

Scientific Production on Muscularity is Concentrated in Five Countries: A Global Bibliometric Analysis (1981–2024)

Short title: Global trends in muscularity research

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ABSTRACT

Concerns about muscularity are prevalent among men in Western cultures and have increasingly emerged among women in recent decades. This drive for muscularity is associated with aesthetic and health standards that generate social pressure and may influence disordered eating behaviours. To foster scientific advancement in this area, it is essential to identify the current state of research on muscularity. This study proposes a bibliometric analysis of global scientific production about muscularity from 1981 to 2024, using the Web of Science database. A total of 807 articles were identified through a search strategy combining the terms “drive for muscularity” OR “muscularity” OR “muscularity concerns.” The analysis examined publication trends, authorship, country, and keyword co-occurrence using VOSviewer. Results indicate a sharp increase in publications between 2019 and 2024, accounting for 49.2% of all studies. The United States and Australia were the most prolific countries, and *Body Image* was the leading journal. The findings highlight the growing scholarly interest in muscularity, particularly through theoretical and theoretical-empirical frameworks. This review offers an overview for researchers, clinicians, and practitioners in psychology, nutrition, and health sciences seeking to understand the social and psychological risks associated with the idealised muscular body.

Keywords: Muscularity; Drive for Muscularity; Muscularity concerns; Body image; Body dissatisfaction; Bibliometric analysis.

INTRODUCTION

Body image is a multidimensional construct encompassing perceptual, affective, and cognitive attitudes toward one's own body (Cash & Smolak, 2011). Over the past decades, the scientific literature has expanded its traditional focus on the drive for thinness to include the pursuit of a muscular physique, a phenomenon that necessitates precise conceptual distinctions. Muscularity refers to the physical attribute or sociocultural aesthetic ideal that manifests as a mesomorphic, bulky physique for men (McCreary, 2012) and, increasingly, as a "toned" and athletic figure for women (Bozsik et al., 2018; Rodgers et al., 2018). Distinct from the physical trait, the drive for muscularity represents the specific motivation and behaviours adopted to achieve this ideal, such as weightlifting and dietary manipulation, a construct seminally operationalised by McCreary and Sasse (2000). Finally, muscularity concerns encompass the negative evaluative dimension, reflecting the distress or dissatisfaction arising from the discrepancy between perceived and ideal muscularity, often serving as a precursor to psychopathology (Rodgers et al., 2018; Campos et al., 2021).

Historically, research on muscularity was predominantly male-centric, catalysed by the identification of "reverse anorexia" or muscle dysmorphia, a condition characterised by a pathological preoccupation with insufficient muscularity (Pope et al., 1993, 1997). However, contemporary literature indicates a significant cultural shift. The female body ideal has evolved from a strictly thin standard to one that emphasises visible muscle tone and fitness, often propagated through "fitspiration" media content (Tiggemann & Zaccardo, 2015, 2018). Consequently, the drive for muscularity is no longer an exclusively male phenomenon; women are increasingly reporting muscularity-oriented body dissatisfaction

and engaging in muscle-building behaviours, challenging the traditional dichotomy that associates thinness with women and muscularity with men (Rodgers et al., 2018; Bozsik et al., 2018; McComb & Mills, 2022).

The consistent association between high levels of drive for muscularity and adverse health outcomes underscores the clinical relevance of this field. Systematic reviews and meta-analyses have established strong correlations between muscularity concerns and the use of anabolic-androgenic steroids, unregulated supplement consumption, exercise dependence, and muscularity-oriented disordered eating across genders (Mitchell et al., 2017; Tod & Edwards, 2015). Among men, muscularity-related concerns have been linked to muscle dysmorphia, disordered eating, and the misuse of performance-enhancing substances (Frederick et al., 2020; Lavender et al., 2017; Griffiths et al., 2016). For women, these ideals have become more strongly linked to adverse psychological outcomes, such as body dissatisfaction and compulsive exercise behaviours (Soihet & Silva, 2019; Lôbo et al., 2020).

Despite this accumulating evidence, the literature remains fragmented. Terms such as muscularity, drive for muscularity, and muscularity concerns are frequently used interchangeably, even though they refer to related but distinct phenomena. The lack of consistent differentiation between these constructs contributes to theoretical ambiguity and challenges the integration of findings across studies. While previous reviews have synthesised specific correlates (Edwards et al., 2014), the rapid expansion of the field (Cash, 2017; Tylka et al., 2020), particularly the surge in publications following the advent of social media, has created a complex and disjointed landscape. Furthermore, existing research appears heavily concentrated in Western, English-speaking contexts (Nagata et al., 2022), potentially obscuring how these constructs operate in diverse cultural settings.

Although the literature on muscularity has expanded rapidly, findings across studies remain difficult to integrate due to inconsistent operational definitions, heterogeneous samples, and the frequent aggregation of conceptually distinct constructs under a single label. This lack of conceptual and methodological coherence limits cross-study comparability and may contribute to contradictory conclusions regarding prevalence, correlates, and clinical relevance.

Given that a significant portion of the scientific production on this topic has emerged only in recent years, there is a critical need to organise this knowledge to prevent conceptual redundancy and identify gaps in diversity. As the literature expands, it becomes harder to maintain a global view of the field and to track developments beyond one's immediate subfield (Andersen & Lund, 2020; Ball, 2018). These challenges are intensified when researchers operate in disciplinary silos or when thematic areas are disconnected (Aria & Cuccurullo, 2017; Crane, 1972). As a result, key concepts may be misapplied, data may be underutilised, and outdated assumptions may guide clinical practices. In this context, methods capable of organising and synthesising large volumes of scientific output become particularly relevant. A bibliometric analysis, a term coined by Pritchard (1969), is essential not only to quantify this growth but to map the intellectual structure of the field.

By providing a comprehensive global bibliometric mapping of muscularity research over more than four decades, this study offers an integrative overview of the field's intellectual structure, identifies structural gaps in geographical representation and conceptual development, and clarifies emerging thematic trends that have not been systematically synthesised in previous reviews. Therefore, the objective of the present revision was to conduct a comprehensive global bibliometric analysis of scientific production on muscularity from 1981 to 2024. Specifically, this study aimed to: (1) map the

temporal evolution of publications to identify key turning points in the literature; (2) analyse collaboration networks to reveal the geographical concentration of research and highlight regions that remain underrepresented; and (3) examine the conceptual structure of the field through keyword co-occurrence, clarifying how research themes have shifted from a male-only focus to include female muscularity and novel psychopathological constructs.

METHODS

Study Design and Data Source

This study employed a bibliometric analysis to evaluate the global scientific production on muscularity from 1981 to 2024. The Web of Science (WoS) Core Collection was selected as the exclusive data source. This decision was based on WoS's provision of high-quality, standardised metadata (e.g., complete affiliation addresses and cited references), which is essential for the accurate construction of bibliometric networks using software such as VOSviewer (Pranckutė, 2021). While other databases, such as Scopus or PubMed, cover relevant literature, selecting a single database was a methodological decision to ensure metadata consistency and avoid errors arising from merging heterogeneous citation structures across multiple sources. Consequently, the exclusive use of WoS is acknowledged as a methodological limitation, as it may exclude specific regional studies or journals indexed solely in other repositories.

Search Strategy

The search was conducted in October 2024. The search strategy used the Boolean string: *“drive for muscularity” OR “muscularity” OR “muscularity concerns”* applied to the Title, Abstract, and Keywords fields. Although muscle dysmorphia and reverse anorexia are historically related to muscularity research, they were not included as search terms because they represent specific psychopathological outcomes rather than the broader constructs of muscularity, drive for muscularity, or muscularity concerns. The objective of the present study was to map the scientific production focused on muscularity as a body image construct. Including disorder-specific terms would substantially broaden the scope toward body dysmorphic disorders and clinical psychopathology, potentially obscuring the conceptual focus of the analysis. This delimitation was also consistent with the broader aim of synthesising the literature on drive for muscularity and muscularity concerns as distinct body image constructs, providing a focused conceptual basis for subsequent empirical investigations in this area. The timespan was restricted to documents published between January 1, 1981, and December 31, 2024.

The selection process followed the PRISMA 2020 guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) (Page et al., 2021) and integrated specific recommendations for bibliometric transparency from the GLOBAL (Guidance List for the Reporting of Bibliometric Analyses) checklist (Ng et al., 2025). The PRISMA flow diagram was adapted to the specific characteristics of bibliometric reviews, emphasising database-specific filtering, record deduplication, and eligibility based on conceptual relevance rather than clinical outcomes. Inclusion criteria were: (a) original peer-reviewed articles; (b) published in English; and (c) substantive focus on the psychological or

behavioural constructs of muscularity. Exclusion criteria encompassed: (a) non-peer-reviewed materials (e.g., editorials, conference abstracts, book chapters); (b) studies purely focusing on physiological muscle physiology without a psychological component; and (c) duplicate records.

To ensure consistency, the lead researcher screened titles, abstracts, and full texts twice using the predefined eligibility criteria. In cases of uncertainty regarding eligibility, a re-evaluation was performed to minimise selection bias. Although the screening process was conducted by a single researcher and did not involve independent validation by a second reviewer, eligibility decisions were based on predefined and objective criteria applied to bibliographic metadata, in line with methodological recommendations for bibliometric studies that emphasise transparency, rule-based selection, and reproducibility (Zupic & Čater, 2015; Donthu et al., 2021).

Data Treatment and Analysis Tools

Bibliographic data were exported from the WoS Core Collection in plain-text (.txt) format. The data processing relied on the VOSviewer algorithms, which automatically handle standard bibliometric network construction. Regarding author names, the software's default fractional counting method was used to minimise bias in multi-authored papers.

Network analysis and visualisation were conducted using the VOSviewer software (version 1.6.20). Following the recommendations of the GLOBAL guidelines on data cleaning to prevent fragmentation of thematic clusters caused by terminological variation, a thesaurus file was manually constructed and applied during network generation. This process involved: (1) Semantic harmonization: Merging synonyms and spelling variations

(e.g., grouping *"anorexia"* and *"anorexia nervosa"*; *"body-image"* and *"body image"*); (2) Unification of acronyms: Standardizing instrument names to aggregate their impact (e.g., merging *"drive for muscularity scale"* into *"DMS"* and *"muscle dysmorphic disorder inventory"* into *"MDDI"*); and (3) Population and methodological grouping: Combining variations of demographic terms (e.g., *"adolescence"* under *"adolescents"*) and statistical terms (e.g., *"confirmatory factor analysis"*, *"factor structure"*, *"validity"*) under the unified term *"psychometric properties"*. This pre-processing step was critical to accurately map the field's conceptual structure, free of redundant nodes.

The study employed co-authorship analysis to identify collaboration networks among authors and countries, thereby revealing the field's social structure. Furthermore, keyword co-occurrence analysis was used to map the conceptual structure and evolution of research themes. In contrast, citation analysis identified influential documents and authors that underpin the domain's intellectual base.

Regarding statistical procedures, it is important to clarify that this study relies on bibliometric metrics, such as Total Link Strength, citation counts, and Average Citations per Document (ACPD), which serve as descriptive indicators of network topology rather than sample-based estimates (Donthu et al., 2021; Zupic & Čater, 2015). Consequently, traditional assumptions of inferential statistics, often applied in psychometric studies (e.g., tests for data normality, such as the Shapiro-Wilk), do not apply to this dataset and were therefore not performed (Hair et al., 2009). The decision not to include normalised impact indicators or period-based thematic evolution analyses was intentional, as the primary aim of this study was to provide a structural and conceptual mapping of the field rather than comparative performance metrics that may be influenced by disciplinary and temporal citation biases.

Although restricted to English-language publications, the study sought to provide a global overview of the scientific production indexed in the Web of Science database, encompassing contributions from multiple countries and regions worldwide.

RESULTS

Initial results yielded 1,240 records. After title/abstract screening and, when necessary, full-text assessment, 807 articles were retained for bibliometric analysis. A total of 433 records were excluded for the following reasons: not original research (e.g., reviews, editorials, conference abstracts) ($n = 21$); published in languages other than English ($n = 33$); and not directly addressing muscularity or the drive for muscularity based on title/abstract/full-text review ($n = 379$) (see Figure 1 for the PRISMA flowchart).

Given the descriptive and exploratory nature of this bibliometric analysis, which relies on metadata retrieval from the Web of Science rather than sample-based hypothesis testing, traditional inferential statistics and effect size calculations were not applicable. Instead, the analysis focuses on network topology metrics (e.g., Total Link Strength) and frequency counts to map the field's structure. Accordingly, traditional effect size metrics (e.g., Cohen's d , η^2) do not apply to bibliometric analyses, as these studies do not involve group comparisons or inferential hypothesis testing.

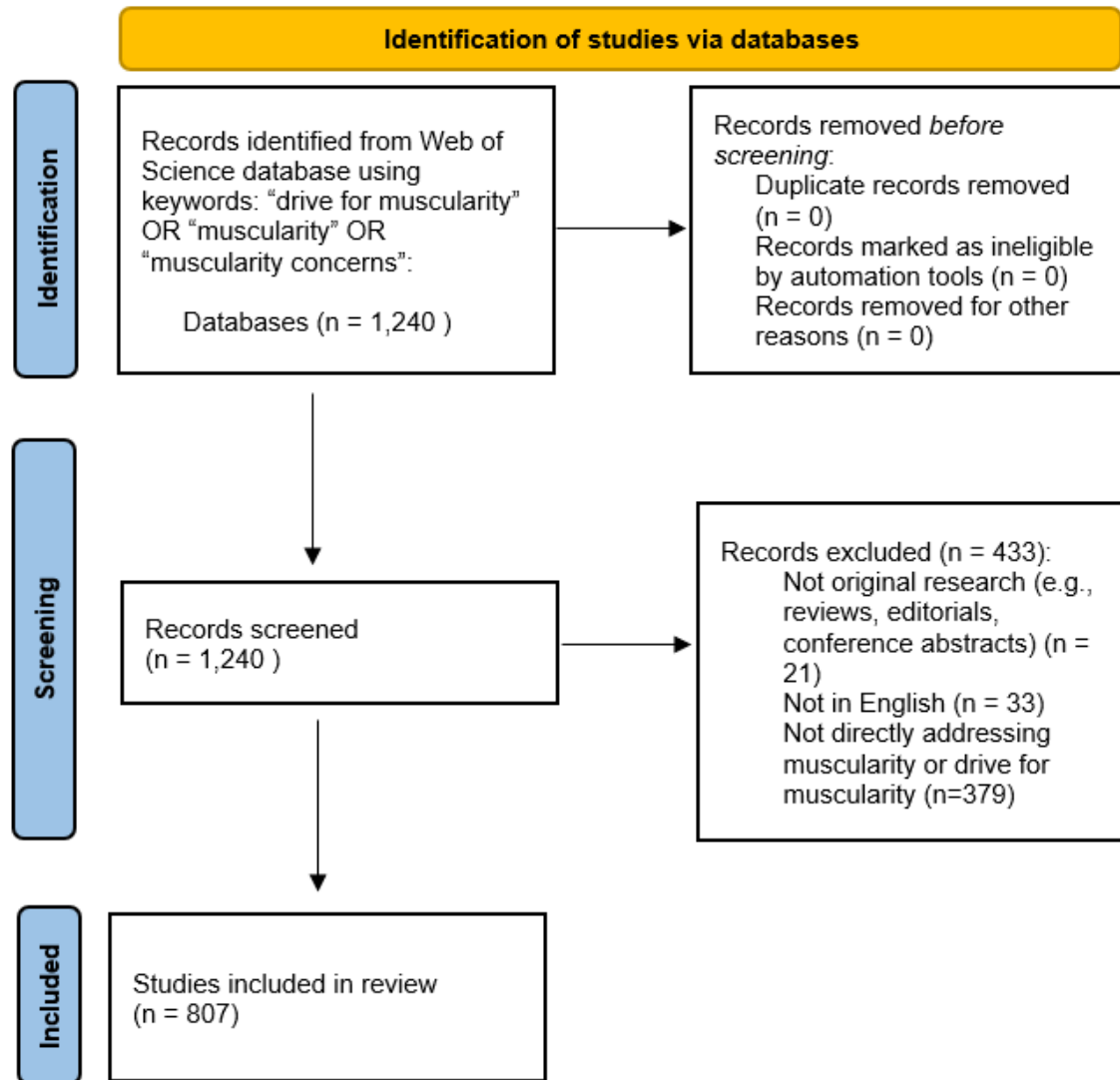


Figure 1. PRISMA 2020 flow diagram illustrating the selection process of scientific production on muscularity (1981–2024).

Temporal Evolution of Scientific Production

The scientific output on muscularity-related research has shown a significant upward trajectory over the analysed period (1981–2024). While the topic remained relatively niche until the early 2000s, a marked exponential growth occurred post-2013. Notably, nearly half of the total production (49.2%) was published in the last five years (2019–2024), with peaks in 2019 ($n=82$) and 2021 ($n=85$). This pattern indicates the

consolidation of muscularity as a distinct construct within the body image literature (Figure 2).

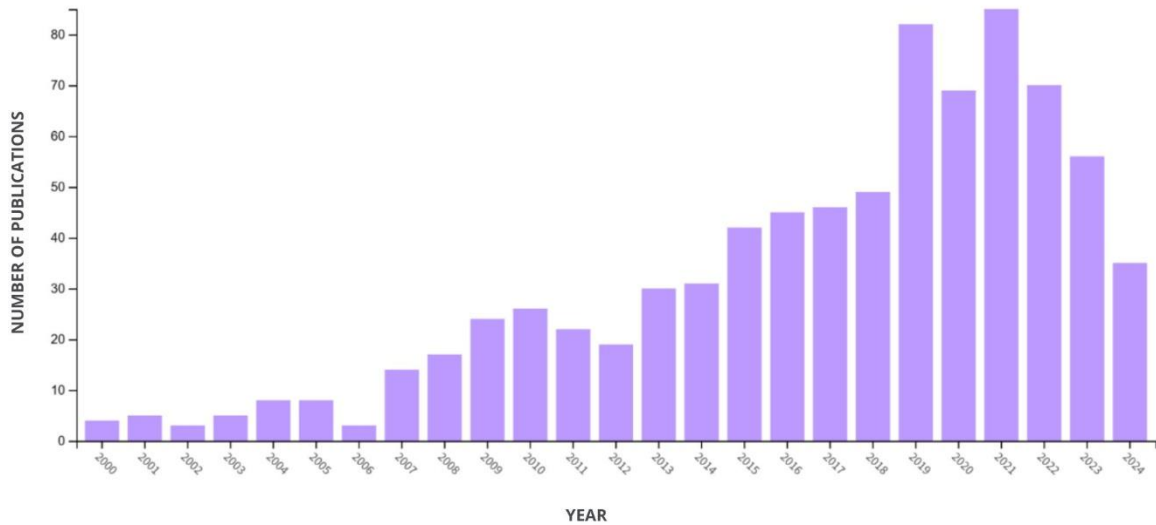


Figure 2. Temporal distribution of publications and citations on muscularity-related research indexed in Web of Science (2000–2024). Source: Web of Science.

Geographic Distribution and Collaboration Networks

Beyond temporal growth, the following analyses examine how this scientific production is geographically distributed and internationally interconnected. Research on muscularity is globally distributed but is concentrated in English-speaking nations. As detailed in Table 1, the United States leads the production, followed by Australia and the United Kingdom.

Table 1. Top 10 Most Productive Countries in Muscularity-Related Research (1981–2024)

Rank	Country	Documents
1	USA	420
2	Australia	160
3	United Kingdom	100
4	Canada	80
5	France	40
6	China	39
7	Germany	32
8	Spain	32
9	Italy	27
10	Brazil	24

Note: Data extracted from Web of Science.

The analysis of international collaboration (Figure 3) shows that the United States serves as the central hub of the network (blue cluster), with strong connections to Australia, Canada, England, Spain, and Germany, indicating its central position within the international collaboration network. Australia anchors a second central cluster (yellow) and connects strongly with countries in Europe, North America, and Asia, including Canada, Italy, Japan, and China. Countries from Latin America (e.g., Brazil, Mexico, Chile, Argentina) appear more peripherally, with weaker collaborative links, mainly connected to the United States and Europe. Despite its peripheral position, Brazil shows emerging connections, suggesting increased integration into the global research landscape.

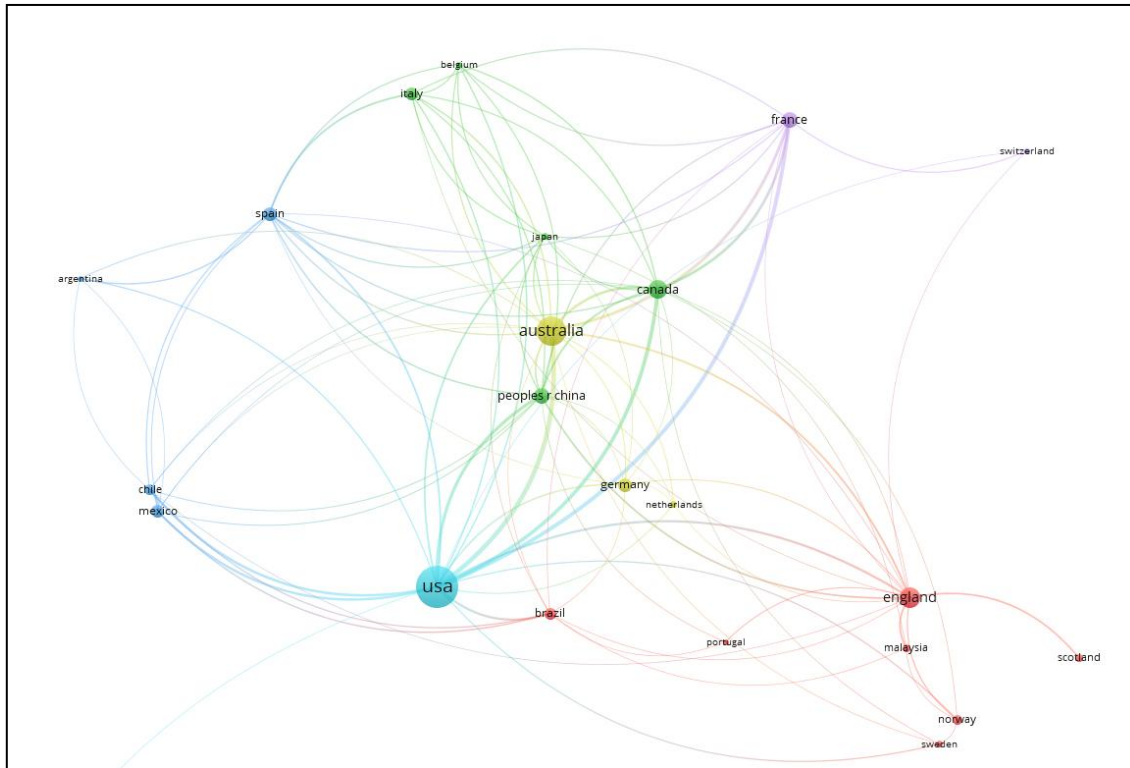


Figure 3. Network visualisation of international co-authorship in muscularity-related research, clustered by collaboration patterns. Blue – Cluster 1: United States and Latin America; Yellow – Cluster 2: Australia and Asia; Green – Cluster 3: European Union (Belgium, Italy, Germany); Red – Cluster 4: United Kingdom and Northern Europe; Purple – Cluster 5: France and Switzerland. The size of each node indicates the number of publications from that country, while the thickness of the lines reflects the frequency of co-authorship links between countries. Only links with at least three co-authored publications are displayed for readability. Source: VOSviewer (based on Web of Science data).

Influential Journals and Authors

The analysis of publication sources reveals that *Body Image* is the core journal in this field, publishing more than three times as many articles as the second-ranked journal (Table 2). Regarding authorship, Table 3 presents the most prolific and influential researchers. To provide a robust indicator of impact beyond simple document counts, the ACPD was calculated based on the dataset. While Murray, S.B., is the most prolific author ($n=58$), Griffiths, S. demonstrates the highest relative impact among the top three authors (ACPD = 22.42), indicating a high density of citations per published paper.

Table 2. Top 5 Most Productive Journals

Rank	Journal	Documents
1	Body Image	163
2	Psychology of Men & Masculinities	44
3	International Journal of Eating Disorders	41
4	Sex Roles	31
5	Eating Disorders	30

Note: Data extracted from Web of Science.

Table 3. Top 10 Most Prolific Authors and Impact Metrics

Rank	Author	Documents	Total Citations	ACPD
1	Murray, S.B.	58	1045	18.01
2	Nagata, J.M.	44	526	11.95
3	Griffiths, S.	35	785	22.42
4	Rodgers, R.F.	35	582	16.62
5	Blashill, A.J.	23	350	15.21
6	Brown, T.A.	20	256	12.8
7	Lavender, J.M.	20	299	14.95
8	Compte, E.J.	19	238	12.52
9	He, J.	18	150	8.33
10	Ganson, K.T.	17	106	6.23

Note: Total Citations derived from network data; ACPD = Average Citations per Doc calculated as Total Citations / Documents.

The co-authorship analysis (Figure 4) shows the collaborative relationships among researchers in the field of muscularity. The most cited and prolific authors appear closely connected, suggesting shared interests or focus on related subtopics. Smaller clusters around authors such as Swami and Edwards indicate distinct subfields, particularly those related to cultural and psychological influences.

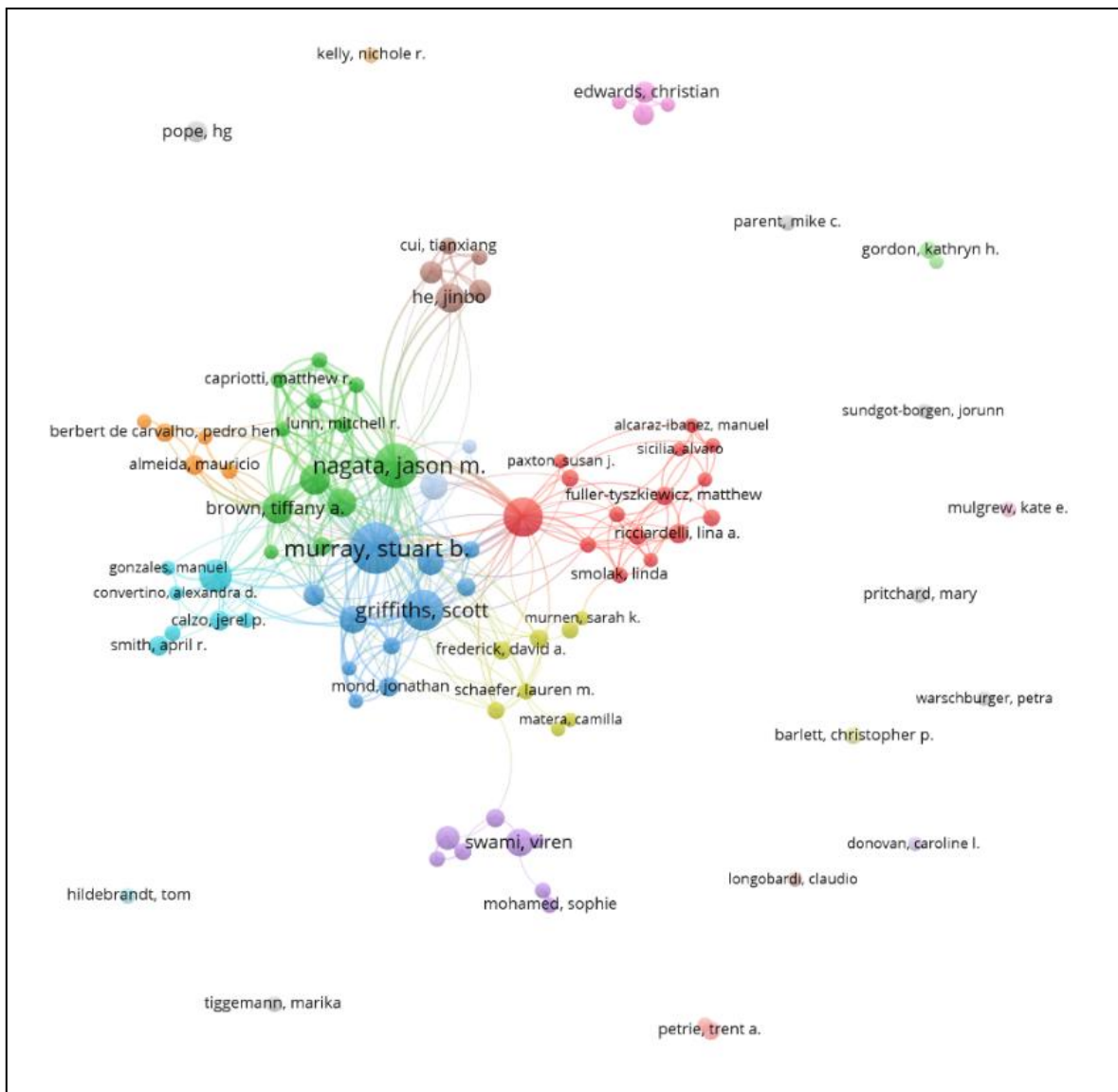


Figure 4. Co-authorship network among leading researchers in muscularity-related studies. Clusters represent collaborative groups based on co-authorship patterns, indicating shared research interests or thematic alignment. Node size reflects the number of publications per author, and link thickness denotes the strength of collaboration. Source: VOSviewer (data extracted from Web of Science).

Citations

Figure 5 identifies the field's intellectual base by mapping the most frequently co-cited documents. Schaefer et al. (2017), Robinson et al. (2017), Karazsia et al. (2017), Carrotte et al. (2017), and Holland and Tiggemann (2017) were the most influential studies,

suggesting that these works form a central knowledge base that is frequently cited together across the literature.

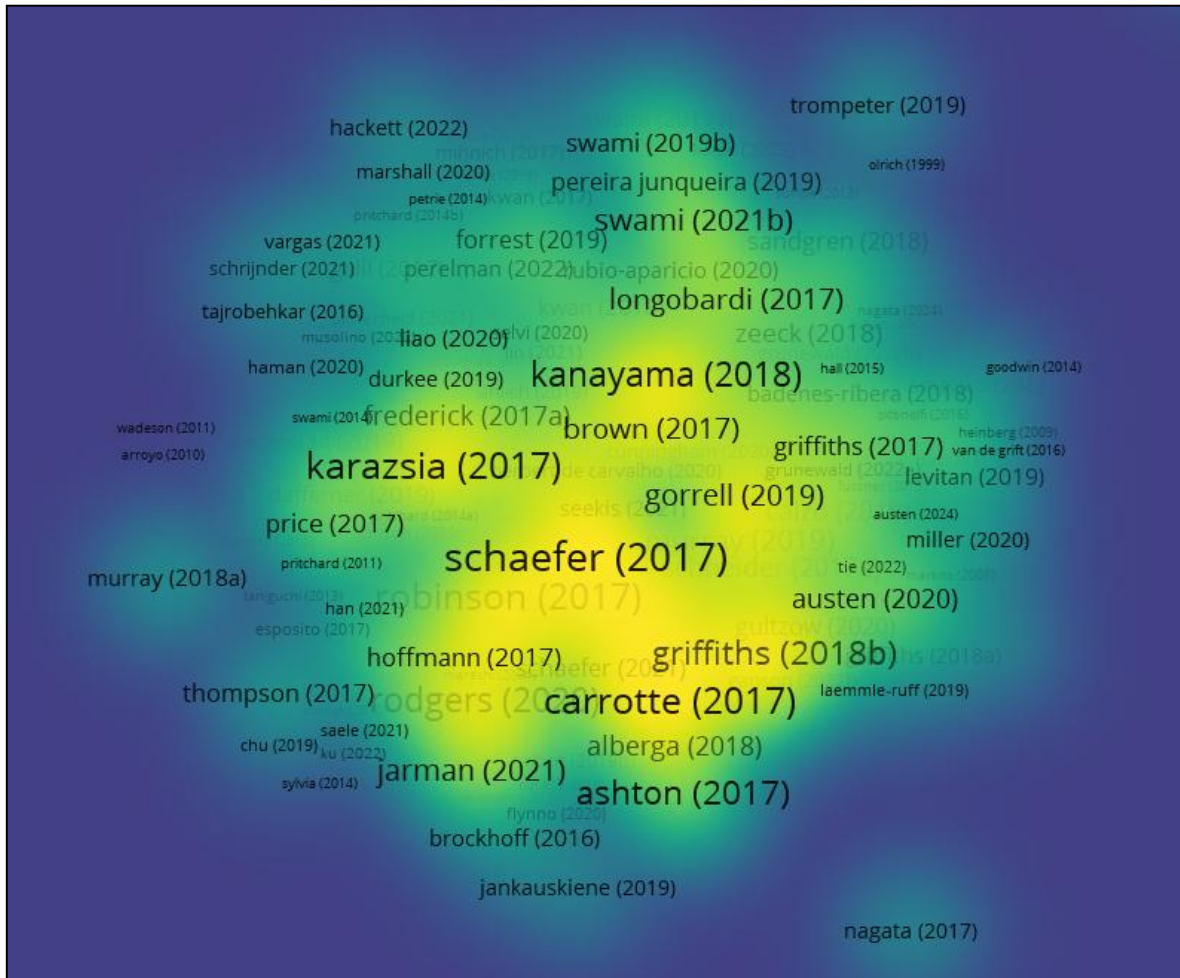


Figure 5. Size and colour intensity represent the number of citations received, highlighting highly cited works such as *Schaefer et al. (2017)*, *Robinson et al. (2017)*, *Karazsia et al. (2017)*, *Carrotte et al. (2017)*, and *Holland and Tiggemann (2017)*. Source: VOSviewer (data extracted from Web of Science).

Keywords Co-occurrence

In contrast to citation-based analyses, Figure 6 maps the field's conceptual structure, reflecting how authors define and interrelate research themes through keywords. Body image emerges as the most central and frequent keyword, forming the network's core. This

centrality is accompanied by strong co-occurrences with muscularity, disordered eating, and eating disorders, indicating that muscularity research is embedded within the broader body image and eating pathology literature. Notably, keywords traditionally associated with female body image research—such as social media, thin ideal, internalisation, social comparison, and objectification—appear closely connected to muscularity-related terms, suggesting an expansion of the field beyond its original male-centred focus. Keywords related to sexual orientation and sexual minority men form distinct but connected thematic areas. At the same time, methodological and psychometric terms occupy more peripheral positions, indicating that measurement-focused studies represent a secondary, rather than central, conceptual axis of the field.

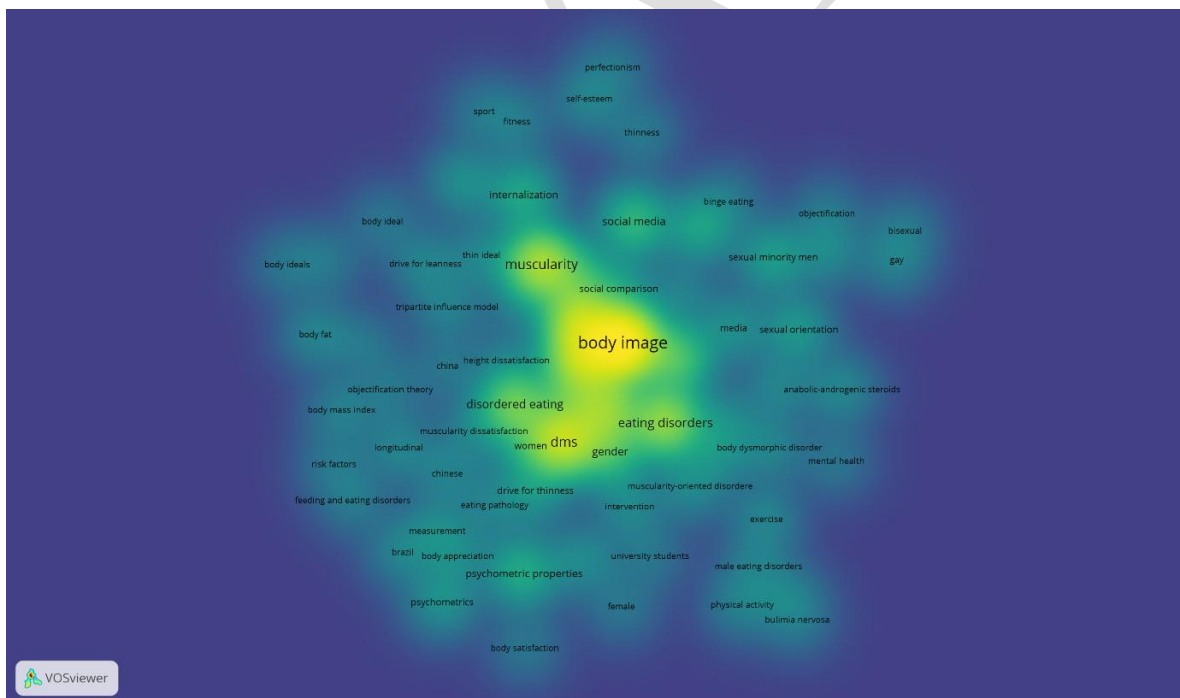
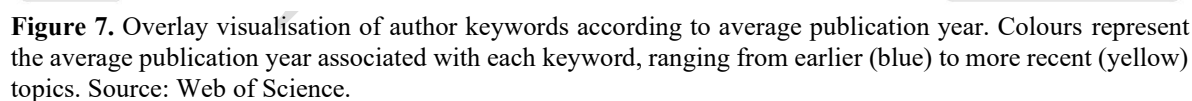


Figure 6. Co-occurrence density map of author keywords in muscularity-related research (1981–2024). Warmer colours indicate higher keyword density, reflecting more frequently occurring and strongly connected concepts within the literature. Source: VOSviewer (data extracted from Web of Science).

Figure 7 presents an overlay visualisation of authors' keywords by average year of publication. Earlier themes in the network were more strongly associated with terms such as sexual orientation, gay, bisexual, physical activity, exercise, and body dysmorphic disorder. In contrast, more recent publications were characterised by keywords including psychometric properties, measurement, body satisfaction, body ideals, and muscularity dissatisfaction. Intermediate themes included body image, muscularity, eating disorders, social media, internalisation, and social comparison.



DISCUSSION

This study aimed to map the global scientific landscape of muscularity research over four decades. The results reveal a field in exponential expansion, particularly post-2013, but one that remains characterised by significant structural inequalities in knowledge production.

The sharp rise in publications from 2019 to 2024 may be related to the growing influence of social media platforms and the global spread of aesthetic ideals emphasising muscularity (Ahmad & Choi, 2024; Merino et al., 2024; Vuong et al., 2021). These sociocultural changes intensified discussions around body image and disordered eating, drawing attention from multiple disciplines in psychology, health, and nutrition (Piatkowski et al., 2024; Vintro-Alcaraz et al., 2025; Bell et al., 2024).

Our keyword analysis confirms that "muscularity" is no longer a niche concern of male bodybuilders but has permeated general body image discourse. This surge suggests an increasing visibility of muscularity-related concerns among women, challenging the historical dichotomy that associated thinness with women and muscularity with men. The emergence of terms related to female muscularity in the network suggests that the scientific community is reacting to a new phenomenological reality where the pursuit of health is often conflated with the pursuit of an aesthetic ideal, potentially masking disordered behaviours as "fitness" or "healthy lifestyle" (Cunningham et al., 2019).

The temporal keyword analysis suggests that the field has expanded from earlier themes related to exercise, sexual orientation, and body dysmorphic disorder toward more recent interests in psychometric assessment, body satisfaction, and the refinement of muscularity-related constructs. This pattern may reflect the field's maturation, with

increasing attention devoted to the assessment and measurement of muscularity-related constructs across different populations.

The temporal concentration of highly cited studies in 2017 may reflect growing academic interest driven by the exponential rise of social media platforms, particularly Instagram, and the widespread circulation of *fitspiration* content (Vintró-Alcaraz et al., 2025; Schoenenberg & Martin, 2020; Yee et al., 2020). These digital environments not only disseminated muscular ideals at an unprecedented scale but also normalised their pursuit among youth (Möri et al., 2022; Donnarumma & Mingoia, 2024). As a result, research attention shifted toward understanding how exposure to idealised bodies online influences body dissatisfaction, eating pathology, and compulsive exercise (Ganson et al., 2023). The field appears collaborative and interdisciplinary, with key authors helping bridge diverse perspectives, especially across body image, eating behaviour, and mental health. This diversification is important because muscularity is not only a sociocultural phenomenon but also a construct linked to adverse biopsychosocial outcomes, such as body dissatisfaction, disordered eating, compulsive exercise, and mental health problems (Mazaraki et al., 2024). Moreover, it is influenced by biological, psychological, social, and cultural variables, which implies that its understanding and intervention require a multidisciplinary approach (Aboukhaled et al., 2023; Jürgensen et al., 2025).

A critical analysis of the geographic data reveals a concerning hegemony. The dominance of the USA, Australia, and the UK suggests that current theoretical models of muscularity are primarily derived from "WEIRD" (Western, Educated, Industrialised, Rich, Democratic) populations, confirming previous patterns in body image research (Swami et al., 2021). This concentration can be explained by structural advantages, such as greater research funding, established academic networks, and the dominance of English-language

journals in disseminating findings globally. This geographic concentration raises questions about the applicability of these constructs in diverse cultural settings (Anderson-Fye, 2011; Merino et al., 2024). While the drive for muscularity is documented as a global phenomenon, the mechanisms driving it in Latin America may differ significantly due to distinct cultural values regarding masculinity and femininity (Laus et al., 2014).

The peripheral position of countries from the Global South in citation networks, despite their growing output, as evidenced by validation studies in Brazil (Campana et al., 2013; Carvalho et al., 2016), indicates a structural inequality in the dissemination of knowledge. This reliance on citation metrics favours established research centres and English-language publications, potentially silencing "peripheral epistemologies" that could offer alternative understandings of how muscularity operates in non-individualistic cultures or contexts with different gender norms. For instance, ideals of muscularity may intersect with race and ethnicity in unique ways, shaping body image pressures differently among minority groups and influencing access to health resources and representation in research (White, Mooney, & Warren, 2019; Li, Talleyrand, & Sansbury, 2024). Overcoming these barriers is essential to achieving a more inclusive and globally valid science of body image and muscularity.

The prominence of *Body Image* as the top publishing journal underscores its central role in shaping muscularity discourse, particularly regarding shifts in body ideals and emerging pressures faced by women. The keyword network demonstrates that muscularity is no longer seen as a concern exclusive to men, but increasingly affects women, aligning with the growing literature on the female athletic ideal and muscularity-oriented disordered eating (Bozsik et al., 2018; Rodgers et al., 2018; Tiggemann & Zaccardo, 2015).

Despite the growing number of publications, the field still lacks longitudinal, multicultural, and clinically validated studies. The current landscape remains dominated by cross-sectional designs and samples from Western populations. Greater investment in diverse methodologies and inclusive samples is essential to deepen understanding and develop targeted interventions.

This study's findings offer a foundational roadmap for researchers, practitioners, and funding bodies, supporting the design of evidence-based programs to address the growing social and psychological burdens associated with pursuing the muscular ideal. Clinicians must move beyond thinness-oriented assessments, which may yield false negatives in individuals pursuing muscularity (Carvalho et al., 2017). Our findings support the urgent integration of specific tools like the *Drive for Muscularity Scale* (DMS) (Campana et al., 2013; McCreary & Sasse, 2000), the *Muscle Dysmorphic Disorder Inventory* (MDDI) (Santos, 2023), or the *Muscularity-Oriented Eating Test* (MOET) (de Carvalho et al., 2023) in clinical screenings to capture the behavioural nuances of this condition.

These findings also have important implications for Physical Education professionals, who frequently work with populations exposed to muscularity-oriented body ideals. Given their close contact with individuals engaged in resistance training and physique-focused exercise, these professionals are well-positioned to identify early signs of compulsive exercise, excessive body dissatisfaction, and risky behaviours associated with the pursuit of muscularity. Incorporating body image education and awareness of muscularity-related concerns into exercise settings may therefore represent an important strategy for prevention and health promotion. Also, prevention programs need to be recalibrated. Addressing the "thin ideal" is no longer sufficient; interventions must

specifically deconstruct the "functional" justification of the muscular ideal (e.g., "strong is healthy"), which often validates compulsive exercise and rigid dietary monitoring (Cunningham et al., 2021). The link between muscularity concerns and the use of appearance- and performance-enhancing drugs highlighted in our keyword network calls for stricter public health regulations. Specific policies are needed to control the marketing of "fitness" supplements to adolescents and to monitor the illicit trade of anabolic steroids, similar to existing regulations on diet pills (Nogueira et al., 2013).

Limitations and Future Directions

This study has limitations inherent to bibliometric methodologies that should be acknowledged. First, the exclusive reliance on the Web of Science Core Collection, while ensuring standardised, high-quality metadata, may have introduced selection bias by excluding studies indexed in other databases or published in regional journals, particularly from the Global South. Second, restricting the analysis to English-language publications likely reinforced linguistic and cultural biases in the mapped literature. The term "global" should be interpreted to refer to the geographical coverage of publications indexed in Web of Science, rather than to the complete representation of all scientific outputs worldwide. Third, bibliometric indicators are cumulative, which may amplify the visibility of older and established research centres while disadvantaging emerging authors and themes.

Future research should address these limitations by incorporating multiple databases and expanding analyses to non-English literature. Cross-cultural validation studies of muscularity-related instruments and longitudinal designs are especially needed to advance

theoretical integration and clarify developmental pathways linking sociocultural exposure to muscularity-oriented disordered eating.

CONCLUSIONS

This bibliometric analysis provides a comprehensive overview of the global scientific production on muscularity from 1981 to 2024. The findings demonstrate that the field has undergone rapid expansion, particularly in the last decade, reflecting a shift from a niche focus on male bodybuilders to a broader body image concern affecting diverse populations. The results reveal three central patterns: (1) a sharp temporal growth concentrated in recent years; (2) a persistent geographical concentration of knowledge production in Western, English-speaking countries; and (3) a conceptual reorganisation in which muscularity is increasingly embedded within body image and eating pathology research, including among women. Together, these patterns highlight both the consolidation of muscularity as a key construct and the structural inequalities that continue to shape the field.

Although this study does not assess causal mechanisms or clinical effectiveness, it offers an integrative framework to guide future research and practice. The prominence of muscularity-related eating behaviours and psychopathology in the mapped literature suggests that thinness-oriented assessment and prevention models may be insufficient. Advancing the field will require culturally inclusive research designs, longitudinal approaches, and the integration of muscularity-specific tools into clinical and public health contexts.

These conclusions should be interpreted in light of the study's methodological limitations, including the exclusive use of the Web of Science Core Collection, the restriction to English-language publications, and the cumulative nature of citation-based indicators,

which may favour established research centres. Despite its limitations, this review provides a roadmap for the next phase of muscularity research, emphasising diversity, conceptual clarity, and clinical relevance.

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