

Key topics and their interconnections in Bulgarian cyberpsychology research

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Abstract. Given the increasing importance of cyberpsychology, the present work extracts key topics in Bulgarian cyberpsychology research, analyses their distribution over time, and studies the number and strength of their interconnections. Three saturation peaks are identified, corresponding to significant technology-related societal events: a boom of online social networks (2011), increased interest in public mental health (2017), and a major COVID-19-induced offline-to-online transition in all areas of life (2021). Two major topical networks emerge: one links cyber-bullying-and-victimization to young people and mental health, while the other connects personality, self-presentation, social networks, and virtual identity. The findings facilitate the identification of future development directions for Bulgarian cyberpsychology research.

Keywords: cyberpsychology, Bulgaria, topics, connections, bottom-up approach

Introduction

Technological advancement and cyberpsychology

Rapid technological advancement and growing numbers of global Internet users (from 57.0% in 2019 to 66.2% in 2024, Kemp 2019; Kemp 2024) are linked to alterations in standard cognitive and social processes (e.g., attention, memory, Firth, Torous, Firth 2020; social media ostracism, Schneider et al. 2017) as well as to the emergence of new behavioural phenomena (e.g., ghosting, catfishing, Zhu 2025) and physical and mental health issues (e.g., cybersickness, Davis, Nesbitt, Nalivaiko 2014; social media burnout, Han 2016). Ensuring safe and efficient functioning on both the individual and societal level in the current fast-evolving technological environment requires proper understanding of the effects technology has on human cognition and behaviour. The significance of conducting a large-scale systematic study of these effects has given rise to a specialized field of science – *cyberpsychology* – which bridges various disciplines

(e.g., psychology, computer science, media studies, etc.) in an attempt to optimize human-technology interaction.

While appearing in the 1990s and still a relatively young branch of science, cyberpsychology is widely recognized among the global scientific community due to its high societal relevance impactful contribution to contemporary societal concerns. Divisions dedicated to cyberpsychology endeavours exist, for instance, in the American Psychological Association (APA) and the British Psychological Society (BPS). Multiple scientific journals have been dedicated to cyberpsychological research – for example, but not restricted to, *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*; *Cyberpsychology, Behavior, and Social Networking*; *Computers in Human Behavior*; *Internet Research*. An analysis of global cyberpsychological research between 2012 and 2019 reports 300 open-access publications from over 50 countries and approximately 200 scientific domains, including ethics, law, business, economics, medicine, philosophy, biology, etc., as well as exponential growth in publication activity over time (Singh, Singh 2019). Multiple cyberpsychology educational programmes and dedicated textbooks have been created to equip new generations to adequately address the newly emerging challenges associated with human-technology interaction and thus guarantee a sustainable technology-enhanced future for human society.

Cyberpsychology on a global and national level

The phenomena of interest to the global cyberpsychology research community are abundant and ever-increasing in number as they arise from the respective current technological advances. Although diverse in nature, these phenomena have been recently systematically reviewed and found to form five major categories: *online behaviour and personality*; *social media use and psychological functioning*; *telepsychology*; *games and gaming*; and *virtual reality, artificial intelligence, and applications* (Ancis 2020). These categories appear to be universal and have been shown to apply to the cyberpsychological research conducted on a national level in Bulgaria with the social categories being more strongly represented than the technological ones (Tsankova 2024). The phenomena addressed by Bulgarian cyberpsychology research are narrower in scope compared to the world-level categorization (Tsankova 2024), as is to be expected on a country level where research is naturally oriented towards matters of current relevance to the respective society. Such matters determine a country's specific research profile for a given discipline. And while it is useful to know that Bulgarian cyberpsychology research does cover to varying degrees the world thematic categories, the logical question arises about the unique nature of Bulgarian cyberpsychology research landscape. In other words, what is the specific profile, in terms of major studied phenomena, that is characteristic of Bulgarian psychological research so far? Uncovering this profile by switching from a global to a local analysis perspective would allow for a more fine-grained analysis of Bulgarian cyberpsychological research and for the identification of topical areas representing its unique strengths and weaknesses. Keeping in mind the rapidly increasing role of technology in all areas of everyday life (evidenced,

for instance, by a rise from 66.8% to 81.9% in overall Internet use in Bulgaria between 2019 and 2024) (National Statistical Institute, Republic of Bulgaria 2024), it is of critical importance for achieving untroubled technologically-enhanced functioning to assess which pressing societal issues stemming from technological advancement have been studied thoroughly, which have been poorly addressed or altogether unaddressed, and which would need to be looked into in the (near) future.

The present research

The present work builds upon the deductive (top-down) global-scale research areas analysis of Tsankova (2024) and aims to expand this knowledge by providing the necessary fine-grained in-depth country-specific research profile of cyberpsychology research in Bulgaria. To achieve this aim the work 1) applies an inductive (bottom-up) topic extraction method, 2) looks into the overall frequency distribution of the extracted topics as well as their frequency distributions over time to identify general and time-specific peaks in research and publication activity, and 3) studies the interconnections between the key topics to define larger topical networks that characterize Bulgarian cyberpsychology research. Given its inductive nature, the research is largely exploratory in nature and does not put forward any particular predictions.

Method

Data

The present analysis used the literature database obtained according to the PRISMA protocol (Page et al. 2021) and described in detail in Tsankova (2024). The database is comprised of 42 scientific articles reporting research in the field of cyberpsychology and published in one of the two leading peer-reviewed Bulgarian psychology journals – the *Bulgarian Journal of Psychology* and *Psychological Research (in the Balkans)*.

Topic extraction

Following an inductive (bottom-up) approach, the key research topics were extracted from the titles and, where applicable (i.e., in 24 instances), from the 42 target articles. The first step required the collection of all key terms without any filtering or modification. During the next integrative phase, the terms that were similar in meaning as well as those representing variations of the same semantic category, were grouped into larger topical categories. Examples of such categories are “cyberbullying and cybervictimization” (including the terms “cyberbullying” and “cybervictimization” that appeared separately or in combination in the titles and/or keywords of the reviewed articles), “social networks and digital media” (including the terms “social networks”, “virtual social networks”, “Internet-based social networks”, “Facebook”, “digital media”, etc.), “personality” (including the terms “personality”, “personality disposition”,

“personality anxiety”, “emotional expressiveness”, “impulsivity”, “artistry”, etc.). To facilitate reading and comprehension, the topical categories are subsequently simply referred to as “topics”.

Each topic was marked as present only once in each article, regardless of the number of individual observations of semantically related terms in its title and/or keywords. In other words, it was assumed that that all semantically related terms reflect one topic. Thus, the same topic (i.e., “cyberbullying and cybervictimization”) could not appear multiple times in an article. At the same time, however, one article could be tagged with multiple topics. For example, the categories “social networks and digital media” and “personality” could be simultaneously present within the same article.

Analysis and synthesis

Topic frequencies and distribution over time

To achieve sufficient statistical power $1-\beta = .80$, a topic was retained for the analysis if it was present in four or more articles, i.e., in approximately 10% of the total number of studied articles (Fugard, Potts 2015). The final selection of topics obtained after applying the above criterion is given in Table 1 together with the observation frequency of each topic. Three articles could not be tagged with any of the final topics (i.e., they tackled a topic that was not well-represented) and were excluded from the analysis as they were not considered representative of the Bulgarian cyberpsychology research landscape. These articles dealt with virtual reality (VR), artificial intelligence (AI), remote education, and virtual leadership – all topics of current societal relevance. Another topic that did not meet the inclusion threshold was “games and gaming”.

Table 1. Final extracted topics and their observation frequency

Topic (alphabetical order)	Observation frequency
cyberbullying + cybervictimization	4
Internet communication	6
personality	6
school age + young people	10
self-presentation	5
social networks + digital media	13
telepsychology	7
virtual identity	8
well-being + health	6

Note. Topics are listed in alphabetical order.

The most well-represented topics appeared to be “social networks and digital media” which was present in 13 articles, closely followed by “school age and young people” which was found in 10 articles. Most of the other topics fell in the middle frequency range with six to eight observations, whereas the least represented topics were “cyberbullying and cybervictimization” (appearing in 4 articles) and “self-presentation” (appearing in 5 articles). Interestingly, while most topics addressed a specific subfield within the larger research areas outlined by Ancis (2020), the presently reported topic “telepsychology” appeared quite broad. A more detailed look into the articles tagged with this topic, however, revealed that the label was in fact correct as the texts largely dealt with introducing the research field of telepsychology in Bulgaria.

In short, based on the overall frequency distribution of the extracted topics it could be concluded that the major effort of Bulgarian cyberpsychological research has been invested in social networks, digital media, and young people. At the same time, the topics of least interest could be pinpointed to self-presentation, cyberbullying, and cybervictimization. Finally, some topics of high societal relevance, such as VR, AI, and gaming, were only sporadically addressed and it could not be concluded that they have formed stable research trends.

Further insights could be obtained from 1) the overall publication activity (Figure 1, panel A), and 2) the distribution and saturation of topics over time (Figure 1, panel B). Two or three publications peaks appear to mark the years with the highest activity in cyberpsychological research in Bulgaria – 2011, 2017, and 2021. These timepoints correspond to significant technological advancements and events of high societal relevance. First, there is heightened interest from the general public and the research community in social media such as Facebook in 2011, shortly after their introduction and popularization in Bulgaria a couple of years earlier. Next, around 2016–2017, there is an increase in motivation among the public, government, and mental health professionals to take action toward improving the mental health of the population, as evidenced by the *National Programme for Mental Health 2017–2023* proposed at the time. Finally, 2021 corresponds to a peak in telecommunications and the transfer to multiple daily activities online as a result of the COVID-19 pandemic.

On the individual topic level, we find a peak for “cyberbullying and cybervictimization” around 2017, as well as later activity around 2021 and 2022. “Internet communication” is not associated with high saturation but appears regularly until the early 2010s and re-emerges in 2021 following a dormant decade. “Personality” and “self-presentation” also do not mark any particularly high peaks but are present in a stable fashion from the mid-2000s until the beginning of the 2020s. Interest in “school age and young people” peaks in 2011, but publications dealing with the topic also appear before and after this point in time almost throughout the full studied period. “Social networks and digital media” emerges as a topic on the research stage with a high peak around 2011 and continues to maintain the interest of the Bulgarian cyberpsychology community later on as well. “Telepsychology” is introduced in 2009 and 2011,

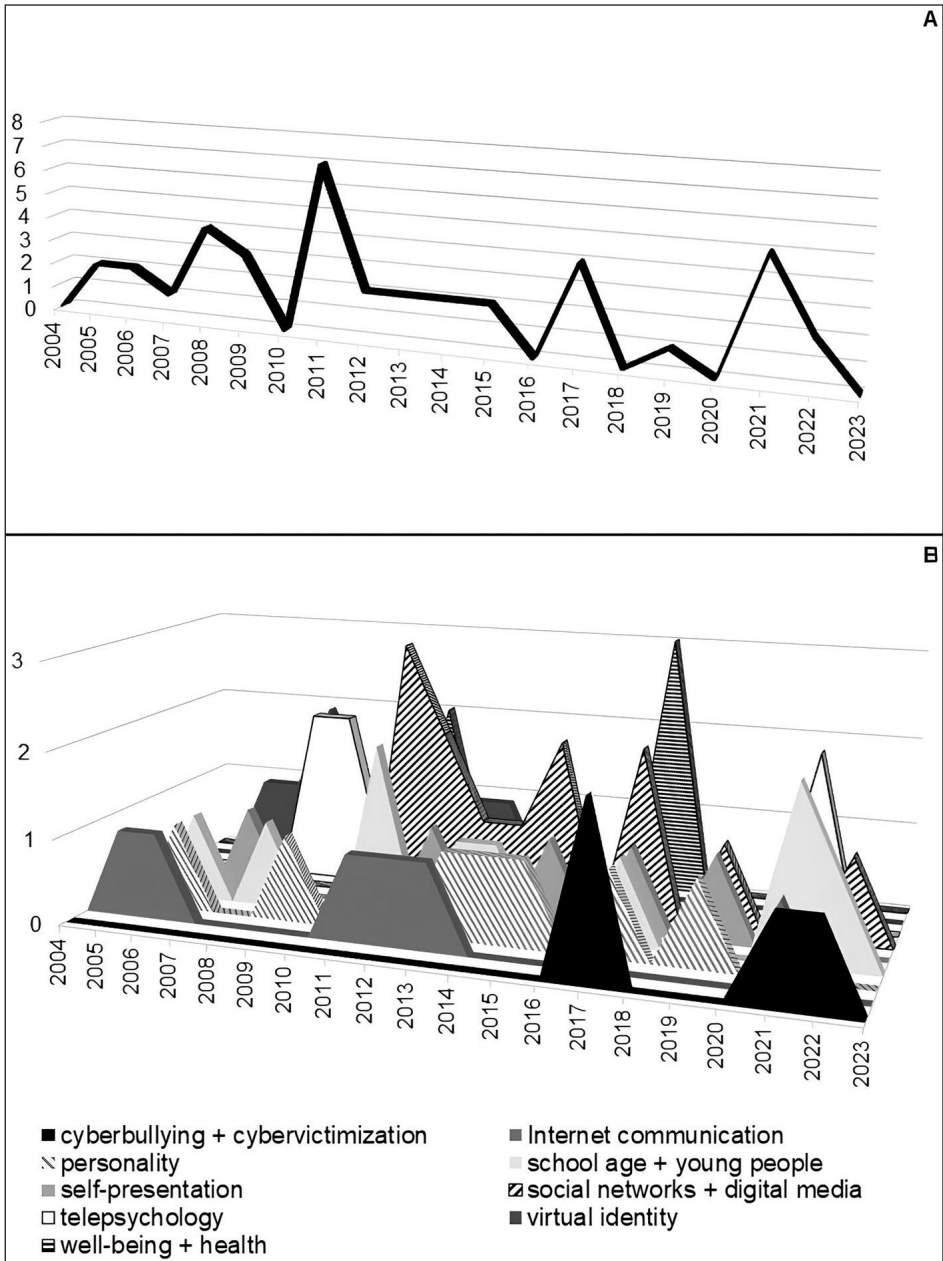


Fig. 1. Overall publication activity (A) and topic distribution over time (B) in cyberpsychological research in Bulgaria

Note. In panel A there are total of 39 observations, each corresponding to a single article. In panel B there are more observations, as each observation corresponds to an occurrence of a given topic and there could be multiple topics connected to a single article. Topics in panel B are presented in alphabetical order from front to back in the graphic and alternating between columns in the legend.

and appears again in 2021. Interest in “virtual identity” is present in a relatively stable fashion in the interval between 2006 and 2012, with a peak in 2008. Finally, “well-being and health” emerges in 2011, and holds the interests for a while and peaks in 2017.

The first peak in overall publication activity in 2011 is linked to strong research interest in “social networks and digital media”, “well-being and health”, and “school age and young people”. It also marks interest in “Internet communication” and “virtual identity”. Thus, Bulgarian cyberpsychological research activity around 2011 has been largely dedicated to studying the effects of a relevant contemporary social phenomena linked to digitalization (i.e., online social networks) on various social phenomena and has addressed a vulnerable age group. The 2017 publication peak is linked to heightened activity in the topics “well-being and health”, “social networks and digital media”, and “cyberbullying and cybervictimization”, as well as to some research interest in “personality”, “self-presentation”, and “school age and young people”. While interest in the social phenomena associated with online social networks and digital media continues, the topic with highest saturation (“well-being and health”) seems to reflect the overall public interest in mental health improvement. The 2021 publication peak shows high saturation of the “telepsychology” and “school age and young people” topics and some saturation of the “Internet communication” and “cyberbullying and cybervictimization”. This particular research profile has likely been determined by a shift in the primary communication mode from offline to online as a result of the COVID-19 pandemic, which has spiked new interest in how the Internet affects human interaction and the related phenomena emerging from the transition of face-to-face activities such as counselling and education to remote environments.

Apart from the observations regarding the research activity peaks, a relative timeline of the evolution of research interest in Bulgarian cyberpsychology could be extracted as follows: Bulgarian cyberpsychology research has begun around the mid-2000s when its landscape has been dominated by topics related to the transformation of social phenomena (e.g., construction of virtual identity, self-presentation, communication) as a result of digitalization; during the next decade research has focused on online social networks, as well as health and well-being in relation to digital phenomena such as, for instance, cyberbullying. Finally, early 2020s research activity has been marked by the major technological transformation of society caused by the COVID-19 pandemic and is characterized by issues likely linked to remote work, education, and health.

In conclusion, both the overall publication activity and the saturation of research topics over time provide evidence for the timely engagement of the Bulgarian cyberpsychological research community with relevant technology-driven transformation in various social phenomena.

Topic interconnections

Though informative when studied in isolation from one another, the key topics may lead to additional insights when studied together. That is why further analysis looked into the interconnections among the topics by means of counting the number of co-occurrences of each topic with all other topics. The count was first obtained for each individual article, then summed across all target articles. The final result is presented in Figures 2a and 2b, in which each connecting line shows the number of co-occurrences between every two topics.

Panel A of Figure 2a presents the general picture of all interconnections among the nine extracted topics and summarizes the topical organization of Bulgarian cyberpsychology research. A network with overall good connectivity emerges where almost all topics are connected to at least three other topics. Panels B through J of Figure 2b depict the connections of each topic with all remaining topics. As a whole, many connections are logical and intuitive (e.g., cyberbullying on the one hand and young people, well-being, and online social networks on the other hand). Other plausible connections that could be expected are missing (e.g., between Internet communication on the one hand, and personality, self-presentation, and well-being on the other hand). In terms of diversity and breadth of research scope, the topics that link to most other topics are “school age and young people” (linked to 6 other topics), “personality” (also linked to 6 other topics), and “social networks and digital media” (linked to 7 other topics). Most other topics have been studied in association with fewer, but typically at least three other topics. “Telepsychology” appears to be the least connected (only linking to “personality”), but this observation needs to be regarded with caution as it is very likely due to the fact that most articles falling within this topic lacked keywords. Thus, the telepsychology articles could be linking to the other major research topics, but this information might have been missed with the present topic extraction method. Finally, it is also interesting to isolate the strongest interconnections (i.e., highest numbers of co-occurrences) as they could point towards the central topical networks. Figure 3 reveals two such networks: 1) “cyberbullying and cybervictimization” – “school age and young people” – “well-being and health”, and 2) “personality” – “self-presentation” – “social networks and digital media” – “virtual identity”.

Taken together, the above observations are very informative as they outline the key topical associations and, therefore, the central research directions of Bulgarian cyberpsychology research.

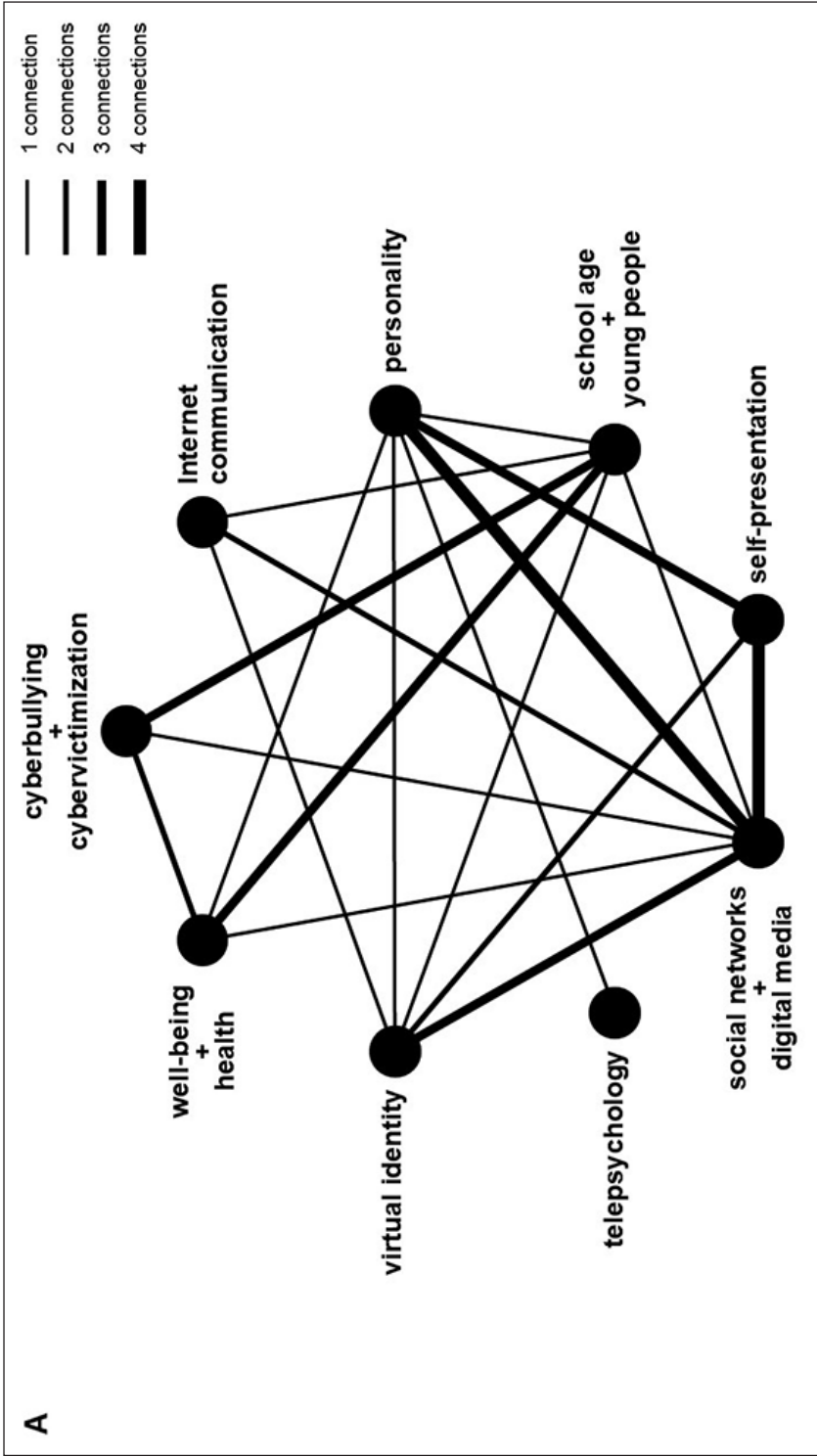


Fig. 2a. All topic interconnections (A)

Note. Topics are given in alphabetical order in clockwise direction.

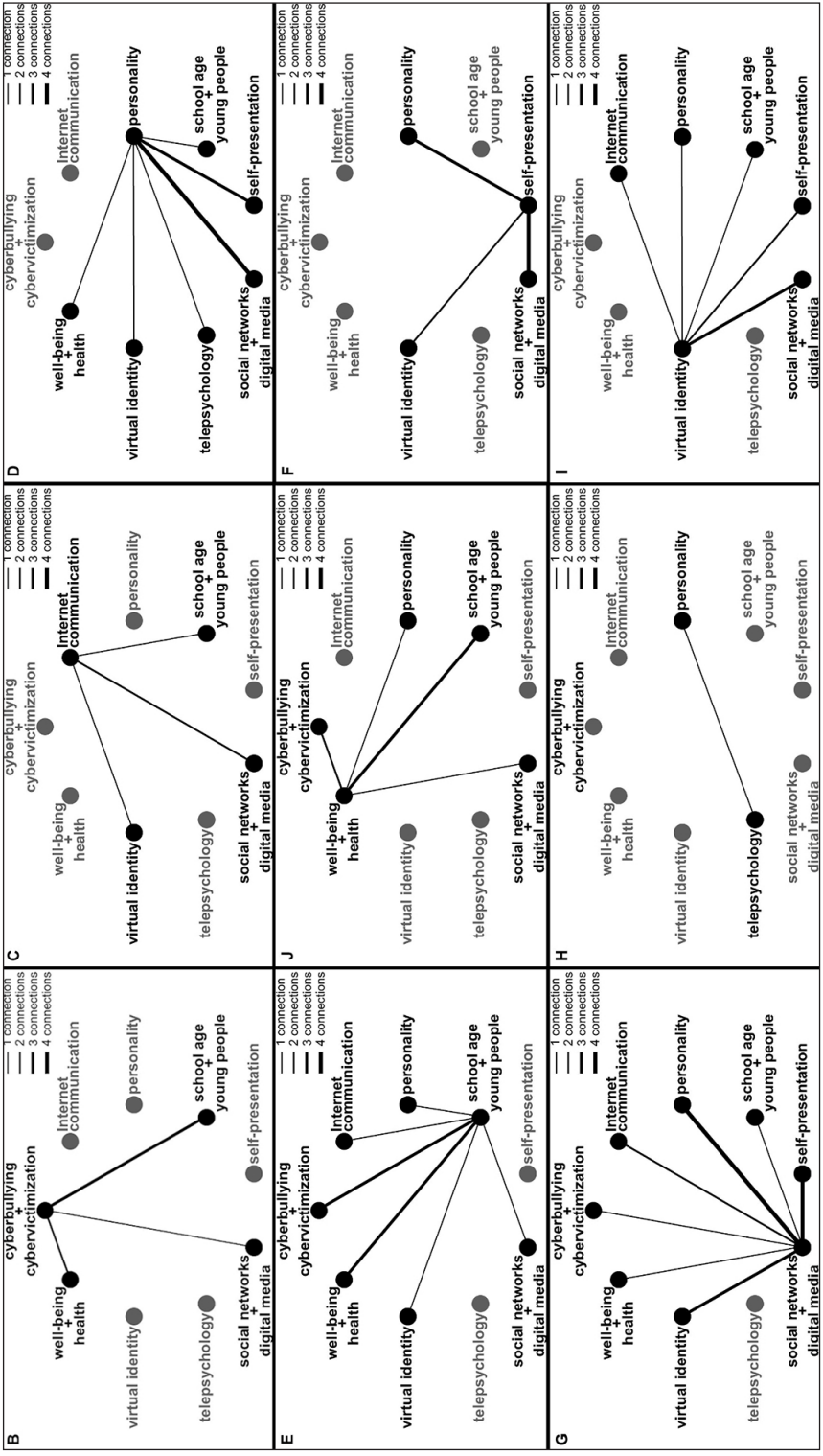


Fig. 2b. Connections of each topic with all other topics (B–J)

Note. Topics are given in alphabetical order in clockwise direction.

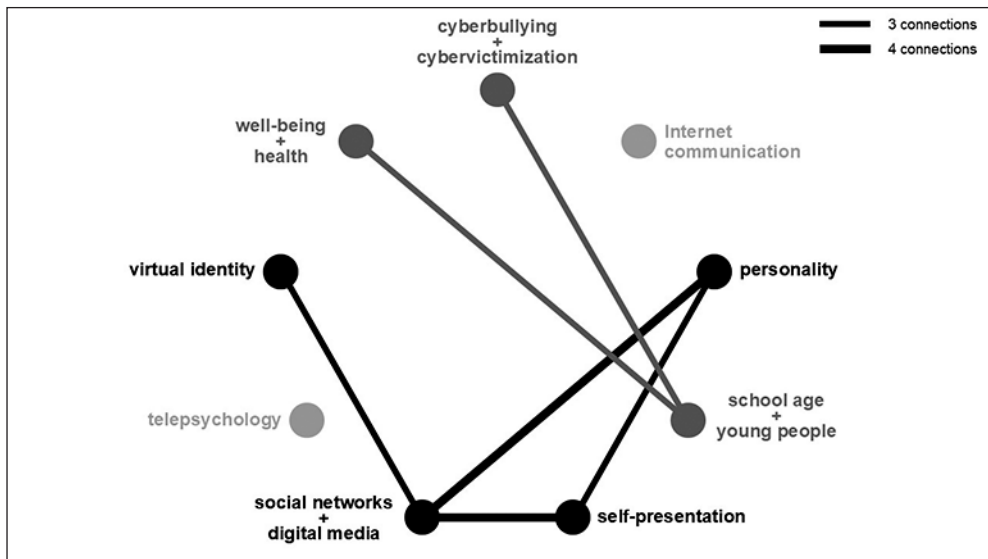


Fig. 3. Central topical networks

Note. Topics are given in alphabetical order in clockwise direction.

Discussion

Research summary

Based on the knowledge that Bulgarian cyberpsychology research generally aligns with the global topical areas in the field (Tsankova 2024), this work aimed at establishing the topical profile that is unique to Bulgaria. This aim was achieved by means of 1) bottom-up extraction of the principal cyberpsychology research topics in Bulgaria from the titles and keywords of the leading articles published in the field, 2) analysis of the saturation of the extracted topics over time, and 3) analysis of the connections among the extracted topics.

Main observations

Frequency analysis revealed that the strongest research interest and effort have been invested in social networks, digital media, and young people. Publication activity and topic saturation over time identified three major research peaks, corresponding to country-specific events of high societal relevance: the boom of social networks around 2011, increased interest in public mental health around 2017, and a major change in the interpersonal communication paradigm caused by the COVID-19 pandemic around 2021. This timeline shows adequate responsiveness and timely public engagement on the side of Bulgarian cyberpsychology research. Finally, a careful look into the connections among the topics uncovered two central topical networks summarizing the key lines of cyberpsychology research in Bulgaria – one linking cyber-bullying-and-

victimization to young people and (mental) health, and the other connecting personality, self-presentation, social networks, and virtual identity.

Further observations

Although not of main interest to this research, two additional observations emerged in the working process and are presented here as they shed further light on the principal findings. First, as is also the case for the dawn of cyberpsychology research on a global level, the research topics in Bulgaria mainly stem from the fields of expertise of the respective research groups. Thus, for example, articles dedicated to virtual identity and self-presentation have been published mainly by social psychologists with a strong interest in these topics. Therefore, in addition to serving as a response to significant social events, the primary research foci of Bulgarian cyberpsychology can be explained by the strong presence and expertise of specific groups on the psychology scene at the respective times. Often, a junior researcher (typically a doctoral student) is also present in the author list, suggesting the possibility for future consolidation of the discipline through the dedicated work of a trained new generation of cyberpsychologists. Second, the transition of interest in specific topics from the offline to the online world is achieved gradually and begins with the seeking of the theoretical foundations of many online phenomena. In the case of telepsychology, the majority of the studied publications have been dedicated to the introduction of the discipline to the Bulgarian research community and the public. Taken together, these observations explain the evolution, focal points, and largely theoretical nature of cyberpsychology research in Bulgaria until the early 2020s.

Limitations and future directions

As is characteristic of all scientific endeavour, the present work comes with a couple of shortcomings. First, it only looks at articles published in Bulgarian scientific journals and in doing so omits cyberpsychology research conducted by Bulgarian researchers and published in international journals. This, however, was intentional as the goal of the work was to obtain a national-level profile of cyberpsychology research. Nevertheless, future analysis of Bulgarian cyberpsychology research published in international journals could be informative and could show how Bulgaria is represented on the global cyberpsychology research scene. A crucial challenge, though, needs to be overcome prior to conducting such analysis – the exhaustive search and collection of the relevant literature.

Second, the present study does not cover work in the areas of media studies and human-computer interaction. Although such publications are present, they did not meet the criteria to be classified as falling into the field of cyberpsychology (Tsankova 2024). However, historically, they do lay the foundations of modern cyberpsychology on a global level, and a separate study dedicated to them could further explain the profile of Bulgarian research in the field.

Third, this work only extracts the overall topical networks for the complete studied time window. It would be interesting in the future to also study how the topical networks have evolved over time.

Finally, citations analysis could shed further light on the evolution of collaborative research groups in relation to the topical networks.

Conclusion

The present study complements and expands previous research on the nature of Bulgarian cyberpsychology by extracting the unique national-level research profile of the discipline. The reported findings could be useful for identifying the future directions that Bulgarian cyberpsychological research could take (e.g., broadening its scope to address current technological advancements such as virtual reality, cybersickness, artificial intelligence, applications, etc.).

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