 있는 일 없을까요? 학교 측에... https://kin.naver.com/qna/detail.naver?d1id=136d1dId=130107dDocId=2975523148qb=7ZWZ7Y+t8enc=utf8§ion=kin.ext&rank=438&search_sort=0&spq=1 질문지님 말씀처럼 학교에서 말해줘서 학폭에서 할 수 있는 것도 없고 졸업전이나 나들라면 하겠지요. 근데 질문자님은 잘못이 있으시잖아요. 질문자님은 그 개새끼를 때려 다닐 필요도 없으시고 졸업시킬 필요도 없어요. 했다가 그 개새끼들이 오히려 더 다쳐서, 물론 그 개새끼를 보고있으면... naver kin 2018-01-01 2019-01-01

학교 신고자한테 뭐 그 후의 일 101 다 물어놓는 20대 배신을 당하고 1과 친구들이 협박한 3과 친구가 되버렸네요. 2는 3에게 1과 친구들이 협담했다고 말한다. 그래서 3이 학교에있는 1에게 화를냈네.(1은 평소애 ভাল음). 한때는 3과 친한 애 10과 같이 갈때 1은 3이 아린것과 1의 친구가 어쩔름... https://kin.naver.com/qna/detail.naver?d1id=66d81dId=602088dDocId=298640525qb=7ZWZ7Y+t8enc=utf8§ion=kin.ext&rank=439&search_sort=0&spq=1 1의 입장에서 위함이나 협박 자식들으로 3을 신고할수 있겠습니까. 뭐 자세히 설명하고 다시 한참토는 정도입니다. 언어폭력 정도에 해당이 되는 경우니까요. 이런 정도는 신고 해봐도 그리 큰 징계가 나오지는 어렵지만 그 래도 이런 경우 신고를 해줘 되면 학교에서 조사해서 선생님의... naver kin 2018-01-01 2019-01-01

학폭 이후 출석조각조조. 저번에 내사일을 했는데 프로그램 때르면서 한참 60/40으로 떨어졌는데 너무 좋았어요. 병원에서 쓰러졌는데 의사도몰리嗎? 이 와서 침대에 올라가 밀려가는데 침대 아래로 걸렸으면 못알아듣는데 다들 생각했어요. 근데 사실 소심은 아직 잘가야있는데 애 뉴욕 못루는지 잘... https://kin.naver.com/qna/detail.naver?d1id=66d81dId=602088dDocId=3015731188qb=7ZWZ7Y+t8enc=utf8§ion=kin.ext&rank=4226&search_sort=0&spq=1

(a)

학폭특위 공소사유 초2대 같은 반 에 한테 한 똥만인 뜯겼는데 개가 초5,6대 사과를했어요 초1대 부모님랑 개 부모님이 알게됐는데 이제야 일치 좀 커지버니저 만악 제가 지글 학폭으로 신고하러 한테 건 의 5년 다되가는 일인데 가능하나요? https://kin.naver.com/qna/detail.naver?d1id=665d1Id=6028868dId=4046881888qB=7ZWZ7Yt&tenc=utf8§ion=kin.ext&rank=10&search_sort=0&spq=1 1년형하세요. 교육부 학교생활실태실태트렌드이다. 질문자님께서는 5년 전의 권리와 관련된 학교폭력을 현재 신고할 수 있는지 문의하셨군요. 학교폭력은 시효가 없습니다. 즉, 학교폭력에 해당하는 사안인 경우에는 폭력의 피해를 입은 당사자가 학생본인(초,중,고)을 유지하는 동안에는 언제든지... [naver kin 2021-01-01 2022-01-01](https://kin.naver.com/qna/detail.naver?d1id=665d1Id=6130936dId=3719313785qB=7ZWZ7Yt&tenc=utf8§ion=kin.ext&rank=20&search_sort=0&spq=1)
 20대 초반 친구에게서 고인 학생시절 학교폭력 피해자 일인이다 솔직하고; 이리나 더없었거요 솔집 살면서 안가봐요 진로로 21남자인데... 손에잡혀요 이 친구 지글 군대있어서 관적역 전 제대하고 집에 뺄수있었습니다 대환... [naver kin 2021-01-01 2022-01-01](https://kin.naver.com/qna/detail.naver?d1id=665d1Id=6130936dId=3719313785qB=7ZWZ7Yt&tenc=utf8§ion=kin.ext&rank=20&search_sort=0&spq=1)
 d1id=665d1Id=6130936dId=3719313785qB=7ZWZ7Yt&tenc=utf8§ion=kin.ext&rank=20&search_sort=0&spq=1 1년형하세요! 저는 그동안 3학년 임시생일이다. 과거에 왕따를 당했었다고 하셨는데 그 때 만났던거 였따 비슷한 경험에 있습니다. 저 자신을 믿고라고 나는 친구 없이 평생 살것이나 싶었어요 그런데 생각을 하면 할수록 내가... [naver kin 2021-01-01 2022-01-01](https://kin.naver.com/qna/detail.naver?d1id=665d1Id=6130936dId=3719313785qB=7ZWZ7Yt&tenc=utf8§ion=kin.ext&rank=20&search_sort=0&spq=1)
 생일만 학폭으로... 친친친 친구 생일과 생일병을때렸습다 영일이 발로 때려뺀것 엄청많은 애들이 때려서 병질다니는데... 내입사실확인사서보내주세요 하 학폭까지 갈수있나요? 좀 어렸는데 저 지생일때 개한테 뺐었는데 하하 어머이다 https://kin.naver.com/qna/detail.naver?d1id=665d1Id=6028868dId=371985917qB=7ZWZ7Yt&tenc=utf8§ion=kin.ext&rank=22&search_sort=0&spq=1
 d1id=665d1Id=6028868dId=371985917qB=7ZWZ7Yt&tenc=utf8§ion=kin.ext&rank=22&search_sort=0&spq=1 친구한테 사과하셔서 그친구가 넘어간다면 학폭검담시킬것이고 그친구가 작성한다면 학폭의 가나까 싸백반세요 [naver kin 2021-01-01 2022-01-01](https://kin.naver.com/qna/detail.naver?d1id=665d1Id=6028868dId=371985917qB=7ZWZ7Yt&tenc=utf8§ion=kin.ext&rank=22&search_sort=0&spq=1)
 20대 초반 친구에게서 고인 학생시절 학교폭력 피해자 일인이다 솔직하고; 이리나 더없었거요 솔집 살면서 안가봐요 진로로 21남자인데... 손에잡혀요 이 친구 지글 군대있어서 관적역 전 제대하고 집에 뺄수있었습니다 대환... [naver kin 2021-01-01 2022-01-01](https://kin.naver.com/qna/detail.naver?d1id=665d1Id=6028868dId=371985917qB=7ZWZ7Yt&tenc=utf8§ion=kin.ext&rank=22&search_sort=0&spq=1)
 d1id=865d1Id=8018193dId=72719314335qB=7ZWZ7Yt&tenc=utf8§ion=kin.ext&rank=23&search_sort=0&spq=1 학폭 피해자이고 아싸 한것 두어 침들었을것 같아요 다란, 본인이 이제는 거지서 나와요 병원을 가시든 사범들이 많으니까를 가시든 어떠한 시도를 해야 본인의 모습이 나아질것 같아요. 물론 그게 어렵고 할거라고 생각합니다. 근데 안좋은 피해자분도 나밖에도 있어요.... [naver kin 2021-01-01 2022-01-01](https://kin.naver.com/qna/detail.naver?d1id=865d1Id=8018193dId=72719314335qB=7ZWZ7Yt&tenc=utf8§ion=kin.ext&rank=23&search_sort=0&spq=1)
 친구들이 지글 계속 우리라고 회피한다 지글 친했던 친구들 2명이 있었는데 아요 정확히 말하면 있었는데 그 친구들이 요즘 따라 짝 짝하고 무시하네요 친구 1명은 2년전 부터 친구였다고 다른 한 친구는 1년전 부터 친구였어요 그 중 2년전 친구는 지글 2년전에도 한중은있일이 있었는데 2년에 중 친하게 지냈었는데요 근데 어느날 부터... [naver kin 2021-01-01 2022-01-01](https://kin.naver.com/qna/detail.naver?d1id=116d1Id=1102628dId=3720028545qB=7ZWZ7Yt&tenc=utf8§ion=kin.ext&rank=26&search_sort=0&spq=1)
 d1id=116d1Id=1102628dId=3720028545qB=7ZWZ7Yt&tenc=utf8§ion=kin.ext&rank=26&search_sort=0&spq=1 일단 그 친구들한테 한번더 친구에게 알릴거구요 화내면 진짜 하게 말하세요 가족들분 이나선생님들께 건 건 학폭입니다 못 하시절대면 다른 친구에게 말하세요!정도는 말해 보세요 저도 말도 못 걸 정도로 속심했는데 모른 친구에 좋게 용기내어 인사해서 지글은 쪼면 일입니다! 그 옛날친구들도... [naver kin 2021-01-01 2022-01-01](https://kin.naver.com/qna/detail.naver?d1id=116d1Id=1102628dId=3720028545qB=7ZWZ7Yt&tenc=utf8§ion=kin.ext&rank=26&search_sort=0&spq=1)
 학폭으로 인한 소송 우러리라고 하길 올랐을때요 그래서 사과 해서라도 끝내려고 했는데 말이 안통하는게 부모 만나서 자기 아이가 학폭 관련으로 학폭 찾아 간것때문에 개해자와 피의 자라고 하더하네요 아가 엄마가 개해자 하길 받은 것으로 확정 시고 있는데 학법 심조리라 정정 진행 중이요 상담해용... https://kin.naver.com/qna/detail.naver?d1id=665d1Id=6028602036dId=3987774895qB=7ZWZ7Yt&tenc=utf8§ion=kin.ext&rank=16&search_sort=0&spq=1
 d1id=665d1Id=6028602036dId=3987774895qB=7ZWZ7Yt&tenc=utf8§ion=kin.ext&rank=16&search_sort=0&spq=1 ... 학폭으로 당한 치료비 및 정신 손해에 대하여 개해자 및 개해자 부모를 상대로 민사상 손해배상청구가 가능합니다. 개해자와 합의가 되지 않으면 민사상 손해배상청구를 할수밖에 없을 것 같습니다. 위 내용은 적시한 사실을 기초로 한 의견으로 참고하시고 사실의 추가 변동으로 상담내용은... [naver kin 2021-01-01 2022-01-01](https://kin.naver.com/qna/detail.naver?d1id=665d1Id=6028602036dId=3987774895qB=7ZWZ7Yt&tenc=utf8§ion=kin.ext&rank=16&search_sort=0&spq=1)
 중2대 학폭 일리면 생기부에 안/아/아요? 제가 피해자로 학폭 신청을 해서 사실 확인서 켜져 가는데 같이 학폭 신청한 친구가 오백만 애길 해봤는데 학폭 중2대 일면 생기부에 안 남는다고 하는데 진짚가? https://kin.naver.com/qna/detail.naver?d1id=116d1Id=1103076dId=4081839666qB=7ZWZ7Yt&tenc=utf8§ion=kin.ext&rank=3&search_sort=0&spq=1
 d1id=116d1Id=1103076dId=4081839666qB=7ZWZ7Yt&tenc=utf8§ion=kin.ext&rank=3&search_sort=0&spq=1 ... 먼저 생활기록부에 기록된 학폭 관련 내용들을 먼저 알음리도록 초,중등교육법 시행규칙 제22조, 학교생활기록 작성 및 관리지침에 의거 하, 5, 6, ... 안쪽 고등학교에서 학폭개해자로 기록되어있던 졸업 이전에 이루어지기 때문에 학교생활기록부에 개해사항에 대한 조치사항이 기재되어 있다면... [naver kin 2021-01-01 2022-01-01](https://kin.naver.com/qna/detail.naver?d1id=665d1Id=6028602036dId=3987774895qB=7ZWZ7Yt&tenc=utf8§ion=kin.ext&rank=16&search_sort=0&spq=1)
 학폭 권의해 기록부이다 도와주세요 제가 이번에 학폭에 연루 될수도 있을것같아서 작성해봅니다 제가 정말 하지않은일을 친구들이 사실확인서에 제가 했다고 썼는데 선생님께서 계속 저라고 의의를 하시는데 이런 상황에서 학폭유가 일리던데 제 상함을 어떻게 말해야할거요 너무 억울해요 속상합니다 [naver kin 2021-01-01 2022-01-01](https://kin.naver.com/qna/detail.naver?d1id=665d1Id=6028602036dId=4082354636qB=7ZWZ7Yt&tenc=utf8§ion=kin.ext&rank=4&search_sort=0&spq=1)
 d1id=665d1Id=6028602036dId=4082354636qB=7ZWZ7Yt&tenc=utf8§ion=kin.ext&rank=4&search_sort=0&spq=1 1년형하세요. 서울지방변호사회-네이버 지식인 상담 변호사 전범진입니다. 본인이 하지 않았는데 부부에 대한 객관적인 증거, 증언, 사진, 동영상 등을 확보하세요. 이를 학교이나 학교교사에게 제출하여 항변하세요 [naver kin 2021-01-01 2022-01-01](https://kin.naver.com/qna/detail.naver?d1id=665d1Id=6028602036dId=4082354636qB=7ZWZ7Yt&tenc=utf8§ion=kin.ext&rank=4&search_sort=0&spq=1)

(b)

Figure 1. (a) Raw data of Pre-Pandemic Era (2018-2020); **(b)** Raw data of Post-Pandemic Era (2020-2022)

3. Results

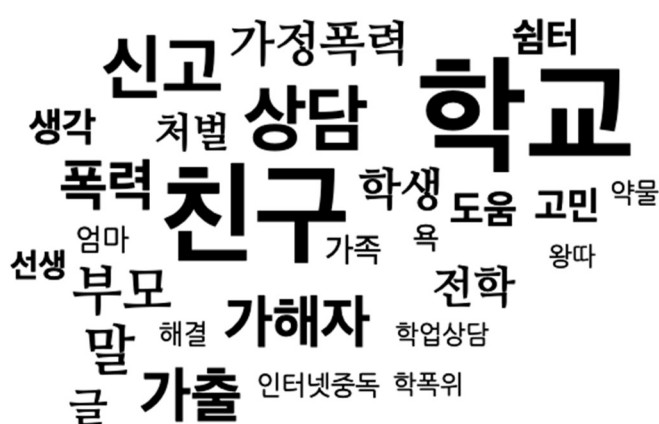
3.1 Visualization

After collecting data, we used an “Espresso K” analyzer for the morpheme analysis. Here, the nouns were extracted from the data, and all parts except the general noun, proper noun, bound noun, measure noun,

and pronoun were excluded from the crawling process. We also assigned dependent nouns and nouns with no specific meaning such as “것,” “경우,” “사실,” “등,” as stop words and eliminated them from the data. After data preprocessing, we conducted frequency analysis and matrix analysis.



(a)



(b)

Figure 2. (a) Word cloud of Pre-Pandemic Era (2018-2020); (b) Word cloud of Post-Pandemic Era (2020-2022)

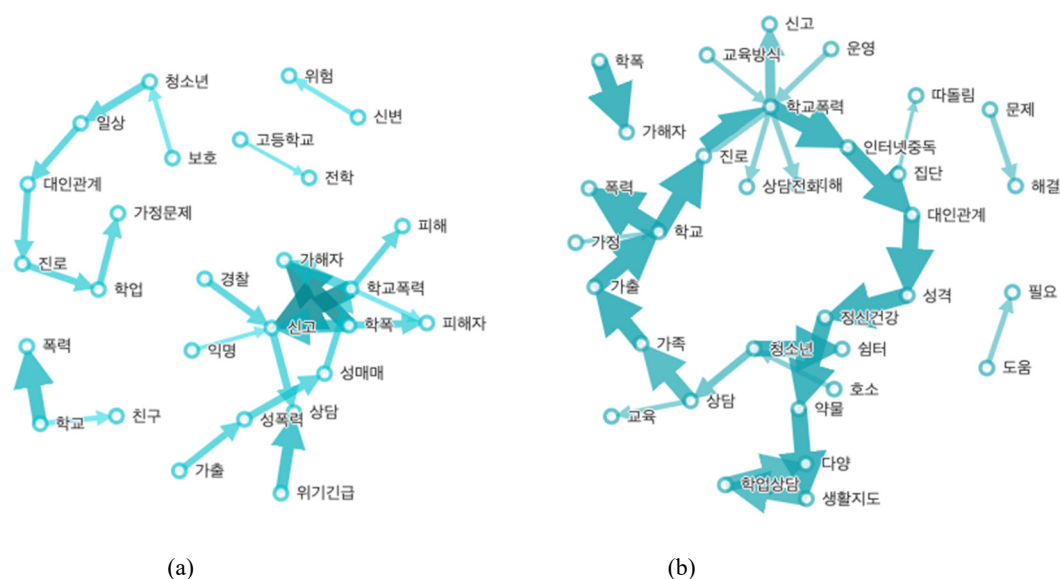
The results of frequency analysis were visualized by making it into a word cloud (Fig 2a and 2b). In order to make it easier to see the frequency and change of words, the results are also summarized in a table. Our team has organized the 19 most used words from the pre-pandemic and post-pandemic eras (Table 1). Words that each appeared only in the top ranking of the pre-pandemic era are counsel (상담), school violence committee (학폭위), disciplinary action (징계), feelings (마음), phone call (전화). Words that are only in the top 19 ranking in the post-pandemic era are school (학교), run away from home (가출), victim (피해자), help (도움), family (가족).

Table 1. Words that have commonly appeared in the top 19 ranking in pre-pandemic era (2018-2020) and post-pandemic era (2020-2022) and their ranking change

Word	Ranking
------	---------

	Pre-Pandemic era (2018-2020)	Post-Pandemic era (2020-2022)	Change
친구 (friend)	1	2	-1
학폭 (school violence)	3	3	0
신고 (report)	2	4	-2
가해자 (perpetrator)	4	6	-2
폭력 (violence)	10	7	3
말 (speech/word)	6	8	-2
부모 (parents)	11	9	2
가정폭력 (domestic violence)	17	10	7
학생 (student)	8	11	-3
전학 (transfer school)	7	13	-6
문제 (problem)	16	14	2
처벌 (punishment)	13	15	-2
고등학교 (high school)	14	17	-3
선생 (teacher)	12	18	-6

Based on the result, our team tried to compare the difference in Korean teenagers' worries about school violence between the pre-pandemic era (2018-2020) and the post-pandemic era (2020-2022). In addition to the frequency of words, the frequency of simultaneous expression (co-occurrence frequency) was analyzed to find out the relationship between words. Co-occurrence means assuming that there is a semantically correlated relationship between all nodes within this range when nodes appear together in a specific range within the entire text. In Fig 3, our group conducted a matrix analysis to visualize matrix charts and networks. A network is a visualization of the connection between words with points and arrows using N-gram results [Fig 4].



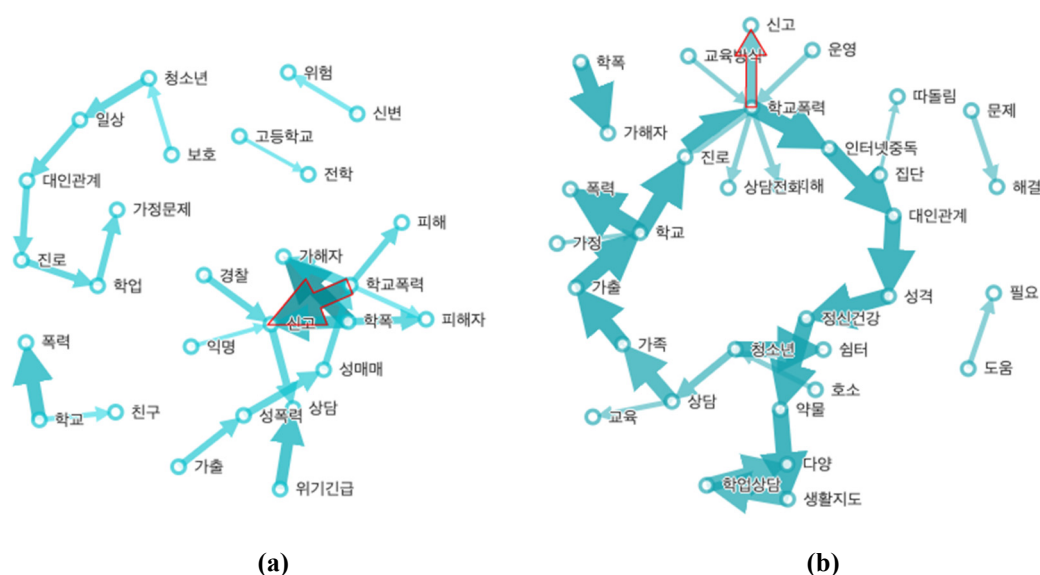


Figure 5. This figure shows the relation between “학폭 (school violence)” and “신고 (report):” (a) from the word network from pre-pandemic era (2018-2020); (b) from the word network from post-pandemic era (2020-2022)

Moreover, the word “help (도움)” suddenly appeared in the top 19 ranking during the post-pandemic era. The connection between the word “help” to “need (필요)” in the post-pandemic word network reflects the situation where students are in touch with fewer entities to gain help from [Fig 6].

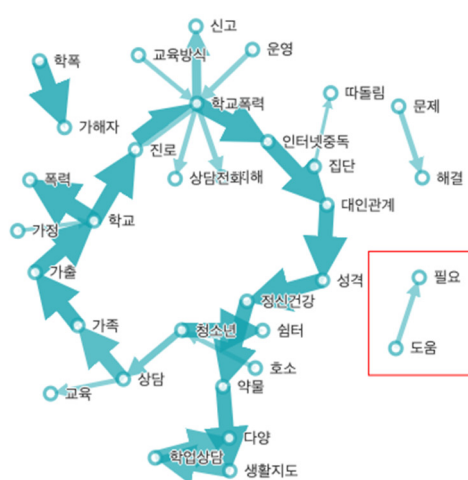


Figure 6. This figure shows the connection between “help (도움)” and “need (필요)”

3.2.3. Changes in Word Usage Related to Internet Usage

We have observed changes in communication methods, and internet usage among teenage groups from the crawled data. The disappearance of the word “phone call (전화)” from the top 19 ranking or the word matrix reflects the changed communication method in the last few years (Fig 3b). With the rapid development of online platforms during the pandemic, it is expected that the younger generation will make fewer phone calls to reach out to their peers. More importantly, our team has observed that the word “internet (인터넷)” and “cyber (사이버)” has newly appeared in the word matrix during the post-pandemic era (Fig 3b). In the word network, our team could witness the situation where teenagers are exposed to cyber violence in the space that they use to maintain social relationships with their peers. Here, the word “school violence (학교폭력)” was directly

connected to “internet addiction (인터넷 중독),” which was connected to “social group (집단)” and “social relationships (대인관계)” [Fig 7].

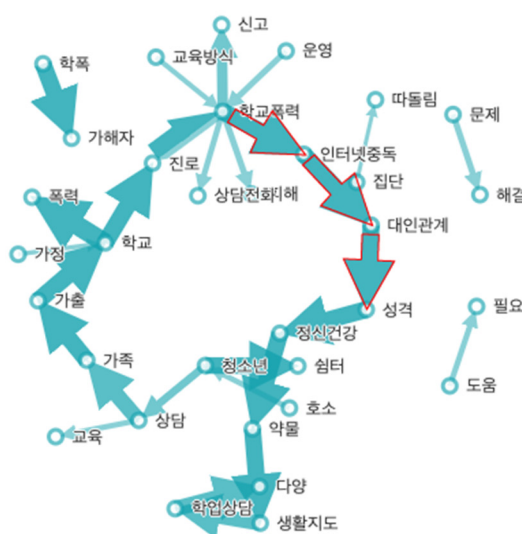


Figure 7. This figure shows the relation between “school violence (학교폭력),” “internet addiction (인터넷 중독),” “social group (집단)” and “social relationships (대인관계)” (From the Word Network From Post-Pandemic Era (2020-2022))

3.2.4. Changes in Word Usage Related to Sexual Violence

In the overall result of the data, our team has observed a significant decrease in the amount of word usage of “sexual violence (성폭력)” among adolescents’ questions in Knowledge-iN. This result can be seen in the disappearance of the word “sexual violence” in both the word cloud and the word network (Fig 2b and 4b). To further examine this phenomenon, we have collected words that were used together with the word “sexual violence” in the collected data [Table 2].

Table 2. Frequency of the Words Used Together with “sexual violence (성폭력)”

Words	Pre-Pandemic era (2018-2020)	Post-Pandemic era (2020-2022)	Change
고민 (worry)	0	105	105
가출 (run away from home)	0	69	69
진로 (future career)	0	57	57
폭력 (violence)	58	96	38
가정폭력 (domestic violence)	80	116	36
도움 (help)	18	52	34
필요 (need)	37	67	30
신고 (report)	21	46	25
글 (writing, post)	0	18	18
쉼터 (shelter)	0	15	15
사이버 (cyber)	0	9	9
인터넷 (internet)	0	6	6
가족 (family)	0	5	5
부모 (parents)	28	31	3
사과 (apology)	0	3	3

문제 (problem)	9	11	2
마음 (feeling, mind)	11	11	0
징계(disciplinary action)	1	0	-1
학폭위 (school violence committee)	3	0	-3
전학 (transfer)	47	43	-4
상황 (situation)	5	0	-5
학폭 (school violence)	8	2	-6
질문 (question)	13	6	-7
선생 (teacher)	14	6	-8
사람 (person)	10	0	-10
학생 (student)	54	44	-10
아이 (child)	13	0	-13
학교 (school)	134	119	-15
생각 (thought)	26	8	-18
처벌 (punishment)	38	19	-19
말 (speech, word)	52	27	-25
폭행 (assault)	30	5	-25
안녕 (hello)	47	19	-28
전화 (phone call)	30	0	-30
청소년 (adolescent)	238	190	-48
친구 (friend)	77	23	-54
시간 (time)	79	0	-79
학교폭력 (school violence)	170	73	-97
상담 (counsel)	175	63	-112

Our team has analyzed the possible reason behind the reduction of word usage of “sexual violence” from the decreased significance of the school environment in the post-pandemic era. Firstly, we have found that words related to the school environment and words related to bullying have significantly decreased in the usage frequencies with “sexual violence.” The word usage of “school (학교)” has reduced from 134 to 119, “friend (친구),” from 77 to 23, “student (학생),” from 54 to 44, and “teacher (선생),” from 14 to 6. The word usage of “school violence (학교폭력)” has also reduced from 170 to 73, “school violence (학폭),” from 8 to 2, and “school violence committee (학폭위),” from 3 to 0. Second, the word “assault (폭행)” has substantially reduced its word usage with “sexual violence.” While the word “assault” appeared 30 times before the pandemic, its usage was reduced to 5 times after the pandemic. Based on these two facts, we have inferred that less sexual violence is happening in the physical school environment since the school environment takes less part in adolescents’ lives during the pandemic. Also, we have noticed that the usage of the word “report (신고)” has increased. This may reflect the reality where teenagers face less hardship in dealing with sexual crimes when confronted with them.

However, it does not mean that adolescents are safe from sexual violence. For instance, although the word usage of “assault” has decreased in the last few years, the word usage of “violence” has increased overall, from 58 to 96. This result shows that worries about sexual assault in physical spaces may have decreased, but the concerns about sexual violence still prevail. For instance, in the collected data, our team has observed that “cyber (사이버)” and “internet (인터넷)” has newly appeared among the words that were used with “sexual violence” [Fig 8].



Figure 8. Relation between “family (가족),” “run away from home (가출),” “school (학교)” and “violence (폭력)” (from Word Network from Post-Pandemic Era (2020-2022))

4. Discussion

4.1. Implications

4.1.1. Increased exposure to domestic violence

During the pandemic, children and teenagers spent more time in their own houses, making them more exposed to domestic violence as a result. However, the official statistics show that domestic violence reports and arrests numbers have decreased in the post-pandemic era. The number of domestic violence 112 reports was 240,564 in 2019, showing a significant decrease in 2020 as its report number was 221,824 [9]. The report number continued to decrease in 2021 to 218,669 [9]. The arrest numbers for domestic violence offenders have also dropped considerably after the pandemic from 50277 in 2019 to 44459 in 2020 [10]. Also, the increase rate of child abuse reports has significantly been increasing in the last three years but declined considerably in 2020. The increase rate of child abuse reports has steadily been two digits in the past 4 years before 2020 [10]. However, it has turned to 2.9% in 2020 which is a dramatic decline compared to 22.1% in 2019, 10.0% in 2018, 19.6% in 2017, and 59.6% in 2016 [11]. Likewise, the official data shows a decrease in domestic violence and child abuse cases overall after the pandemic outbreak. However, it is important to take into account that the decrease in documented domestic violence may in fact show the more vulnerable state the victims are in during the pandemic, in which victims cannot even report the violence they are exposed to. In fact, many professionals were worried that the report system of child abuse might not effectively function in an environment where children and teenagers cannot enter the public space frequently as before [12].

While we have observed the increased vulnerability of the domestic violence victims in the collected data, it is curious why the word “domestic violence (가정 폭력)” frequently appeared in the discourse of school violence. As “parents (부모)” frequently appeared in the collected data, we have understood that “parents” has been an essential part of the discourse on school violence. Parents would have been the closest entity to getting help for minors under parental protection when exposed to school violence. However, the word network from the post-pandemic era shows the heavy connection between “family (가족),” “run away from home (가출),” “school (학교),” and “violence (폭력)” (Fig 8). Therefore, extra analysis on the relationships between school, family, and violence seems required to understand the parent’s position in post-pandemic discourse on school violence.

4.1.2. Changed role and significance of school institutions and digital school violence

As students spend less time in the school space, it is expected that school violence is occurring in different spaces in the post-pandemic era. Especially with the rapid increase of internet usage during the pandemic, our team is expecting that more school violence is occurring digitally. Moreover, with school violence occurring in the blind spots of the school institutions, schools may be taking a more timid position in tackling the school violence.

As already mentioned, internet usage has rapidly increased in the last two years. As offline activity has been restricted in both number and variety, a lot of the population has relied on internet activities during the pandemic era. Digital Media Overuse and Health Forum held in 2021 has announced that all kinds of digital content usage time, including video, social media, games, online gambling, online investment, and pornography, have increased in all age groups [13]. An increase in internet usage raised addiction problems within the teenage population. Research conducted by the Ministry of Gender Equality and Family in April 2021 shows that teenagers with a high risk of Internet addiction have increased 13.2% during the pandemic [14]. This phenomenon could be observed in the crawling result as the word “internet addiction (인터넷 중독)” newly appeared in both the word cloud and word matrix (Fig 2b and 3b).

With the increased internet usage, our team has speculated that communication methods among teenage groups have changed, and consequently, school violence has moved from offline to online in the last two years.

4.1.3. Reduction of the word usage of “sexual violence”

Based on the analyzed data, our team has inferred that less sexual violence is happening in the physical school environment as the school environment takes less part in adolescents’ lives during the pandemic. Also, we suspected that the increased usage of the word “report (신고)” signifies that teenagers are having fewer difficulties in reporting or dealing the sexual crime when experiencing it.

We believe that less difficulties in handling the sexual violence is due to raised awareness of sexual violence within Korean society in the last two years. With the ‘Me Too’ movement in the late 2010s and the ‘Nth room’ case in 2020, Korean society has continued various discourses on sexual violence. More specifically, Korean adolescents publicized sexual abuse and harassment happened in the school environment through social media platforms in 2018. As ‘School Me Too’ movements and their solidarity, ‘With You’ movement grew, public concern and demand on safe school environment raised dramatically. Consequently, the Ministry of Education has taken actions such as expanding sexual harassment and sexual violence task force team, conducting inspection on spy cameras installations in school, and building human rights center within schools [15]. Also, as the response to ‘School Me Too’ and the ‘Nth room’ incident, The Ministry of Education has conducted nation-wide sexual violence survey in October 2021 which was unprecedented before [16]. In March of the same year, the Seoul Metropolitan Office of Education also constructed a student-friendly online sexual violence report center, “School With You” that will help students report and handle when experiencing sexual violence [17]. Therefore, due to the raised awareness and measures taken by the government, we expect that adolescents face fewer physical and psychological difficulties reporting sexual crime.

However, it does not signify that adolescents are entirely safe from sexual violence. A research article states that about 60% of the world's children are exposed to cyber violence, and 45% are exposed to cyberbullying [18]. The article anticipates a further increase in the danger of cyberbullying in the on-tact era after COVID-19, where more people communicate online [18]. It is important to notice that one of the topics that Lee et al. set in their topic modeling was sexual violence which included keywords such as sex crime, Nth room, exploitation, minors, etc. [18]. As such, many teenagers have become more vulnerable to digital sexual violence with increased internet usage.

4.2. Contributions and Limitations

The research utilizes posts from Naver Knowledge-iN, a popular online platform in South Korea. By examining user-generated content, the study taps into real-time discussions and experiences shared directly by adolescents, providing valuable insights into the perceptions and narratives surrounding school violence during the pandemic. Moreover, a direct comparison between before and after COVID-19 allows a comparative analysis that enables the more precise identification of potential changes in school violence patterns.

Moreover, through the data mining analysis, we were able to find that the form of school violence is becoming more diverse but hidden and that domestic violence is heavily related to school violence. Hence, this research calls for wider proactive measures in educational institutions to protect adolescents from violence rather than limiting school violence in physical school spaces. Especially, heavily digitalized school life of today’s adolescent appears to have influenced the form and nature of school violence and sexual crimes. The findings could inform policy development, educational initiatives, and interventions that aim to promote developing a support system in schools.

The limitations of our investigation are as follows. First, there is a limit to the representation of the sample because the study was conducted only with limited questions with the hashtags #학교폭력 and #학폭 (school violence) in Naver Knowledge-iN. School violence-related inquiries posted on Naver Knowledge-iN are sorted with various hashtags, such as #변호사(lawyers), #교육부 학교폭력 상담(school violence counseling at the Ministry of Education), #학교 생활(school life), and #친구관계(friendship), and there are many questions that do not have hashtags at all. Second, although efforts were made to confirm the relationship of each word through a network or matrix analysis, it was still not possible to grasp the exact context of the word in each post. For instance, we had trouble understanding the context “domestic violence” was used in the discourse of school violence. The word “help” was also unclear in its context since the object of help and the situation where help is required were unsure. Further qualitative research seems needed in future research. Additionally, although the research has conducted data mining with user-generated data directly collected from the platform, the series of analyses on the data mining results are author’s opinion. Hence, there supporting evidence in the analysis may be insufficient. Lastly, we were also unable to crawl the answer posts in Knowledge-iN that were the purpose of the first study. Analyzing the contents of the “adopted answers (채택된 답변)” seems to be able to determine which content of counseling is most helpful to the victims. If we improve the sampling method and analyze the answers that actually helped the victims, we believe we may obtain improved research results.

5. Conclusions

This study analyzed the pattern of school violence before and after COVID-19 from various perspectives and found a significant correlation between school violence and domestic violence, the increase in digital crime, the change in the role of the school, and the change in the form of juvenile sex crimes. Through the results, we were able to find a phenomenon in which the form of school violence is becoming more diverse but hidden. Therefore, research on school violence should not be limited to violence in school spaces but should be viewed from a broader perspective. It is also necessary to detect and prevent domestic violence, crimes through online media, and sex crimes before it is connected to school violence. In addition, schools should restore their original role in protecting their students by developing online and offline policies that protect students from various violence and provide emotional stability. In addition, as COVID-19 is prolonged, victims of violence are often concealed. Therefore, it is urgent to devise measures to rescue teenagers in the blind spot of crime.

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