Trends in social neuroscience research on adolescents: A bibliometric analysis

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Abstract

This study aims to analyze publication trends, authors, dominant keywords, and emerging research areas on adolescents from a social neuroscience perspective over the past 30 years. Social neuroscience focuses on aspects of brain development and social behavior. A bibliometric analysis was conducted using the Scopus database covering the period 1995–2025. Analytical techniques included trend analysis, co-occurrence mapping, and pareto chart to identify patterns and clusters of research. The results indicate a significant growth of publications with R2 = 81.56%. Journal articles were the dominant document type 66.59% of the publications. Based on geographic distribution, 80% of the research was conducted in five countries. Co-occurrence mapping based on the keywords reveals four clusters, and based on document titles and abstracts, five clusters are identified. The most frequently used keywords are adolescent, child, young adult, mental health, emotion, brain mapping, prefrontal cortex, social behaviour, decision making, and controlled study. The findings demonstrate that social neuroscience research on adolescents has grown substantially, with increasing attention to brain development and social behavior. This study provides valuable insights for researchers, policymakers, and practitioners by highlighting emerging themes and key contributors in adolescent social neuroscience.

Keywords: Adolescent, Bibliometric analysis, Co-occurrence mapping, Social neuroscience, Trend analysis.

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Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

1. Introduction

Adolescence is marked by significant biological, cognitive, emotional, and social transformations, which play a vital role in shaping an individual's quality of life in adulthood. Neuroscience has progressed remarkably in recent decades. Advances in magnetic resonance imaging (MRI) technology have made it possible to observe the brain as it grows and

changes in real time. Contrary to the long-standing belief that the brain reaches full maturity in childhood, research reveals that it continues to develop well into adulthood, especially in regions such as the prefrontal cortex and frontal lobe [1].

Neuroscience has made significant progress in identifying and determining brain functions at various stages and locations within the brain [2]. Specifically, adolescent changes in hormonal stress reactivity, brain maturation, and sensitivity to stress-related hormones can lead to marked increases in stress-related dysfunctions often associated with adolescence. From a neuroscience theoretical perspective, the development of the brain becomes a key factor highlighting the need for studies focusing on adolescents. The brain develops into a more complex and efficient network during adolescence, particularly in the frontal lobes. The frontal lobe is responsible for higher-order functions such as learning and socialization.

Additionally, the prefrontal cortex (PFC), a crucial part of the frontal lobe often referred to as the brain's "executive," also develops during adolescence. This region is responsible for setting priorities, organizing, planning, formulating ideas, developing strategies, controlling impulses, and allocating attention [3, 4]. Trauma, such as violence, loss, or abuse, can influence the emotional, behavioral, and cognitive development of individuals [5].

The adolescent brain network becomes increasingly complex and efficient, especially in the frontal lobe, which plays a role in learning and socialization. The prefrontal cortex (PFC), often called the brain's "CEO" or executive, is responsible for establishing priorities, organizing, planning, formulating ideas, developing strategies, controlling impulses, and allocating attention. The PFC is believed to be the last part of the brain to mature fully.

A fully developed brain functions like an advanced computer, with neural pathways capable of efficiently handling multiple tasks. In the prefrontal cortex (PFC), dopamine is a vital chemical messenger that enables focused attention when navigating decisions involving conflicting options. Core executive skills, such as impulse control, planning, and decision-making, are primarily governed by the frontal cortex and reach maturity during adolescence.

The PFC undergoes rapid growth during this stage, with increasingly complex surface folds. The most significant changes occur in regions responsible for higher-order abilities like learning and social interaction, although many of these processes are still in progress. Throughout adolescence, the prefrontal cortex continues to refine its capacity for regulating impulses, strategic thinking, and sound decision-making. While adults tend to process stimuli with greater intellectual control, adolescents are more likely to react emotionally. This difference arises because the adolescent brain is still developing the ability to adapt socially, evaluate the long-term consequences of actions, and accurately interpret emotional relevance. Additionally, brain functions that support memory retrieval, contextual understanding, and recalling past experiences are essential in guiding adolescents through this critical growth stage.

Nevertheless, the extent of brain development depends on its susceptibility to intervention. Through a series of case studies, emphasises how severe damage to one part of the brain can permanently impair areas involved in essential functions such as speech or movement [3]. Numerous studies have shown that learning can change the brain [2]. Moreover, learning is a coping mechanism for stress exposure, promoting neural adaptation to improve emotional regulation and resilience.

It is a myth that adolescents are inherently overly emotional [6]. Changes in neural development affecting brain function play a role in shaping affective behavior. The brain is designed to enhance emotion regulation and learning. Moreover, the brain operates as an affiliative system across development, with affective behaviours interacting reciprocally with social demands across different life stages and contexts. As with all behaviors, there are individual differences in active processes related to stress reactions. Schematic representations illustrate factors contributing to increased stress vulnerability observed during adolescence. Such vulnerability results from the interaction of stress responses, ongoing brain development, and sensitivity to cortisol (CORT). However, a more positive approach involves viewing situations as challenges rather than threats.

One expansion of neuroscience research is studying brain development and social behavior, known as social neuroscience. The social brain refers to interconnected neural regions that support social processing during adolescence, contributing to age-related variations in cognitive tasks such as facial recognition, inferring mental states, responding to peer influence, and making social judgments. Social cognition encompasses the mental processes necessary for understanding and engaging with others [7]. MRI evidence shows that adolescents differ from adults in the structure and function of these regions. Like overall brain development, the social brain continues to mature throughout adolescence, with functional activity changes occurring in parallel with the growth of social cognitive abilities and neuroanatomical structures [7].

Social neuroscience integrates brain structure and function with the social sciences to understand how brain processes influence social behavior. It provides a biological map of how the adolescent brain regulates emotions and behaviors in social interactions and how the social environment can strengthen or weaken these processes. With the growing number of publications in social neuroscience, bibliometric analysis is necessary to map current research trends. This study aims to identify publication trends, authors, dominant keywords, and emerging research areas in adolescents from a social neuroscience perspective.

2. Materials and Methods

The data source for the bibliometric analysis is the Scopus-indexed database. The publication period is from 1995 to 2025, with data retrieval conducted on August 13, 2025. The search keywords used were (TITLE-ABS-KEY (social AND neuroscience) AND TITLE-ABS-KEY (adolescents) OR TITLE-ABS-KEY (youth) OR TITLE-ABS-KEY (teenagers)).

Articles were included in the analysis if they were indexed in Scopus, published between 1995 and 2025, written in English, and classified as journal articles, reviews, conference papers, or book chapters. The articles must contain the specified keywords and focus on research on social neuroscience with adolescents or young people as the study population. Articles were excluded from the analysis if they were not relevant to social neuroscience in adolescents, were not based on scientific research, or lacked complete access to the metadata required for bibliometric analysis. Duplicate articles appearing more than once in the search results, publications outside the 1995–2025 period, and publications in languages other than English were also excluded.

VOSviewer (version 1.6.16) was used to analyze the structure and identify clusters for co-authorship, co-citation, and keyword co-occurrence analysis. In VOSviewer, collaborative partnerships are represented by links between nodes, where the links' thickness indicates the collaboration's closeness. Different colors represent different clusters, and lines between circles indicate partnerships between other points. In the density visualisation, the redder the colour, the higher the density [8]. In the average publication year map, different colours correspond to other years. Microsoft Excel was also used to describe and predict publication trends.

3. Result and Discussion

3.1. Bibliometric analysis of Annual Publication

The bibliometric analysis covers 853 documents over the past 30 years, from 1995 to 2025. The publication trend is presented in Figure 1. In the first phase (1995–2002), the number of publications was relatively low, with fewer than two articles per year. The articles remained below ten per year in the second phase (2003–2006). A sharp increase began in 2007 and continued through 2025, with more than 20 articles published annually. The publication trend was analyzed using a growth trend model, yielding an R² value of 0.8156. Research on social neuroscience in adolescents shows a steadily increasing growth trend over the years. Approximately 81.56% of the variation in the number of documents is explained by the increase over time, with an average annual growth rate of two publications per year.
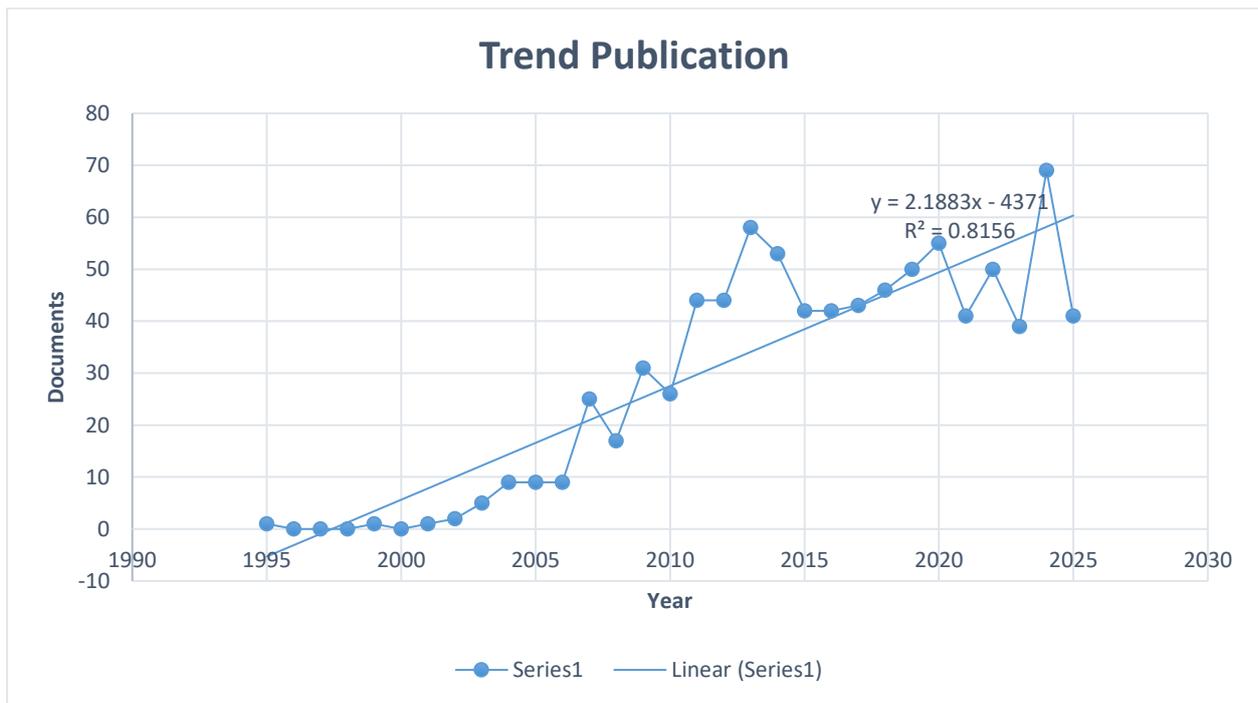

Figure 1.
Trend Publication 1995-2025.

The bibliometric analysis covers 853 documents published across various types of publications. The pie chart illustrates the distribution of document types used in the bibliometric analysis of social neuroscience research on adolescents (1995–2025). Research articles dominate with 66.59%, indicating that most publications in this field consist of original research findings. Reviews rank second at 14.54%, suggesting a considerable focus on knowledge synthesis and literature overviews. Books (4.92%) and book chapters (4.81%) represent a notable share of book-based publications, often used to examine theories or discuss topics in depth. Other document types, such as editorials (2.81%), notes (2.70%), and conference papers (1.52%), account for a small proportion, likely serving as supplements or introductions to preliminary findings. Errata (0.47%) and minor document types such as letters and short surveys (<1%) make up a minimal contribution, indicating that corrections or brief communications are rare in this topic area.

The high proportion of research articles reflects the data-driven and hypothesis-testing nature of the adolescent social neuroscience field, rather than a focus solely on theoretical work. Furthermore, the relatively large proportion of reviews suggests that the field is developing, with increasing efforts to map existing knowledge. The relatively high contribution of

books and book chapters compared to other disciplines indicates that this area also receives substantial academic attention in non-journal literature.
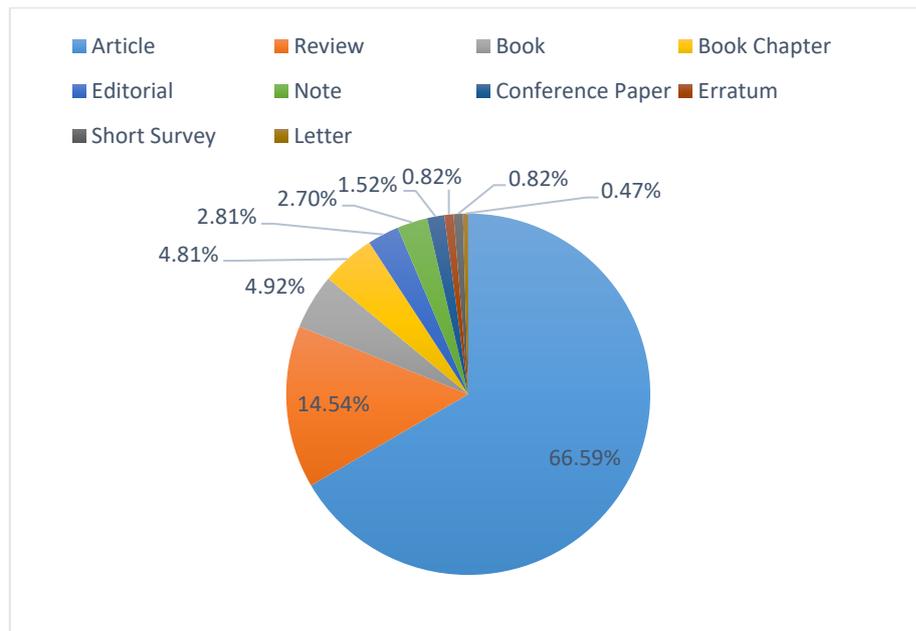

Figure 2.
Types of Documents.

The Figure 3 shows the distribution of scientific fields publishing research on social neuroscience in adolescents. The field of medicine dominates the contributions with a proportion of 26.29%, followed by neuroscience (25.57%) and psychology (23.21%). This indicates that the topic is predominantly investigated from clinical, biological, and behavioral perspectives. Social sciences account for 9.86%, suggesting a social approach to understanding adolescent behavior in the context of social neuroscience. Other fields, such as arts and humanities (3.14%), biochemistry, genetics, and molecular biology (2.86%), as well as multidisciplinary (2.36%) and nursing (1.86%), contribute smaller shares but still reflect cross-disciplinary involvement. The varied distribution of fields highlights the interdisciplinary nature of adolescent social neuroscience, although the most significant focus remains on medical, neurological, and psychological aspects.
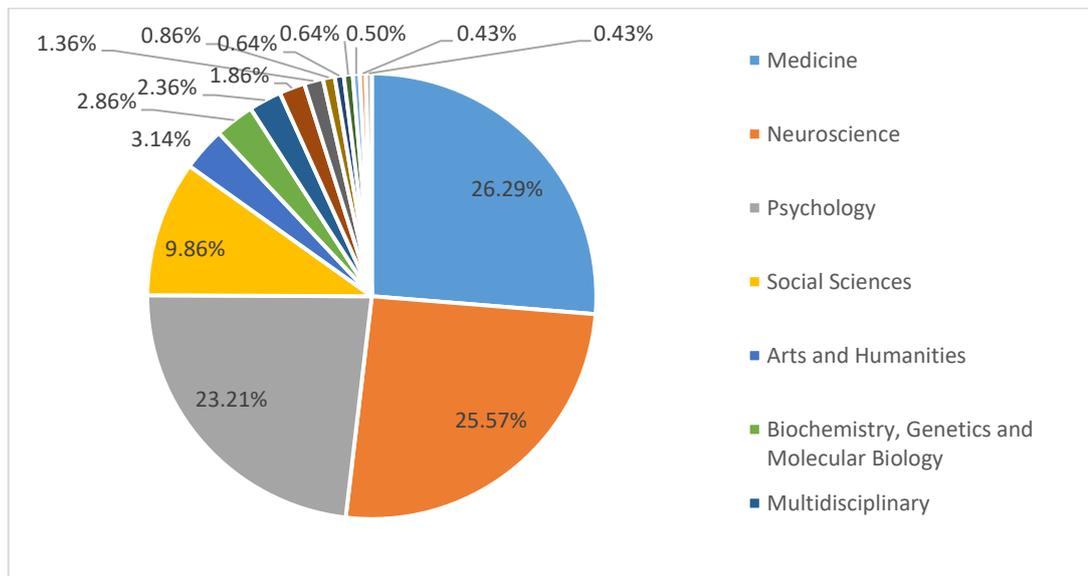
Figure 3.
Distribution of scientific fields.

3.2. Bibliometric Analysis of Geography and Institutions

Figure 4 depicts the bibliometric analysis of countries publishing research on social neuroscience in adolescents. The Pareto chart illustrates the distribution of publications by country and geographical distribution in social neuroscience studies. Applying the Pareto principle (80/20 rule), it is evident that most publications originate from a small number of countries. The dominant countries publishing studies on adolescent social neuroscience are listed in Table 1.
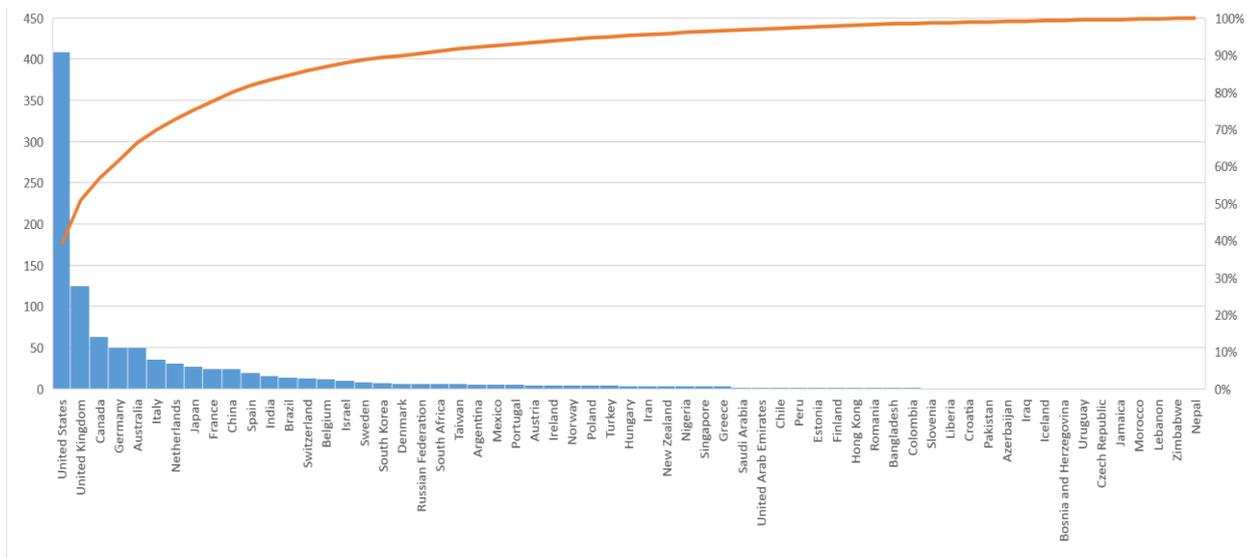
Figure 4.
Pareto Chart of Geographical Distribution.

The accumulated contribution of the top seven countries accounts for more than 80% of total publications. The orange curve represents the cumulative percentage, which rises steeply initially and levels off after approximately the seventh country. Publication output in this field is highly concentrated in developed countries: the United States, the United Kingdom, Canada, Germany, Australia, Italy, and the Netherlands, while contributions from other countries are relatively small.

Table 1.
Contributing Countries to Total Publications.

Countries	Documents	Citations
United States	409	37974
United Kingdom	125	10460
Canada	63	4984
Germany	50	3591
Australia	50	1586
Italy	36	1135
Netherlands	31	1478

Figure 5 presents the number of publications or collaborations by the top 10 institutions or universities contributing the highest number of research articles. University College London (UCL) ranks first with 32 articles—significantly higher than other institutions—indicating its dominant role in the research topic analyzed. Harvard Medical School and the University of California, Los Angeles each have 21 contributions, placing them in second position. Institutions with medium-level contributions include the University of Minnesota Twin Cities (20) and several universities and organizations with 18 contributions each, such as the University of Maryland, College Park, King's College London, Yale University, and the National Institute of Mental Health. The University of Pennsylvania and the UCL Institute of Cognitive Neuroscience follow, each contributing 17 articles.
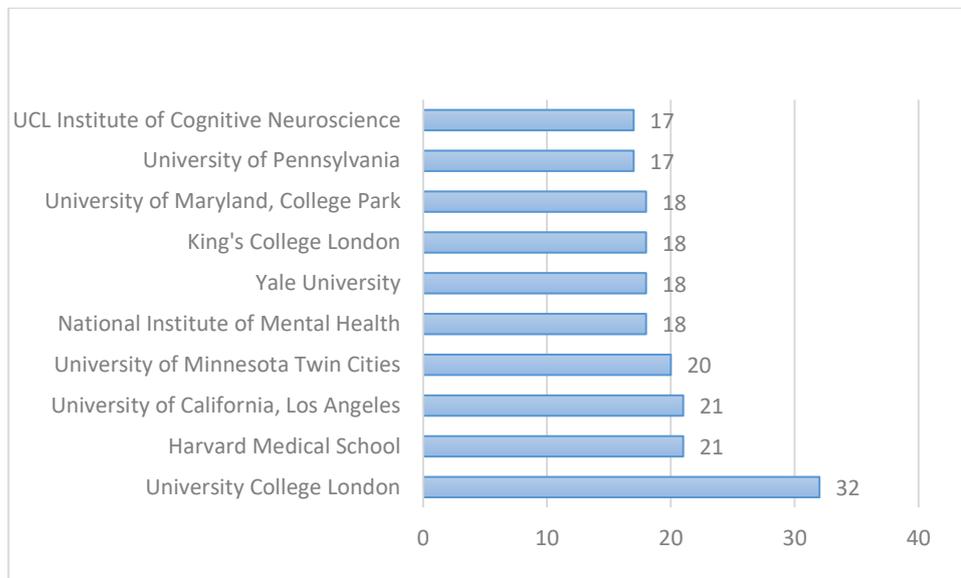
Figure 5.
Number of Publications or Collaborative Contributions.

3.3. Bibliometric analysis: Top Prolific Authors

The bibliometric analysis of the top prolific authors and their collaborations is presented in Figure 6. The figure highlights the most productive authors in publications on social neuroscience in adolescents. Blakemore [9] ranks first with 13 documents, making her the most prolific author in this field. Crone [10] follows in second place with 12 papers, reflecting consistent engagement and a high level of productivity. Decety and Jackson [11] ranks third with 10 documents, followed by Pine [12] and Choudhury, et al. [13] each with nine documents. Dahl [14] has eight publications, while Telzer, et al. [15] and Kasai, et al. [16]. each have seven publications. Steinberg [17] and Feldman [18] complete the list with 7 and 6 publications, respectively. These authors form a strong network of international collaboration, as the topic of social neuroscience in adolescents is inherently multidisciplinary and requires cross-country cooperation.
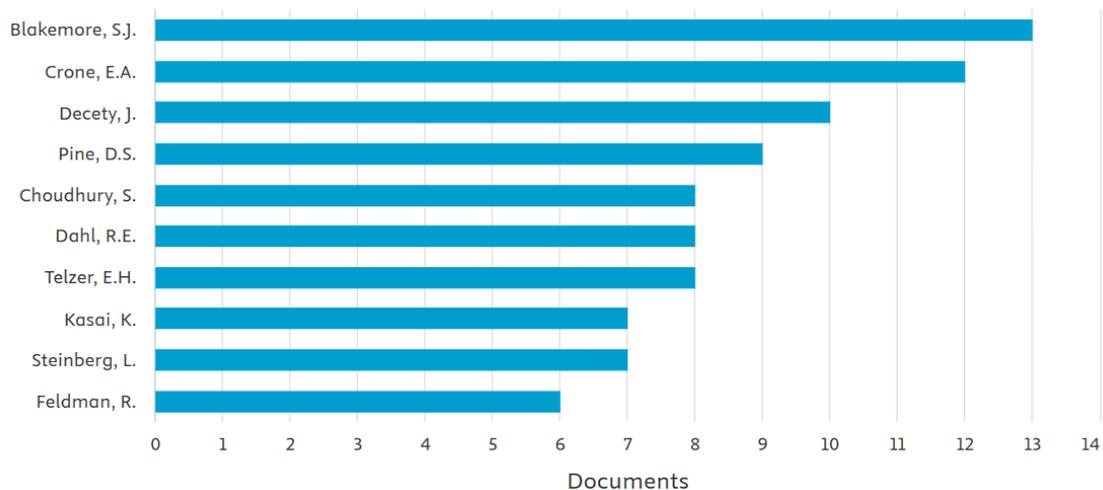
Figure 6.
Bibliometric Analysis of the Top Prolific Authors.
Source: Blakemore [9]; Crone [10]; Decety and Jackson [11]; Pine [12]; Choudhury, et al. [13]; Dahl [14]; Telzer, et al. [15]; Kasai, et al. [16]; Steinberg [17] and Feldman [18]

3.4. Analysis of Influential Journals

Based on the publication data in Table 2 the journal with the highest number of articles on social neuroscience research in adolescents is Developmental Cognitive Neuroscience, with 32 publications, reflecting a strong research focus on the development of cognitive functions and their relationship to social processes. Social Cognitive and Affective Neuroscience ranks second with 20 publications, highlighting the significant role of studies examining the relationship between cognitive processes, emotions, and social interactions. NeuroImage (18 publications) and Psychiatry and Clinical Neurosciences (16 publications) are also key references, particularly in brain imaging–based research and its implications for mental health. Other journals with notable contributions include the Journal of Child Psychology and Psychiatry and Allied Disciplines (13 publications) and the European Journal of Neuroscience (12 publications), as well as Child and Adolescent Psychiatric Clinics of North America, the Journal of Neuroscience, and PLOS ONE, each with 11 publications. In addition, journals

such as the Journal of Neuroscience Nursing, Neuroscience and Biobehavioral Reviews, Scientific Reports, and Social Neuroscience also hold a significant presence, each contributing 10 publications. Human Brain Mapping (9 publications) and BMJ Open (8 publications) complete the list, indicating that research in adolescent social neuroscience is disseminated across a wide range of journals with multidisciplinary foci, spanning brain development, mental health, clinical applications, and imaging methodologies.

Table 2.
Journals with the Highest Number of Articles on Social Neuroscience in Adolescents.

Source	Documents
Developmental Cognitive Neuroscience	32
Social Cognitive and Affective Neuroscience	20
Neuroimage	18
Psychiatry and Clinical Neurosciences	16
Journal of Child Psychology and Psychiatry and Allied Disciplines	13
European Journal of Neuroscience	12
Child and Adolescent Psychiatric Clinics of North America	11
Journal of Neuroscience	11
Plos One	11
Journal of Neuroscience Nursing	10
Neuroscience and Biobehavioral Reviews	10
Scientific Reports	10
Social Neuroscience	10
Human Brain Mapping	9
BMJ Open	8

The articles cited most frequently in other studies are presented in Table 3. Based on the list of publications with the highest citation counts, social neuroscience and adolescent brain development research covers a broad range of themes, including risk-taking, empathy, autism, and the biological and social factors influencing behavior. The most highly cited article is "A social neuroscience perspective on adolescent risk-taking" (2008, Developmental Review), with 2,651 citations, underscoring the strong interest in understanding the neural mechanisms underlying risky behavior in adolescents [19]. Another key reference is "The functional architecture of human empathy" (2004, Behavioral and Cognitive Neuroscience Reviews), with 2,341 citations, which has been instrumental in mapping the brain networks underlying empathy [11]. Highly cited works also include "Autism spectrum disorder" (2018, 1,659 citations) [20] and "Inequality in early childhood" (2011, 1,217 citations) [21] reflecting global attention to the socio-neurological implications of developmental disorders and early-life disparities. The article "Meta-analytic evidence for common and distinct neural networks associated with directly experienced pain and empathy for pain" [22] makes a significant methodological contribution by identifying similarities and differences in neural networks associated with direct pain experience and empathy for pain.

Research on adolescent brain development is also represented by "The social brain in adolescence" (2008, Nature Reviews Neuroscience, 1,380 citations) [9] and "Adolescent brain development: A period of vulnerabilities and opportunities" (2004, Annals of the New York Academy of Sciences, 1,336 citations) [14]. Studies linking hormonal and social factors, such as "Oxytocin modulates neural circuitry for social cognition and fear in humans" (2005, Journal of Neuroscience, 1,310 citations) [23] further expand knowledge on the neurochemical basis of social behavior. The study "The neural substrate of human empathy: Effects of perspective-taking and cognitive appraisal" (2007, Journal of Cognitive Neuroscience, 1,088 citations) [24, 25] reinforces findings on the role of cognitive perspective-taking in empathy. Lastly, "Microbes, Mating, and Morality" (2009, Journal of Personality and Social Psychology, 875 citations) [26] illustrates a cross-disciplinary approach by linking biological factors and morality. These publications represent a rich, interdisciplinary, and highly influential body of research that advances understanding of the interactions between the brain, behavior, and social context in social neuroscience.

Table 3.
Most Cited Articles by Other Studies.

Publication Year	Document Title	ISSN	Journal Title	Vol	Issue	Citation
2008	A social neuroscience perspective on adolescent risk-taking	2732297	Developmental Review	28	1	2651
2004	The functional architecture of human empathy.	15345823	Behavioral and Cognitive Neuroscience Reviews	3	2	2341
2018	Autism spectrum disorder	1406736	Lancet	392	10146	1659
2011	Meta-analytic evidence for common and distinct neural networks associated with directly experienced pain and empathy for pain	10538119	Neuroimage	54	3	1585
2008	The social brain in adolescence	1471003X	Nature Reviews Neuroscience	9	4	1380
2004	Adolescent brain development: A period of vulnerabilities and opportunities - Keynote Address	778923	Annals of the New York Academy of Sciences	1021		1336
2005	Oxytocin modulates neural circuitry for social cognition and fear in humans	2706474	Journal of Neuroscience	25	49	1310
2011	Inequality in early childhood: Risk and protective factors for early child development	1406736	Lancet	378	9799	1217
2007	The neural substrate of human empathy: Effects of perspective-taking and cognitive appraisal	0898929X	Journal of Cognitive Neuroscience	19	1	1088
2009	Microbes, Mating, and Morality: Individual Differences in Three Functional Domains of Disgust	223514	Journal of Personality and Social Psychology	97	1	875

3.5. Co-Occurrence Map

Co-occurrence analysis is a mapping technique that illustrates the relationships between two or more terms, concepts, or entities based on their frequency of appearing together (co-occurrence) within a data source. In this co-occurrence map analysis, related keywords were examined using VOSviewer. The results of the keyword-based co-occurrence map are shown in Figure 7. Based on the analysis, the most frequently occurring keywords (indicated by larger node sizes) are adolescent, child, young adult, mental health, emotion, brain mapping, prefrontal cortex, social behavior, decision making, and controlled study. Five clusters were identified in the grouping of these interrelated keywords.
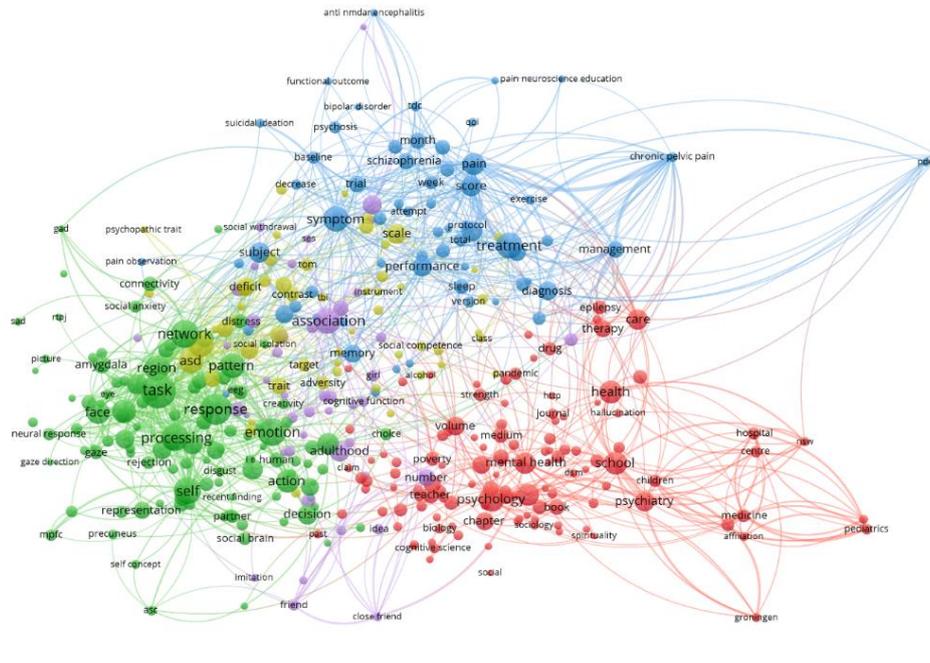
Figure 7.
keyword co-occurrence map.

Based on the keyword co-occurrence map generated by VOSviewer, thematic clusters and dominant keywords for each cluster can be identified as follows:

1. Green Cluster – Neurobiology & Social Brain Mechanisms
    Dominant keywords in this cluster include *amygdala*, *prefrontal cortex*, *brain cortex*, *brain mapping*, *emotion*, *social behavior*, *decision making*, *nerve cell network*, *human experiment*, and *recognition (psychology)*. The thematic focus of this cluster is on studying the brain mechanisms underlying adolescents' social and emotional behavior, including brain mapping, emotion regulation, and the role of brain regions such as the amygdala and prefrontal cortex. A potential research trend in this cluster is the integration of neuroimaging techniques (fMRI, NIRS) with social-emotional and decision-making tasks in adolescents.

2. Red Cluster – Mental Disorders & Child-Adolescent Psychiatry
    Dominant keywords include *mental health*, *mental disease*, *depression*, *anxiety disorder*, *attention deficit disorder*, *schizophrenia*, *psychotherapy*, *public health*, and *child psychiatry*. This cluster's thematic focus is on the identification, prevention, and treatment of mental disorders in children and adolescents, including depression, anxiety, ADHD, and schizophrenia. A potential research trend is the development of early interventions based on social neuroscience to improve adolescent mental health.

3. Blue Cluster – Developmental Psychology & Public Health
    Dominant keywords include *adolescent*, *child*, *middle-aged*, *adolescent development*, *adulthood*, *public health*, *growth*, *development and ageing*, *schools*, and *students*. The thematic focus is on cross-age studies of social, cognitive, and emotional development from childhood to adulthood and the influence of environmental factors (schools, families, health policies). A potential research trend in this cluster is longitudinal studies on social-emotional developmental trajectories and their impact on mental well-being.

4. Yellow Cluster – Molecular Biology & Animal Models
    Dominant keywords include *pathophysiology*, *genetics*, *animal model*, *amygdaloid nucleus*, *fear*, *nerve cell plasticity*, *animal experiment*, and *metabolism*. The thematic focus is on basic research using animal models to understand the biological mechanisms of social behavior and mental disorders. A potential research trend in this cluster is the translation of animal model findings to human studies for adolescent preventive interventions.

In addition, the co-occurrence map also analyzes keyword relationships in document titles and abstracts, as shown in Figure 8. The VOSviewer-generated co-occurrence map shows that research in adolescent social neuroscience is divided into five clusters.

Figure 8.
Thematic co-occurrence map.

The grouping of research in adolescent social neuroscience is divided into five interconnected thematic clusters:

1. Green Cluster: Social Cognition & Emotion
   Keywords in this cluster include *amygdala*, *emotion*, *task*, *response*, *social anxiety*, *connectivity*, *activation*, *stimuli*, *processing*, and *self-concept*. Social cognition and emotion research focuses on the brain mechanisms involved in processing emotions, self-regulation, social interactions, and disorders such as social anxiety disorder. Studies in this area increasingly adopt multimodal and interdisciplinary approaches, combining neuroimaging techniques and computational modelling to enhance understanding of emotion and social cognition.

2. Blue Cluster: Clinical & Neuropsychiatric Interventions
   Keywords include *schizophrenia*, *trial*, *treatment*, *symptom*, *pain*, *diagnosis*, and *management*. This cluster focuses on applying social neuroscience data to diagnose and treat psychiatric disorders affecting social functioning. Recent studies emphasise integrating neuroimaging biomarkers with clinical assessments to enhance diagnostic accuracy. There is also a growing interest in developing targeted interventions that combine pharmacological and cognitive-behavioural approaches based on social neuroscience insights.

3. Red Cluster: Developmental Psychology & Education
   Keywords include *psychology*, *psychiatry*, *school*, *teacher*, *mental health*, *children*, and *public health*. The thematic focus of this cluster is the relationship between mental health, the school environment, and socio-cognitive development. Research in this area highlights the role of early school-based interventions in promoting resilience and emotional regulation among children and adolescents. Collaborative programs involving teachers, parents, and mental health professionals are increasingly recognised as essential for fostering supportive learning environments.

4. Yellow Cluster: Executive Function & Memory
   Keywords include *memory*, *performance*, *association*, *trait*, and *attention deficit hyperactivity disorder*. This cluster examines the relationship between executive function and academic and social performance. Studies emphasise how deficits in working memory and attentional control can hinder learning outcomes and peer interactions. Interventions targeting executive skills are shown to improve academic achievement and adaptive social behaviours.

5. Purple Cluster: Social Relationships & Identity
   Keywords include *social development*, *friend*, *partner*, *adolescent development*, and *neural development*. This cluster focuses on identity formation, friendships, and peer interactions among adolescents. Research highlights how peer relationships are crucial in shaping self-concept and emotional regulation during adolescence. Neural development in regions associated with social cognition further influences the quality and stability of these relationships.

4. Conclusion

The bibliometric analysis reveals that research in social neuroscience focusing on adolescents has experienced a significant increase (R^2 = 81.56%) in publication volume from 1995 to 2025. The dominant document type is journal

articles, accounting for 66.59% of publications. This body of research spans neuroscience, medicine, psychology, and social sciences. Based on the Pareto chart of geographical distribution, 80% of the studies originate from the United States, the United Kingdom, Canada, Germany, Australia, Italy, and the Netherlands. Most publications come from University College London, with the most productive author being S.J. Blakemore. The *Developmental Cognitive Neuroscience* journal publishes the most articles in this field. Regarding citation impact, the most cited publication is *A Social Neuroscience Perspective on Adolescent Risk-Taking*, with 2,651 citations.

Based on co-occurrence analysis, the most frequently appearing terms (represented by larger node sizes) are *adolescent*, *child*, *young adult*, *mental health*, *emotion*, *brain mapping*, *prefrontal cortex*, *social behaviour*, *decision making*, and *controlled study*. The mapping of keywords in the field of social neuroscience reveals four main thematic clusters: (1) Neurobiology & Mechanisms of the Social Brain, (2) Child and Adolescent Mental Disorders & Psychiatry, (3) Developmental Psychology & Public Health, and (4) Molecular Biology & Animal Models. Furthermore, co-occurrence mapping of terms from document titles and abstracts identifies five clusters: (1) Social Cognition & Emotion, (2) Clinical & Neuropsychiatric Interventions, (3) Developmental Psychology & Education, (4) Executive Function & Memory, and (5) Social Relationships & Identity.

These bibliometric findings indicate that social neuroscience research on adolescents has grown significantly over the past two decades and is also increasingly characterized by international collaboration and multidisciplinary approaches. The dominance of publications from developed countries such as the United States, the United Kingdom, and Canada reflects strong research infrastructure and funding support in these regions. The prominence of keywords such as *adolescent*, *mental health*, *emotion*, and *prefrontal cortex* underscores the growing interest in understanding the relationship between brain development, mental health, and social behavior during adolescence. Integrating insights from the four main thematic clusters and the five clusters derived from the co-occurrence map suggests that research in this field will continue to advance by combining neuroimaging technologies, large-scale data analytics, and cross-disciplinary approaches.

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