Unveiling Global Trends in Reactive and Proactive Aggression: A Cutting-Edge Bibliometric Analysis

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Abstract

This bibliometric mapping discusses the research landscape of proactive and reactive aggression, key authors, collaborative networks, and trends in scholarly publishing for the past two decades. The study, using tools like VOSviewer, shows important patterns in co-authorship, citation networks, and keyword co-occurrence. The leading personalities include Adrian Raine, Paula J. Fite, Richard E. Tremblay, and Paul J. Frick. Heavy contributors to the knowledge about aggression from biological, psychological, and developmental perspectives are identified. Co-authorship is intense, especially on topics dealing with neuro-criminology, childhood and adolescent behavior, and the role of psychopathy in violent behavior.

The analysis shows that from the year 2009, the publication of works has grown rapidly to their peak in the year 2022, reflecting an upward spiral of interest and interdisciplinary research on aggression. Dominant keywords like "aggression," "reactive," "proactive," "psychopathy," and "conduct disorder" point to the core themes of research on emotional regulation, developmental trajectories, and clinical interventions. This review has come to a close that studies in the field

of aggression have now developed into a multi-disciplinary science, embracing neuroscience, psychology, criminology, and social science knowledge to further advance the understanding of the underlying mechanisms of aggressive behavior and develop various treatments. Future research will have to go on filling in areas of investigation that are underrepresented, including but not limited to aggression at the interface with particular demographic variables and newer approaches to intervention.

Keywords: Bibliometric analysis, proactive aggression, reactive aggression, VOSviewer, wordsift

Introduction

Reactive aggression is considered an immediate behavioral reaction to frustration, threats, or physical aggression and is generally associated with high, uncontrolled autonomic arousal (Bertsch, Florange, & Herpertz, 2020). Such a reaction is self-protective or vengeful, particularly through inflicting injury on whoever has caused the noxious stimulation. It has further been put forward that this sort of aggression consists of unconditioned, temperamentally based reactions or else conditioned-by-negative-reinforcement emotional reactions towards environmental events (Romero-Martinez, Sarrate-Costa, & Moya-Albiol, 2022). A number of terms synonymous with reactive aggression appear in the research literature, including affective, defensive, impulsive, retaliatory, and hot-blooded. In contrast, proactive aggression is conceptualized as an instrumental behavior exercised in anticipation of a reward, which may be external/material or internal/psychological in nature (Vitiello & Stoff, 1997). As such, it is a response acquired through positive reinforcement rather than preceded by autonomic arousal. Individuals using proactive aggression are classically described as likely to plan ahead, and as methodical, logical, calculating, and regulated in character (Bubier & Drabick, 2009). Thus, the terms predatory, premeditated, instrumental, and cold-blooded are often used as synonyms for proactive (Belfry & Kolla, 2021). As a final point, it is worth noting that on separate occasions an individual can display both reactive and proactive aggression.

In fact, research has evidenced that the two types of aggression can co-exist in the same individual. Besides, the validity of the dichotomy is supported empirically according to summaries of its correlates (McEllistrem, 2004) (Wagle, Neupane, Nyaupane, & Timalsena, 2024). The identified correlates suggest distinct etiological and developmental trajectories for reactive and proactive aggression. In general, reactive individuals have been found to have grown up in family environments characterized by physical maltreatment and have experienced rejection or victimization by peers. On the contrary, proactive individuals tend to be perceived by their peers in positive terms because of their charisma (Dugré & De Brito, 2024) (Neupane, Adhikari, Adhikari, & Thakur, 2018). They have been found to have had family backgrounds characterized by a lack of parental control and an absence of physical maltreatment. They are exposed to antisocial or aggressive behavior engaged in by their parents. Differences in socialization experiences seem, then, to lay the foundations for the emergence of distinct

psychosocial adaptation problems. Research indicates that reactively aggressive individuals tend to have deficits in social information processing.

On the other hand, proactively aggressive individuals seem to have good cognitive and emotional regulation abilities, and perform well academically. They have higher verbal abilities than reactively aggressive individuals., control their frustration, and do not pay attention to others in a hostile fashion. It has nonetheless been demonstrated that they are less emotional in their day-to-day life (Neupane & Lourdusamy, 2024) (Dugré & De Brito, 2024). At the behavioral level, proactively aggressive individuals develop externalized problems. and criminal behavior, notably assuming the form of physical aggression. With regard to psychopathology, overall the empirical evidence converges on an association between proactive aggression and psychopathy (Romero-Martinez, Sarrate-Costa, & Moya-Albiol, 2022). These differences in the socialization experiences and psychosocial adaption between reactively and proactively aggressive individuals have principally been identified based on the analysis of samples of children, adolescents, and adults from the general population.

The validity of the reactive-proactive dichotomy has been examined in offender samples. Including some studies that also use samples of homicide offence perpetrators, but these studies focus on the relationship between the types of aggression (reactive versus proactive) and psychopathic personality (or its neural substrates) (Miller & Lynam, 2006). Though offender samples report adverse childhood experiences at higher rates compared to other populations, examination of their role in such samples in relation to reactive and proactive aggressison has been somewhat neglected. Surprising as well is that no studies look at sexual offending with respect to the reactive-proactive dichotomy (Neupane, 2019). Indeed, studying it in a sample of sexual offenders who have committed an act of highly violent aggression, such as in the case of sexual homicide, has better defining potential for the scope of the reactive-proactive dichotomy. The study of reactive and proactive aggression among perpetrators of sexual homicide will, therefore, help link the two literatures on violence and sexual offending and perhaps highlight pathways to violent sexual offending (Aron, 2011) that will improve our knowledge regarding the factors predisposing an individual to act with reactive or proactive aggression in the context of a sexual offense.

Accordingly, reactive and proactive aggressions are associated with two different sets of behavioral and psychological phenomena important for understanding the roots, manifestations, and consequences of aggressive behaviors. Although these two forms of aggression have been well documented in various domains, the global research trends, thematic developments, and co-occurrence of such studies in academic literature remain fragmented (Conway, et al., 2024). Research on reactive and proactive aggression is an ever-growing body of work; even so, little effort has been made to date to map overarching global trends and themes within this research area (Neupane & Subedi, 2018). Moreover, there are critical gaps

regarding the different ways various research communities, regions, and disciplines approach such types of aggression. A combined bibliometric approach would provide clarity with respect to the constantly changing face of research in the area, identification of key themes and influential works (Romero-Martinez, Sarrate-Costa, & Moya-Albiol, 2022), emerging areas (Neupane, 2014), and give some insight into how reactive and proactive aggression is being studied across different contexts.

It therefore plans to carry out a bibliometric analysis of the trends, patterns, and themes that have globally characterized research into reactive and proactive aggression. In detail, this study aims to study the historical and recent trends in publications on reactive and proactive aggression, highlighting the growth trajectory and geographic distribution of the research output. Then it identifies major themes and emerging topics in the study of reactive and proactive aggression through keyword analysis and co-occurrence mapping. Key authors, influential works, and collaboration networks are looked into to understand which molding factors have shaped the research landscape of aggression. This also looks at how the different academic disciplines and sectors are contributing toward studies on reactive and proactive aggression. Further, the paper points toward research gaps and suggests some probable future directions to attain an understanding of reactive and proactive aggression, particularly within underexplored domains of offender populations and contexts of sexual aggression.

Methodology

A bibliometric approach has been used to explore global trends, themes, and patterns related to reactive and proactive aggression. The present approach represents a multitier bibliometric analysis that includes data collection, processing, and analysis at different levels to offer a comprehensive overview of the research landscape.

Data Source and Search Strategy

The main source of data for this bibliometric analysis was Lens.org, which is a world-recognized academic research platform indexing vast areas of scholarly output. While acknowledging search strategy, search terms were "reactive aggression" OR "proactive aggression". The filters were applied in searching (Aryal, Karki, Mahat, & Neupane, 2024). Under publication type, only journal articles were filtered. Similarly, the field of study was only selected psychology. And, finally, the date range was set from January 1, 2004, to December 31, 2023.

This search retrieved 2,568 matching journal articles that met the selection criteria, of which 2,092 were classified as journal articles and 1,352 of those were psychology-specific. The overall number of scholarly works in Lens.org at the time of this analysis was 278,565,050.

Data Processing

The dataset of 1,352 extracted journal articles was imported into VOSviewer, a software tool used for constructing and visualizing bibliometric networks. Bibliometric maps of collaboration networks were created and analyzed at the level of authors, countries, and institutions using VOSviewer. It was also used in identifying the most influential publications, top authors, and productive regions about the contribution to research on reactive and proactive aggression.

Besides, keywords analysis was performed through using WordSift. This word cloud and frequency analysis-based tool gives information about the thematic pattern of keywords; it shows which terms occur repeatedly in the corpus. These visualizations from WordSift enabled us to present the key terms and emerging research trends that were present within the dataset.

Analysing and Visualization

A longitudinal analysis was performed to identify the growth trajectory in publication on reactive and proactive aggression from 2004 to 2023. This helps analyze how interest in this field has evolved over time, including peaks that occur in significant volume.

Using data from Lens.org, the geographic origins of publications were mapped to identify the countries and regions most active in this research area. Co-authorship networks were visualized using VOSviewer to understand international collaboration patterns.

We then used VOSviewer for keyword co-occurrence mapping of the most frequent keywords related to reactive and proactive aggression. By doing so, this study illuminated the key themes, recurring research topics, and emerging areas of interest within the area of study.

An analysis of co-authorships was performed, highlighting the most influential authors and groups in the setting of the research. Visualization of collaboration networks between authors and institutions was done to highlight the key players in driving research in this area.

The citation patterns were analyzed in order to find the most frequently cited articles and authors of the field. This was crucial for the recognition of foundational works and seminal contributions constituting the current understanding of reactive and proactive aggression.

This thematic clustering was based on the co-occurrence of keywords and citation networks. Each one of these clusters represented one domain within the general topic of reactive and proactive aggression, including topics related to development during childhood, offenders, and neuropsychology.

Software Used

Lens.org: Data extraction and retrieval of relevant journal articles.
VOSviewer: Visualizations of co-authorships, keyword co-occurrence, and citation analysis.
WordSift: Keyword frequency analysis and thematic visualization.

Limitations and Scope

The dataset from Lens.org was limited to psychological journal articles. Other domains can also facilitate research into both reactive and proactive forms of aggression. These, though, were beyond the scope of the present work. Furthermore, the review limits itself to those publications published between 2004 to 2023, which is why such works before this period are not included within the ambit of this paper.

Results and Analysis
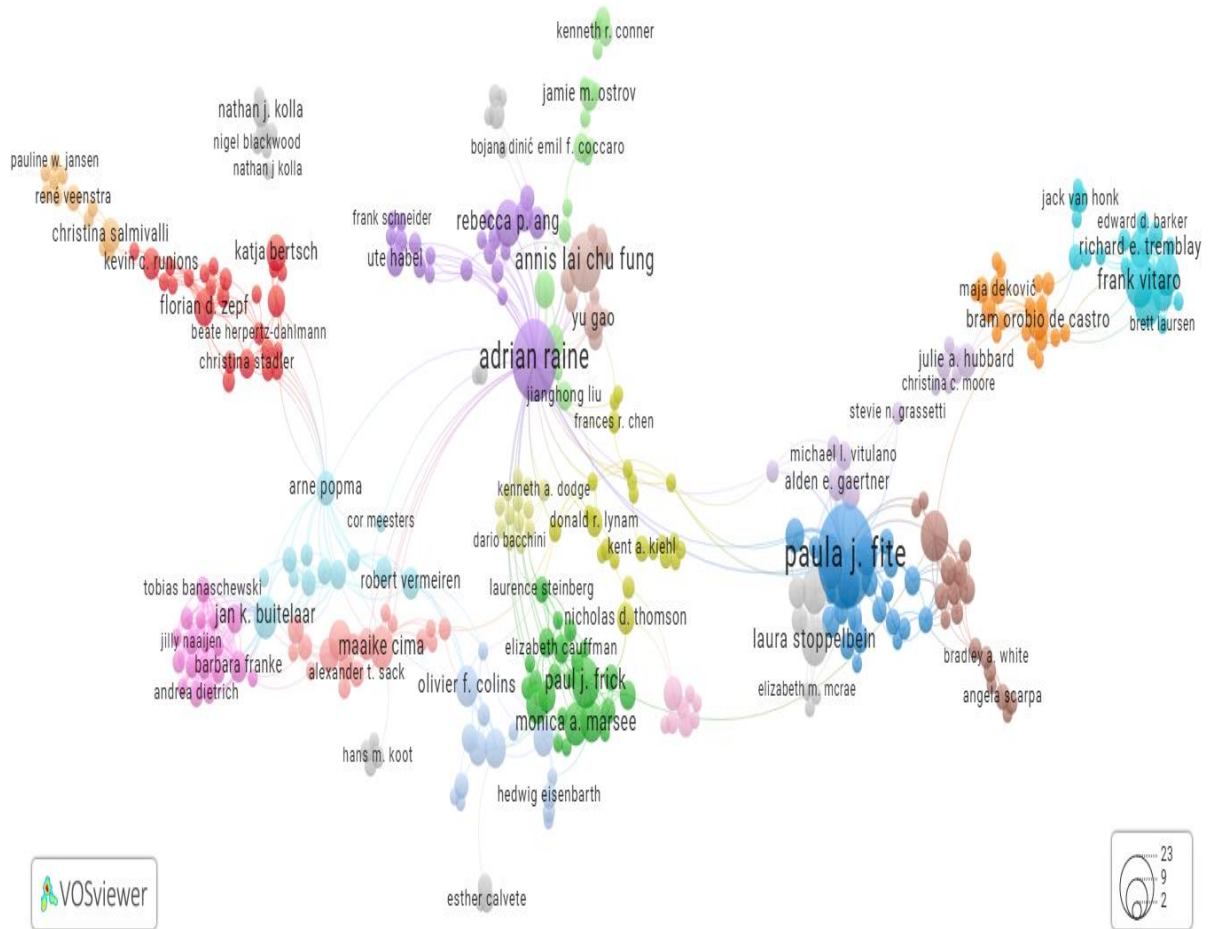### Visualisation of the co-authorship network

Figure 1: Co-authorship network visualisation

Figure 1 presents the co-authorship network visualisation. The nodes represent authors, and the links are the edges between them, showing co-authorship relationships. The size of a node means the number of publications or impact from the respective author. The distance between nodes signifies strength in co-authorship relations. Different colors represent different clusters, generally relating to collaborative research groups or thematic areas.

Cluster 1 (Purple - Adrian Raine and associates): Adrian Raine is one of the leading neurocriminologists and psychologists in this research field of the biological causes of antisocial and aggressive behavior. The big central node indicates that Raine has many publications and a large dissemination over several authors. This cluster is connected with many other smaller clusters, which indicates strong interdisciplinary collaborations.

Cluster 2 (Blue - Paula J. Fite and associates): Another big cluster working on the psychological aspects of aggression seems to be led by Paula J. Fite. The cluster is rather dense, with a number of internal collaborations among the authors in this area. Fite's work could be related to child and adolescent aggression, for which developmental and behavioral studies are the significant context.

Cluster 3 (Orange - Richard E. Tremblay and Frank Vitaro): This cluster by Tremblay and Vitaro appears to focus on developmental psychology and longitudinal studies related to the development of aggression and behavior in children. The size of these nodes and their proximity indicates consistent collaboration over time. The cluster also appears to connect with scholars studying early childhood aggression and delinquency.

Cluster 4 (Green - Paul J. Frick and associates): Frick's cluster focuses on callous-unemotional features and psychopathy in youth, often related to proactive and reactive aggression. His group of researchers would thus seem rather well-placed, most likely to research aggression from a cognitive-behavioral and personality development perspective.

Cluster 5 (Red - Katja Bertsch and associates): This cluster could be working on aggression from a neurobiological and psychophysiological perspective, researching emotional and reactive aggression, and could be led by Bertsch. Strong intra-group collaboration is indicated by the tight clustering; there would likely be a specific focus on biological correlates of aggressive behavior.

Smaller Clusters (Yellow, Brown, and Other Colors): These have come to represent smaller yet significant groups of active researchers working on particular subfields of aggression. Such small-size focuses might include the intersection of aggression with gender, clinical population issues, or particular intervention strategies.

Density and Collaboration Patterns: Some of the clusters are highly interconnected, as has been seen with the clusters formed around Adrian Raine and Paula J. Fite; such definitely attests to their fruitful collaboration within these groups. This reflects a collaborative culture in aggression studies whereby interrelations between diverse specializations are strongly connected. The degree of connectivity suggests that neuroscientists, psychologists, and criminologists might have interdisciplinarily collaborated.

Key Authors Influence: The position and size of some nodes, such as Adrian Raine, Paula Fite, and Richard Tremblay, suggest that these authors have leading roles in shaping the research agenda of their respective subfields. These authors may act as hubs within the worldwide research network on issues of aggression, facilitating the diffusion of ideas across more varied subfields.

Connections between Clusters: While the clusters are fairly distinct, there is some crossing of lines between clusters, indicating that even though the topics of their research are very different, some meaningful cross-pollination does occur across different research areas. For example, there would appear to be a link between Adrian Raine and both Paul Frick and Paula Fite; this may reflect overlapping interests in the biological and psychological mechanisms underlying aggression.

Multidisciplinary Approach: This map also represents a broad multilevel approach to studying aggression through the contributions of researchers in psychology, psychiatry, criminology and neuroscience. Research on proactive and reactive aggression is therefore not entrenched in a single field but is enhanced through various disciplines.

Psychopathy and Aggression: Key figures include Adrian Raine and Paul J. Frick, who show that the emphasis on psychopathy in proactive aggression research is strong. This may be supposed to suggest that one of the most primary research directions is indeed to understand the cognitive and emotional regulation differences in aggressive individuals, mostly those with psychopathic features.

Developmental Aggression: Other researchers, such as Richard Tremblay and Frank Vitaro, mention the developmental focus, especially on childhood and adolescence. This could mean that, with time, the focus will shift more towards early intervention strategies and the course of aggressive behavior since early development.

Thus, the co-authorship map gave a good overview of the global research landscape on proactive and reactive aggression. The clusters reflect clear but interrelated themes of research into the developmental, psychological, and neurobiological factors that are involved in aggression. Influential contributors in this field, such as Adrian Raine and Paula J. Fite, add to

the interdisciplinary interaction. Future studies might productively concentrate on underrepresented areas in the research, such as the theme of sexual offending and aggression, by including the latest technological advances to extend knowledge on aggression further.

Works Published Over Time
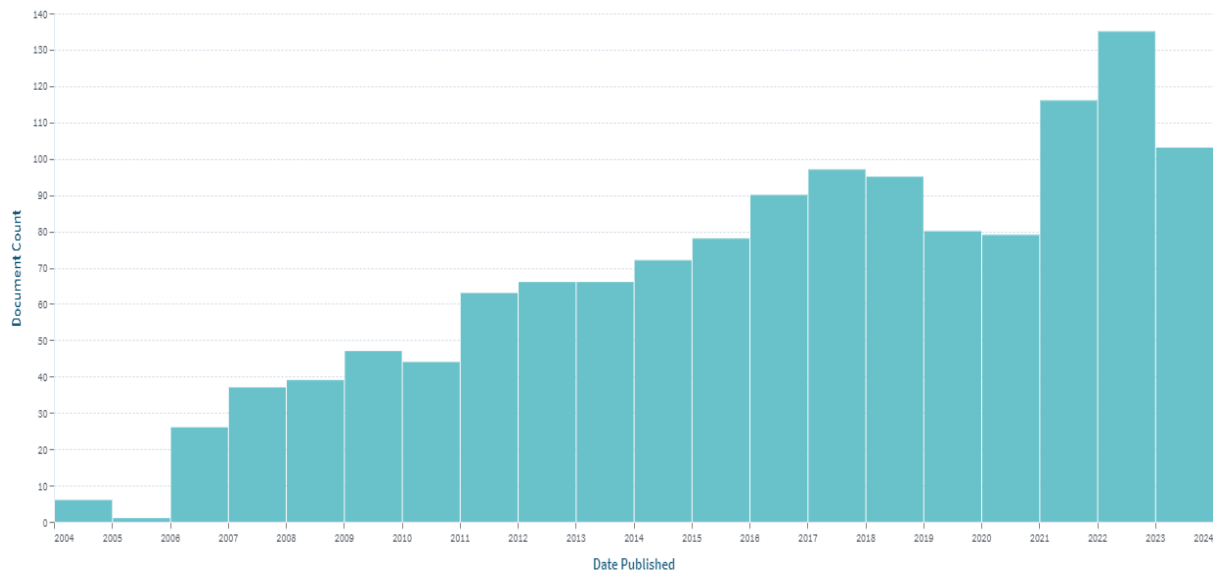
Figure 2: Works published over time

The graph shows the development in two decades of scholarly interest in the research domain under study. In the year 2004, the field was still relatively nascent, with few recorded publications. Indeed, this early period must have marked the laying of the ground for understanding basic concepts and methodologies. Over the years, there was some growth, gradual but limited, of publications from 2006 through 2008, indicating a growing academic interest but yet a forte area of research.

This evolution really began to become more pronounced around the year 2009 with the increase in scholarly works. From this point forward, the output that is related to research seems to gain momentum and reflects a field in evolution. Further dimensions and new theoretical frameworks were likely adopted by scholars while extending the scope of the research. Still, by the period 2015-2016, we can denote a more serious leap. At this point, a serious turn took place because the field began to pass into broad recognition in the academic world. It could indicate that new theories are coming together, there is increased interdisciplinary collaboration, or related global issues make this a more compelling field of study.

This may indicate that, in 2019, the subject had reached a level of maturity and importance to attract the contributions of many researchers from various fields. It could be interpreted as the fact that after years of preliminary research, new technological advancements finally allow

deeper analysis, or global societal changes have reached a threshold where further exploration of this topic is warranted.

However, 2020 reflects a noticeable dip, probably because of the impact of the COVID-19 pandemic on research activities globally. That disruption did not last very long, as in 2021 the field rebounded when scholars either re-engaged in ongoing projects or took up new questions stemming from the pandemic's effects at large in society. In 2022, research reached its peak, testifying to the resilience and growing importance of this area.

The consistent growth, apart from the dip in 2020, also suggests that this research area is dynamic, constantly evolving, and responsive to global events. Given this trajectory, one can only predict further advancements and perhaps even more significant growth for the future, as scholars will continue to delve into emerging themes or interdisciplinary studies.

This graph is the narrative of early development, the increase in prominence, and finally the consolidation of this research area as a major academic focus. It reflects both the resilience of the scholarly community and the growing relevance of the topic at hand over time.

Co-Citation Network Map
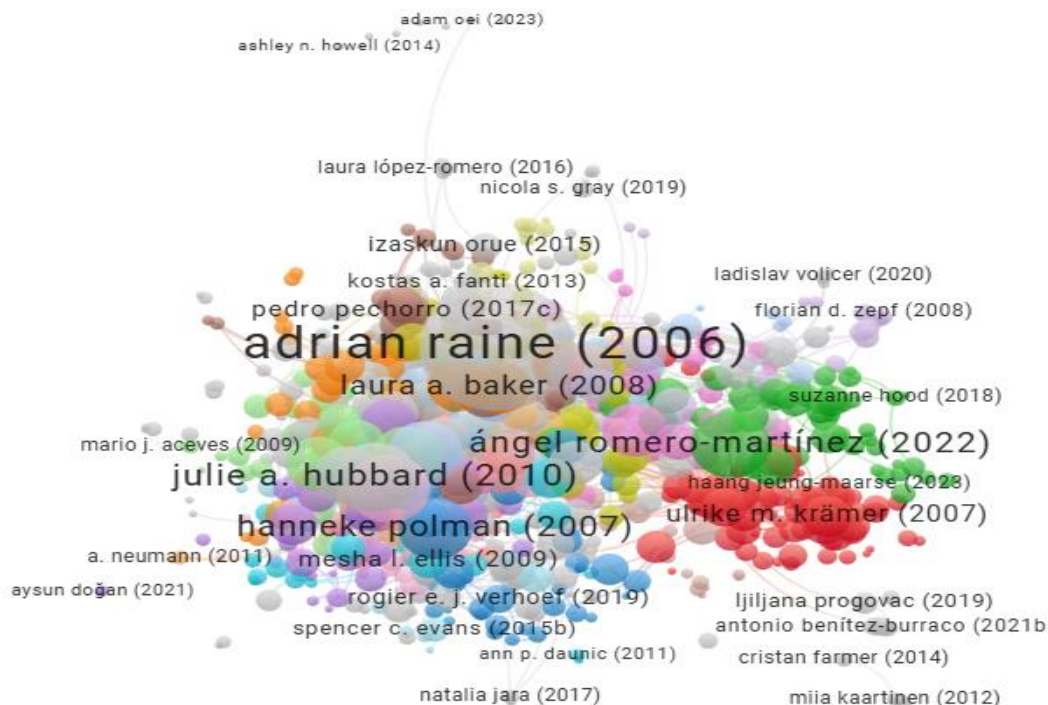
Figure 3: Citations

This co-citation network map shows the centrality of Adrian Raine, standing in the middle, which means that his research is of primary importance in the connected areas of aggression, psychology, or behavioral studies. It can be seen that the node for Raine is the biggest, and it sits in the middle, which suggests that his findings are being cited across subfields and thus he

stands out as a landmark figure. Other prominent authors include Julie A. Hubbard, 2010, and Hanneke Polman, 2007, each with other close clusters standing out as influential works that are often cited alongside the studies conducted by Raine, making substantial contributions to building the field.

It is possible to see a number of distinct clusters of authors, representative of thematic groupings or subfields of research. Ángel Romero-Martínez and Laura A. Baker are especially authorities whose works are much cited within niche topics; one may even have the coverage of themes pertaining to newer or very well-established research. The presence of more recent researchers such as Aysun Doğan and Adam Oei would suggest that their work is an emerging interest for some, probably because it introduces new ideas or at least new methods. The map visually expresses the dynamic interaction between the established foundation works and the emergence of new scholarly contributions.

The diversity of the research topics within the domain is further underlined by the wide dispersion of colored clusters. Such authors as Suzanne Hood (2018) and Ladislav Volicer (2020) may thus represent the publications of more narrow fields or even interdisciplinary contributions included in the aggression and behavior studies in general. While the network is constantly being enriched by a new generation of authors appearing in the network, such as Rogier E. J. Verhoef 2019 and Ulrike M. Krämer 2007, this visualization gives an impression of a field in motion: continued collaboration and new research questions are the ever-changing landscape of discourse.

Keywords

Figure 4: Keywords

Figure 4 is VOSviewer output of all-keywords. These are clusters related to the terms or concepts according to the data on co-occurrence.

The most central big nodes are "humans", "aggression", and "adult", which would indicate that those are the most central or frequent terms in the data set.

Numerical values in the bottom right of each probably represent link strength or number of connections between terms. The bigger the circle, the more that term is connected to other terms.

Three circles with 84, 34, and 6 show link strength or frequency; hence, the closer the number is to 84, the stronger the association or co-occurrence of terms.

Red cluster is focused on such terms as "aggression", "animals", "brain mapping", "emotions/physiology," and "problem behavior." Green cluster covers the following subjects: "humans", "sex factors," "risk factors," "antisocial personality disorder," and "reproducibility of results." Blue and purple clusters are related to the terms which denote "crime victims/psychology", "peer group", "bullying," and "self-concept."

Word Cloud from Keywords-list

Figure 5: Keywords List

This word cloud encompasses the overall core themes and concepts related to research into aggression. Immediately, the highest-ranking word "aggression" indicates that the interest of

this dataset is to understand various forms, causes, and effects of aggressive behavior. The two highly related words "reactive" and "proactive" point to an interest in distinguishing between these types of aggression. Reactive aggression is usually emotionally activated in a response to some provocation, whereas proactive is more instrumental and goal-directed. These differences are likely to be some of the main areas of research within this field, given the size of these words in the word cloud.

Further investigation of words such as "disorder," "behavior," and "psychopathy" indicates that aggression is also examined within the context of a variety of psychological disorders. The word "disorder" indicates a strong orientation toward clinical or behavioral disorders, most of which include aggression, like conduct disorder or antisocial personality disorder. Inclusion of "psychopathy" points, in turn, to the interest in links between aggression and personality traits, especially in individuals with limited empathy and heightened impulsivity. Other behavioral factors such as "conduct," "emotion," and "trait" suggest that a high number of investigations explore the concept of aggression in terms of emotional regulation and personality traits-particularly those linked to externalizing behaviors.

Furthermore, terms like "child," "adolescent," and "peer" suggest that there has been an emphasis on developmental perspectives, which would indicate that aggression is of major concern during the period of childhood and adolescence. The frequent presence of words like "social," "peer," and "bullying" may indicate that, quite often, aggression is framed within the realm of social contexts, especially those involving group dynamics and peer relationships. This points toward an interest in how aggressive behavior develops in social settings-such as schools or within peer groups-and perhaps also in connection with bullying and victimization. Keywords like "parenting" and "intervention" reflect the growing research into strategies of prevention and treatment with a view to reducing aggression by family-based and therapeutic interventions.

Conclusion

This bibliometric review sets the stage for an investigation of main trends in proactive and reactive aggression research as a function of scholarly collaboration, theme development, and the overall evolution of this area of study. The core interconnectedness of scholarship on aggression across domains in psychology, neuroscience, criminology, and the behavioral sciences will be highlighted in this study through the examination of co-authorship networks, keyword networks, and cocitation patterns. This is further reflected in the highly centrality of the influential scholars within that field, whose work contributes much to shaping the discourse: Adrian Raine, Paula J. Fite, and Richard E. Tremblay. The work also ranges from neurobiological and psychological underpinnings of aggression up to developmental

trajectories, especially in childhood and adolescent behaviors. These dense and well-interconnected clusters of co-authorship reflect a high level of interdisciplinarity in collaboration among these various thematic groups on this common path of understanding aggression through neurocognitive, behavioral, and developmental lenses. That means the field really thrives from multidisciplinary input just by how complex aggression is as a multifactorial behavior.

Thematic foci, as indicated through keyword analysis, range around the central concepts of "aggression," "reactive," and "proactive." A very important area of research is the distinction between reactive and proactive aggression, whereby scholars do investigate their different emotional, cognitive, and behavioral underpinnings. Furthermore, the high ranking of terms such as "psychopathy," "conduct disorder," and "emotional regulation" is indicative of high interest in linking aggressive behavior with broader psychological and clinical contexts. That is, aggression is studied not in isolation but also forms part of broader psychological disorders and traits such as antisocial behavior, callous-unemotional traits, and impulsivity. Temporal analysis of publications shows that the growth of interest has developed steadily in the domain, noticeably leaped from 2010 onwards. Thus, the surge in academic output on both forms of aggression, reactive and proactive, forms a domain of concern which has grown possibly due to global social dynamics, advances in neurobiological methods, and growing interest in early interventionist strategies. The striking increase in 2021 may indicate that the area still can refer closely to contemporary events, and among the impulses that can revitalize scholarly efforts to place aggression in both a social and psychological perspective could be the COVID-19 pandemic.

On the whole, this bibliometric analysis suggests that research into aggression is sound and multidisciplinary. The field is dynamic, with continued growth, and has developed into a substantial area of study with identifiable implications for clinical practice, policy, and social interventions. The attention being given to both reactive and proactive aggression, but also to the larger psychological and social contexts within which they occur, signals a growing understanding that is apt to intensify as new methodologies and interdisciplinary approaches are incorporated into ongoing work. The most promising things for the future of research on aggression are the strong networks of collaboration and the appearance of new thematic areas, while continuously exploring new frontiers and addressing contemporary challenges in understanding human behavior.

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