

The impact of privacy design in university student housing on mental health and academic performance: A systematic review (2000-2024)"

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Abstract: The rapid expansion of higher education has intensified focus on student housing design and its impact on academic success and well-being. Despite substantial research examining various aspects of student housing, a critical gap exists in understanding how privacy design features specifically influence student outcomes. This study aims to systematically analyze student housing research from 2000 to 2024, evaluate interconnections between design aspects and student outcomes, and develop an evidence-based framework for understanding the relationship between housing design and student well-being. Following PRISMA guidelines, this systematic review analyzed 143 documents across 94 sources from Scopus, employing a Structural Topic Model (STM) approach to uncover latent thematic structures. The analysis revealed five distinct research themes: social implications (37%), campus development (22%), student satisfaction (18%), training programs (15%), and facility design (9%). Temporal analysis demonstrated a significant shift from technical considerations toward social and experiential aspects, with 55% of publications occurring between 2020-2024. Correlation analysis revealed predominantly negative correlations between research streams, particularly between social implications and campus development (-0.41), indicating limited interdisciplinary integration. The findings highlight the need for more integrated approaches to student housing design that balance privacy considerations with community development. The study's correlation patterns and topic coherence analysis suggest opportunities for bridging distinct research streams through interdisciplinary frameworks. Future research should focus on developing integrated methodologies, conducting longitudinal studies on privacy design impacts, and investigating the role of emerging technologies in student housing design.

Keywords: Academic performance, Mental health, Privacy design, Student housing, Systematic review, Topic modelling.

1. Introduction

The rapid expansion of higher education globally has led to increased attention on student housing design and its impact on academic success and student wellbeing [1]. Student accommodation represents a critical component of the university experience, serving not only as living spaces but as environments that significantly influence student development, social integration, and academic performance [2, 3]. The evolution of student housing research reflects growing recognition of the complex interplay between physical design elements, particularly privacy features, and student outcomes in university settings [4].

Recent years have witnessed substantial growth in research examining various aspects of student housing design and development [5]. This expansion is particularly evident in the increasing focus on how housing design influences student satisfaction and wellbeing [6, 7]. For instance, studies have demonstrated that thoughtful integration of privacy features in student accommodation can significantly impact students' mental health and academic performance [8]. Furthermore, research has

highlighted the importance of considering both individual and communal spaces in student housing design, emphasizing the need for balanced approaches that support both private study and social interaction [9, 10].

Furthermore, the relationship between student housing and the broader university community has also emerged as a significant area of investigation [11, 12]. Research has shown that student housing developments can substantially influence local neighborhoods and community dynamics through processes such as studentification and urban change [13]. These findings underscore the importance of considering both micro-level design features and macro-level community impacts when developing student housing solutions. On the other hand, contemporary research has increasingly focused on the technical aspects of student housing design, particularly concerning sustainability and energy efficiency [14]. Studies have examined how innovative design approaches can enhance both environmental performance and student comfort [15, 16].

Additionally, researchers have investigated how different spatial configurations and privacy features influence student satisfaction and academic outcomes, revealing complex relationships between physical design elements and student experience [17, 18]. The growing complexity of university student housing design and its impact on student wellbeing will become increasingly critical in higher education research. While current literature examines various aspects of student housing design Beckers, et al. [17] a significant gap exists in understanding how privacy design features specifically influence student mental health and academic outcomes. Recent research by Baba, et al. [16] demonstrates that the relationship between housing design elements and student performance remains insufficiently explored.

To address these research gaps, this study will pursue three focused objectives. First, it will systematically analyze the evolution of student housing research from 2000 to 2024, specifically examining how privacy design features have been implemented and evaluated in university accommodation. Second, the research will identify the relationships between privacy design elements and student outcomes, particularly focusing on mental health and academic performance metrics. Third, the study will develop an evidence-based framework integrating five key research themes: social implications, training programs, campus development, student satisfaction, and facility design. This systematic approach will address the current lack of interdisciplinary synthesis in student housing research while providing practical insights for university administrators and housing developers. The resulting framework will guide the development of more effective student housing solutions that enhance both academic performance and student wellbeing through informed design decisions.

2. Research Methodology

This systematic review follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines to ensure transparency and reproducibility [12, 19]. The methodology has been structured to comprehensively identify, evaluate, and synthesize relevant research on privacy design in university student housing and its effects on mental health and academic outcomes.

2.1. Database Selection and Search Strategy

The primary database selected for this review is Scopus, chosen for its comprehensive coverage of interdisciplinary research in engineering, environmental science, and business studies related to student housing. The search strategy employed Boolean operators to combine relevant terms and was conducted in January 2024.

2.2. Initial Search Results

The initial search using TITLE-ABS-KEY ("Student Housing" OR "Mental Health in Housing") yielded 427 records. This broad search ensured capture of relevant articles while maintaining focus on the core concepts of student housing and mental health.

2.3. Filtering Process

The systematic filtering process was conducted through a series of carefully considered sequential steps to ensure the identification of the most relevant and high-quality research publications. Beginning with a publication year filter spanning from 2000 to 2024, which yielded 433 records, this timeframe was selected to encompass both contemporary design approaches and foundational studies that have shaped current understanding of student housing design. The scope was then refined by subject area, focusing on Engineering, Environmental Science, and Business disciplines, resulting in 364 records. This disciplinary focus was essential as these fields collectively address the physical design elements, environmental considerations, and operational aspects of student housing developments.

The next refinement focused on document types, limiting results to articles and reviews, which reduced the corpus to 283 records. This filter ensures the inclusion of only peer-reviewed research, representing the highest level of scholarly rigor and evidence-based findings. A language filter was subsequently applied to include only English-language publications, yielding 265 records, as English represents the primary language of international academic discourse and ensures comprehensive analysis capabilities.

Further refinement through keyword filtering reduced the collection to 159 records, carefully selecting terms directly related to student housing, built environment, privacy, and social behavior aspects. The source type was then restricted to journals, resulting in 154 records, as journal publications undergo rigorous peer review processes and represent established scholarly discourse. Finally, the publication stage was limited to final publications only, yielding 143 records, ensuring access to complete, peer-reviewed research rather than preliminary or in-press articles. This methodical filtering process created a focused and high-quality dataset for comprehensive analysis while maintaining the integrity and relevance of the research scope.

2.4. Inclusion Criteria

The inclusion criteria for this systematic review were established to ensure a focused and rigorous examination of privacy design's impact on student wellbeing in university housing. Studies must present primary research specifically investigating university student housing design, with a clear focus on privacy features or design considerations. The research should demonstrate measurable outcomes related to mental health or academic performance, supported by empirical data collection and analysis. Additionally, all included studies must present a clear methodology and research design that enables proper evaluation of the findings' validity and reliability. This comprehensive set of inclusion criteria ensures that selected studies provide substantial evidence to address the research questions while maintaining high standards of academic rigor. Only studies meeting all these criteria were considered for detailed analysis, ensuring the systematic review's findings are based on robust and relevant research contributions to the field.

To contextualize this approach: Our selection criteria prioritize empirical studies that directly link design elements to student outcomes, rather than theoretical frameworks or general housing studies. This focus allows us to draw actionable conclusions about the relationship between privacy design features and student wellbeing in university housing contexts. The emphasis on measurable outcomes and clear methodology ensures that our findings can inform evidence-based design recommendations for future student housing developments.

2.5. Exclusion Criteria

The exclusion criteria were strategically developed to maintain the review's focus and ensure high-quality evidence synthesis. Studies were excluded if they focused solely on technical building specifications without addressing student outcomes, as this would not contribute to understanding the relationship between design and student wellbeing. Research examining general residential housing without specific attention to student populations was also excluded, ensuring the findings remain

relevant to the university context. Studies lacking clear methodology or empirical evidence were omitted to maintain scientific rigor, as were those presenting purely theoretical frameworks without practical application. Additionally, research focusing exclusively on economic aspects without considering design elements was excluded, as this would not contribute to understanding the impact of privacy design on student outcomes. Figure 1 below illustrates the inclusion and exclusion criteria according to the PRISMA statement 2020.

PRISMA 2020 Filtering of Research Articles

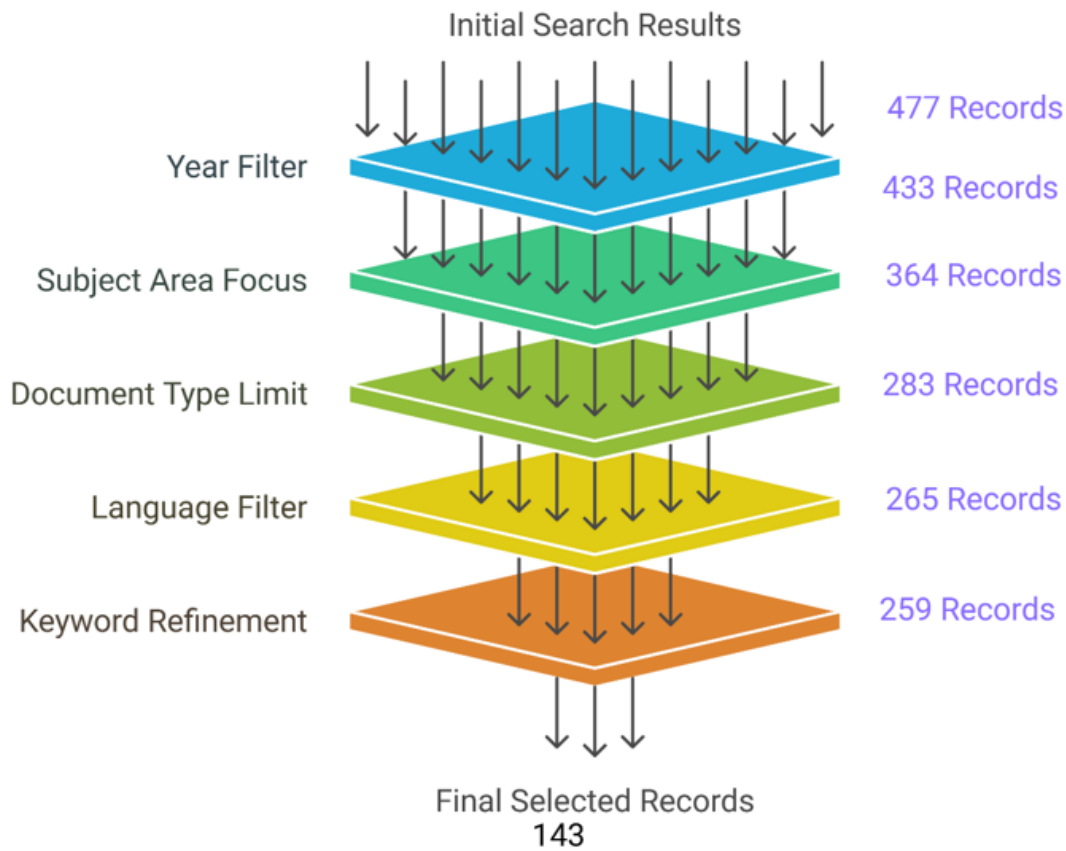


Figure 1.
Inclusion and exclusion criteria.

This approach ensures the systematic review remains focused on empirical, student-centered research that directly addresses the relationship between privacy design features and measurable student outcomes in university housing contexts. The exclusion criteria complement the inclusion criteria by eliminating research that, while potentially related to student housing, would not substantively contribute to answering our core research questions about privacy design's impact on student wellbeing and academic performance.

2.6. Descriptives

The research on privacy design in university student housing reveals significant patterns in scholarly output and collaboration from 2000 to 2024 in Table 1. The dataset comprises 143 documents published across 94 distinct sources, primarily academic journals, demonstrating a substantial body of literature in this field. The research area has shown robust growth, with an annual growth rate of 15.86%, indicating increasing scholarly interest in student housing design and its impacts. The relative youth of the research field is evident in the document average age of 6.64 years, suggesting that much of the significant work in this area has been conducted recently. The scholarly impact of this research field is demonstrated by an average of 19.39 citations per document, with the analyzed papers collectively referencing 6,326 works, indicating a well-developed theoretical and empirical foundation. The research area shows rich conceptual development, evidenced by 652 Keywords Plus (ID) and 510 author-designated keywords (DE), reflecting the diverse theoretical and practical approaches to studying student housing design.

The authorship analysis reveals a collaborative research environment, with 377 unique authors contributing to the field. While 26 authors published single-authored documents (totaling 30 such papers), most of the research was collaborative, with an average of 2.94 co-authors per document. The international nature of this research field is reflected in the 17.48% rate of international co-authorships, suggesting opportunities for increased global collaboration. The document type distribution heavily favors empirical research, with 138 articles and 5 reviews, indicating a strong focus on primary research rather than synthetic analyses of existing literature.

Table 1.
Main information.

Description	Results
Timespan	2000:2024
Sources (Journals, Books, etc)	94
Documents	143
Annual Growth Rate %	15.86
Document Average Age	6.64
Average citations per doc	19.39
References	6326
Keywords Plus (ID)	652
Author's Keywords (DE)	510
Authors	377
Authors of single-authored docs	26
Single-authored docs	30
Co-Authors per Doc	2.94
International co-authorships %	17.48
article	138
review	5

In addition, Figure 2 illustrates the annual publication trends in university student housing research from 2003 to 2024 demonstrate a clear pattern of growth, particularly accelerating in recent years. The field began with modest publication numbers, showing just one article in 2003 and maintaining relatively low output through the early 2000s. A gradual increase began to emerge from 2006 onwards, with notable fluctuations in the annual output ranging from 1 to 7 articles through 2016.

A significant shift in research productivity occurred from 2017 onwards, marking the beginning of sustained higher publication volumes. The years 2017 and 2018 both saw eight publications annually, establishing a new baseline for research output. This upward trajectory continued with a notable acceleration from 2020, which produced 11 articles, followed by 15 publications each in 2021 and 2022. The field showed continued momentum with 16 articles in 2023, culminating in a peak of 22 publications in 2024.

This publication pattern reveals three distinct phases: an initial period of sporadic publication (2003-2010), a period of stabilization with moderate output (2011-2016), and a period of substantial growth (2017-2024). The most recent five-year period (2020-2024) accounts for nearly 55% of all publications in the dataset, indicating a significant intensification of research interest in student housing design and its associated outcomes. This trend suggests growing recognition of the importance of student housing research and potentially reflects increased institutional focus on student wellbeing and accommodation quality in higher education settings.

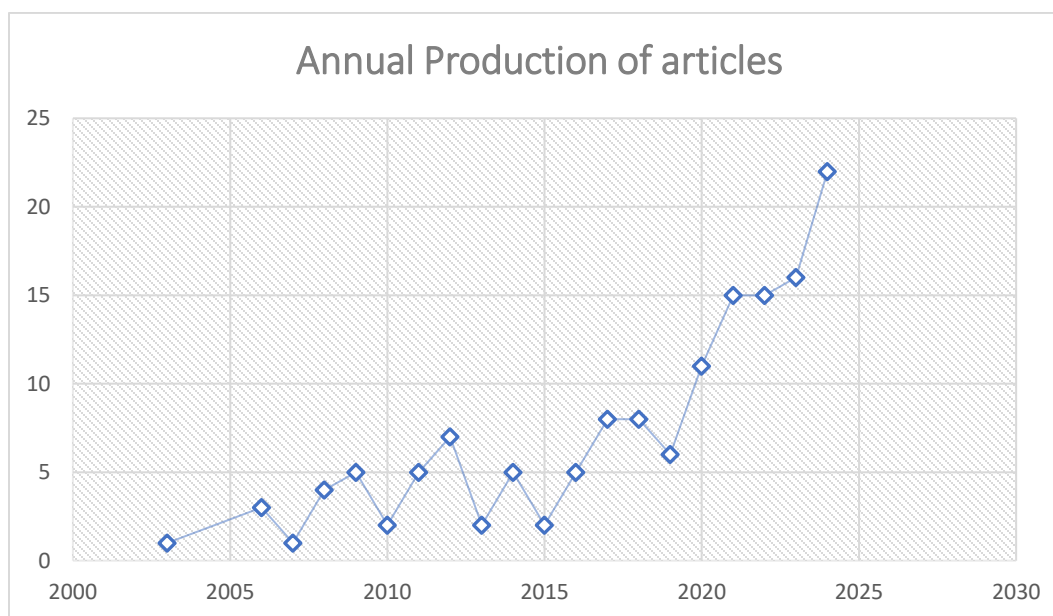


Figure 2.
Annual production of articles.

Furthermore, Figure 3 the analysis of publication sources reveals a concentrated distribution of research across specialized journals in housing, built environment, and facilities management. The Journal of Housing and the Built Environment emerges as the leading publication venue with 8 articles, establishing itself as a primary platform for research in this field. This is followed by Housing Policy Debate and the Journal of Facilities Management, each contributing 6 articles, demonstrating the interdisciplinary nature of student housing research spanning policy and operational management perspectives. A second tier of journals, each publishing 4 articles, includes Architectural Engineering and Design Management, Energy and Buildings, Housing Studies, and Property Management. This group reflects the diverse aspects of student housing research, encompassing architectural design, energy efficiency, social housing policy, and property management considerations.

The third tier comprises Area, Journal of Green Building, and Sustainability (Switzerland), each with 3 publications. These journals represent emerging research directions in student housing, particularly focusing on geographical perspectives, sustainable design, and environmental considerations. This distribution pattern indicates that while research in student housing design is published across various journals, it maintains a strong presence in housing-specific publications while extending into related fields such as facilities management, sustainability, and architectural design.

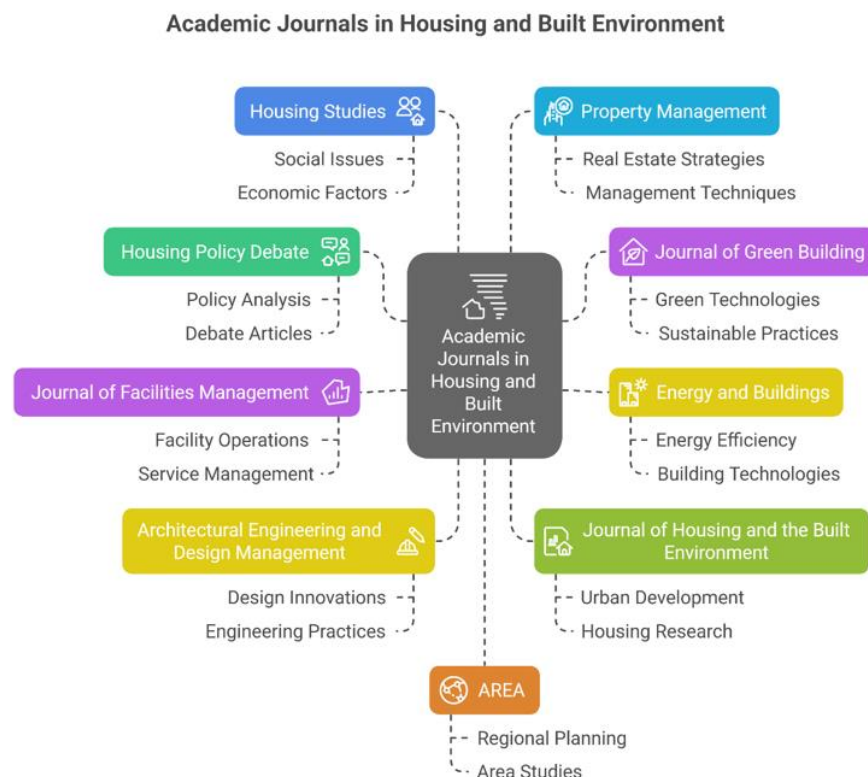


Figure 3.
Major sources contributed for the study.

3. Results

A Structural Topic Model (STM) approach was selected for this research due to its advanced capabilities in uncovering latent thematic structures while accounting for document-level metadata, which is particularly crucial for analyzing the evolution of robotics research [20]. STM extends traditional topic modeling by incorporating document-level covariates, enabling the examination of how research themes vary across different journals and time periods [21]. The temporal analysis of extracted topics in student housing research reveals distinct thematic concentrations and their relative prevalence in the literature identified in Figure 4. The most prominent theme, "Exploring University Student Housing and Its Social Implications," accounts for 37% of the analyzed publications, indicating a strong research focus on the social dimensions and community impacts of student housing arrangements. Campus development and its relationship to student housing emerges as the second most prevalent theme, representing 22% of the publications. This substantial proportion reflects growing academic interest in how physical infrastructure and campus planning integrate with student accommodation to enhance overall educational experiences.

Student satisfaction in university accommodation comprises 18% of the research output, highlighting the importance of understanding and meeting student housing needs and preferences. This research strand emphasizes the relationship between housing quality and student wellbeing, satisfaction, and retention rates. The topic of student training programs in rural nursing, while seemingly specialized, represents 15% of the publications, suggesting significant attention to professional training programs that intersect with student housing considerations, particularly in rural contexts.

The design and construction of student housing facilities, accounting for 9% of publications, represents a more technically focused research stream, emphasizing innovative approaches to physical infrastructure development. While this proportion is smaller, it indicates a consistent interest in the

practical aspects of student housing development. This distribution of topics suggests that while social implications and campus development dominate the research landscape, there is a balanced coverage across various aspects of student housing, from technical design to user satisfaction and specialized training programs.

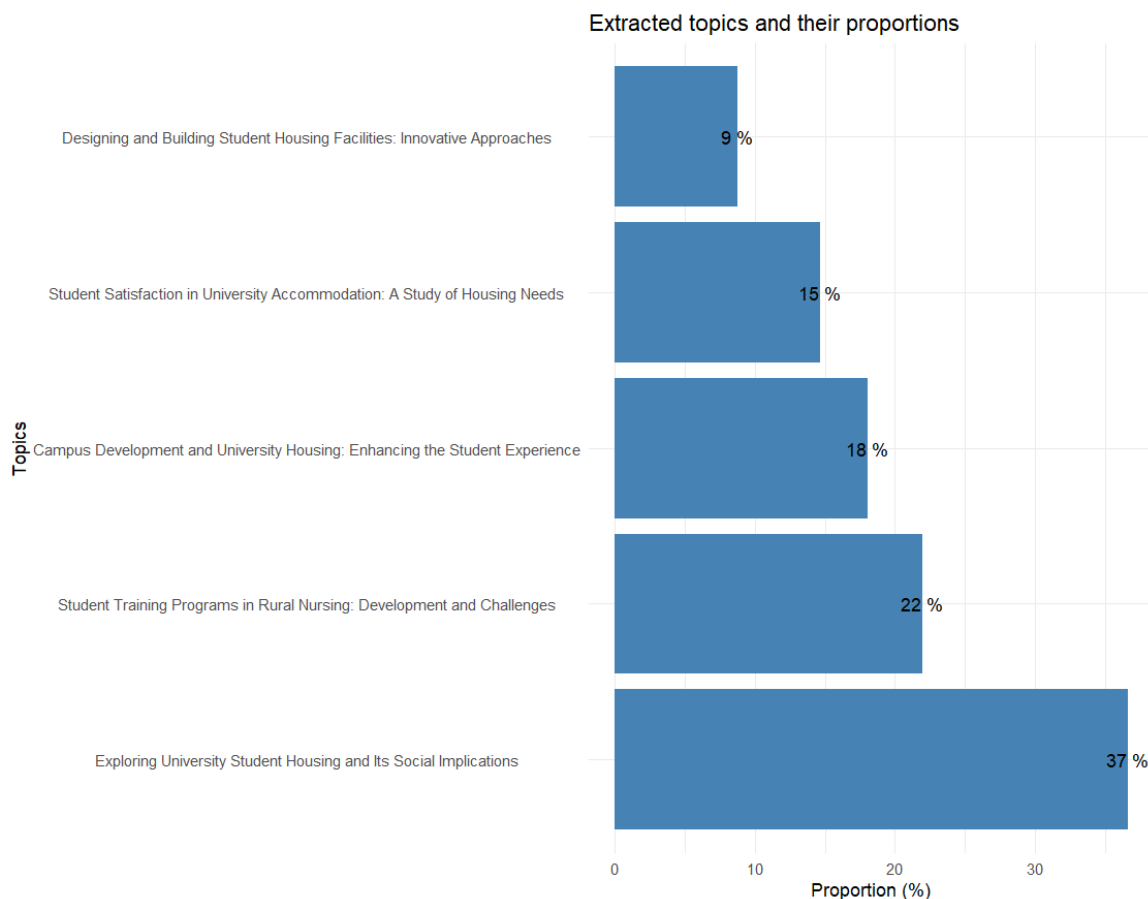


Figure 4.
Extracted topics and propositions.

In addition, the temporal analysis of topic prevalence across the five identified research areas reveals distinct trends and evolving patterns in student housing research from 2000 to 2024 in Figure 5. Topic 1, "Exploring University Student Housing and Its Social Implications," shows a consistent upward trajectory, with its prevalence steadily increasing from approximately 0.05 in 2005 to 0.20 by 2020, indicating growing academic interest in the social dimensions of student housing. The confidence intervals for this topic narrow over time, suggesting increasing consensus in the research approach. Additionally, topic 2, focused on "Student Training Programs in Rural Nursing," demonstrates a declining trend, with prevalence decreasing from 0.25 in 2005 to approximately 0.10 by 2020. This decline suggests a shift away from specialized training program considerations in student housing research. Similarly, Topic 3, "Campus Development and University Housing," shows a gradual decline from 0.30 to 0.15, though with relatively stable confidence intervals throughout the period, indicating consistent methodological approaches despite decreasing research attention.

Although, "Student Satisfaction in University Accommodation" (Topic 4) exhibits the most dramatic positive trend, rising from 0.20 to 0.40 between 2005 and 2020, with particularly accelerated

growth post-2015. This trend reflects increasing emphasis on student experience and satisfaction metrics in housing research. Conversely, Topic 5, "Designing and Building Student Housing Facilities," shows a declining trend from 0.25 to 0.15, suggesting a shift from technical design considerations toward more user-centered research approaches.

The overall pattern suggests a significant transformation in the field, moving from technically oriented research toward more social and experiential aspects of student housing. The narrowing confidence intervals across most topics indicate increasing methodological rigor and consensus in the field, while the divergent trends highlight the evolution of research priorities in response to changing educational and social contexts. This analysis reveals a clear shift toward student-centered research approaches, with particular emphasis on social implications and satisfaction metrics, while technical and specialized training aspects receive diminishing attention.

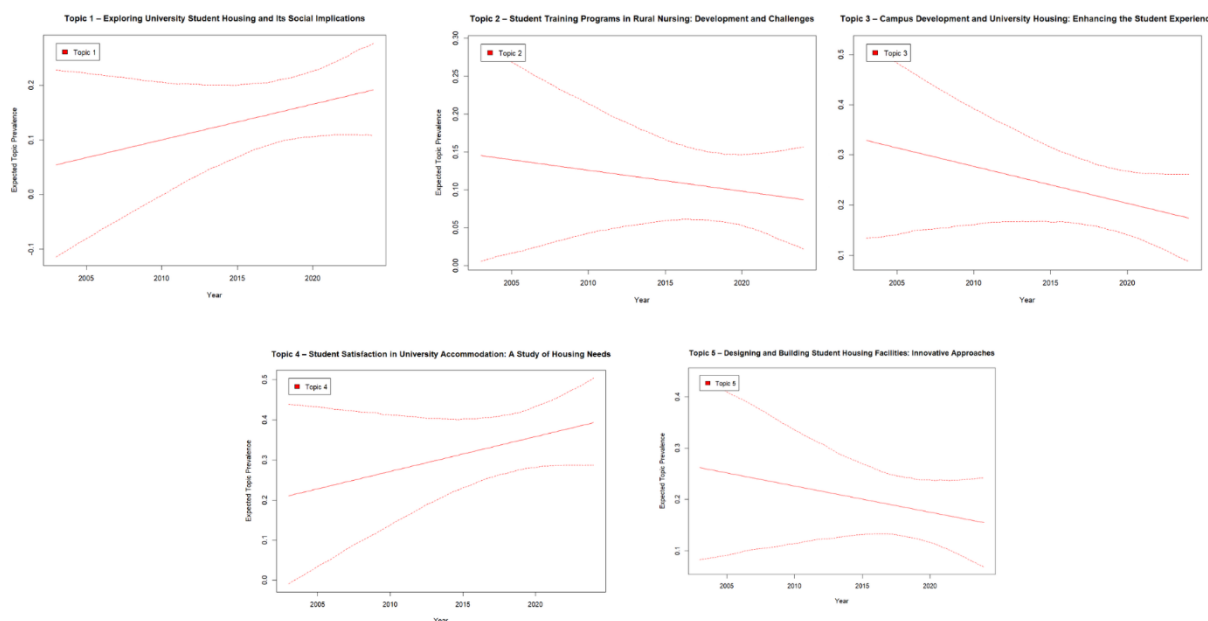


Figure 5.
Topic prevalence analysis.

3.1. Cooccurrence Network and Word Cloud

Figure 6 of the network analysis of research topics in student housing reveals complex interconnections between five major thematic areas, with varying strengths of relationships indicated by the thickness of connecting lines. The visualization demonstrates that Topic 3 (Campus Development and University Housing) and Topic 4 (Student Satisfaction in University Accommodation) share the strongest connection, represented by the thickest line (0.4 weight), suggesting substantial overlap in research approaches and conceptual frameworks between campus development and student satisfaction studies. Topic 1 (Exploring University Student Housing and Its Social Implications) maintains moderate connections (0.3 weight) with multiple other topics, particularly with Topic 4, indicating that social implications are frequently considered alongside student satisfaction measures. This moderate connectivity suggests that researchers often integrate social impact analysis with other aspects of student housing research, creating a more holistic understanding of the field.

Topic 5 (Designing and Building Student Housing Facilities) shows varying connection strengths with other topics, with stronger links to Topics 3 and 4, suggesting that facility design research

frequently incorporates both development considerations and satisfaction metrics. The weaker connections (0.2 weight) between some topics, such as between Topics 1 and 2 (Student Training Programs in Rural Nursing), indicate more specialized or distinct research streams that share fewer methodological or conceptual approaches. Topic 2 appears somewhat isolated, with predominantly lighter connections to other topics, suggesting that research on student training programs in rural nursing represents a more specialized subfield within student housing research. However, its continued presence in the network indicates its relevance to the broader research landscape, particularly through its connections to student satisfaction and social implications research. This network visualization effectively illustrates the interdisciplinary nature of student housing research while highlighting the varying degrees of integration between different research streams.

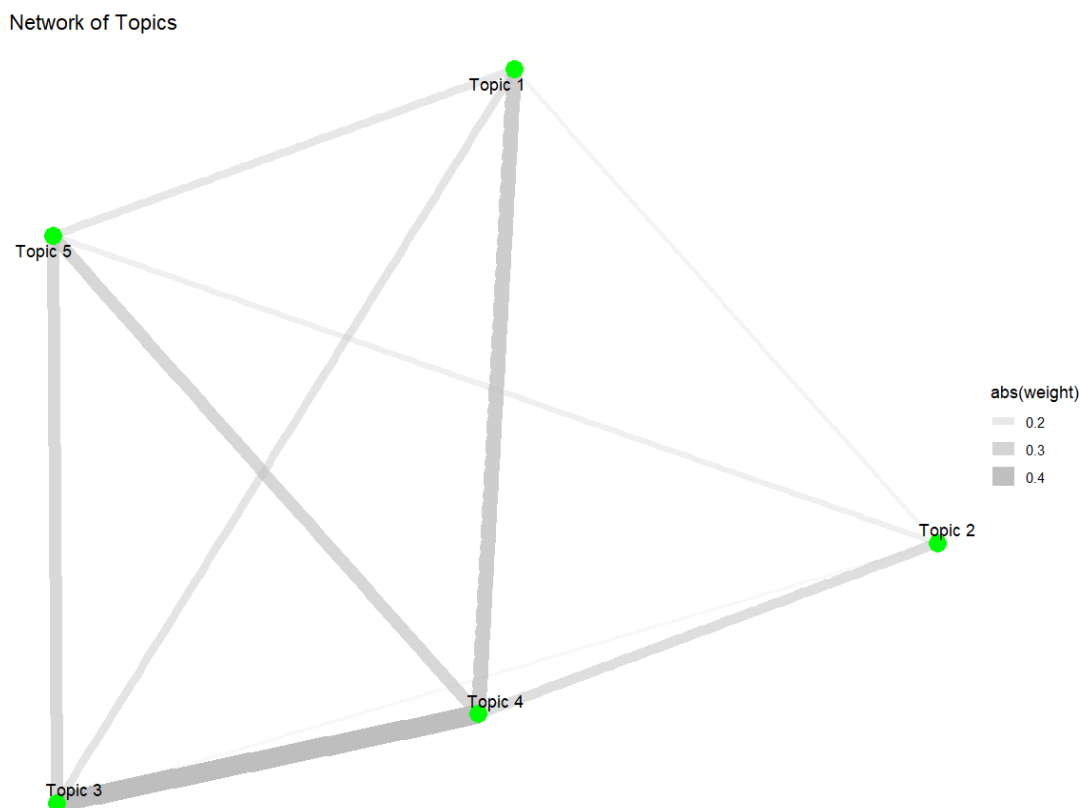


Figure 6.
Network of topics.

In addition, Figure 7 of the word cloud analysis of the five identified topics reveals distinct thematic concentrations in student housing research, each emphasizing different aspects of the field. In Topic 1, "Exploring University Student Housing and Its Social Implications," the prominence of terms such as "privacy," "unit," and "infrastructure" alongside "public" and "social" indicates a strong focus on the balance between private and communal spaces in student housing design. The presence of "college" and "universe" reinforces the institutional context of these considerations. Topic 2, focused on "Student Training Programs in Rural Nursing," demonstrates a unique vocabulary cantered around "inform," "commute," and "health," with "factor" and "educations" playing supporting roles. This cluster suggests research emphasis on educational program delivery and healthcare training considerations in student housing contexts, particularly for rural nursing education programs.

The third topic, "Campus Development and University Housing," showcases "neighbourhood" and "local" as dominant terms, accompanied by "impact," "education," and "policy." This word distribution reflects research focusing on the broader community implications of student housing development and its integration with urban planning policies. The presence of "student if" suggests attention to studentification processes in local communities. Topic 4, "Student Satisfaction in University Accommodation," emphasizes service-oriented terms with "service," "higher," and "need" appearing prominently. The inclusion of "market" and "prefer" indicates a consumer-focused approach to understanding student housing satisfaction, while "student if" suggests consideration of broader housing market dynamics.

The fifth topic, "Designing and Building Student Housing Facilities," is characterized by technical terms such as "assess," "model," and "develop," alongside "perform" and "quality." The presence of "fire" and "energy" indicates attention to safety and sustainability considerations in facility design. This cluster represents the more technical and operational aspects of student housing development. This detailed word cloud analysis demonstrates the multifaceted nature of student housing research, ranging from social and community implications to technical design considerations and service delivery aspects, reflecting the field's comprehensive approach to understanding and improving student accommodation.



Figure 7.
Word cloud of 5 topics.

3.2. Correlation Patterns and Topic Coherence

The correlation matrix analysis of the five identified topics in student housing research reveals interesting patterns of relationships and distinctions between research themes in figure 8. The matrix shows predominantly negative correlations across topics, indicating distinct research streams within the field. The strongest negative correlation (-0.41) exists between Topic 1 (Exploring University Student Housing and Its Social Implications) and Topic 3 (Campus Development and University Housing), suggesting these areas tend to be investigated separately despite their theoretical connections.

Topic 2 (Student Training Programs in Rural Nursing) shows relatively weak negative correlations with other topics, ranging from -0.12 to -0.25 , indicating a degree of independence in this research stream. This aligns with its specialized nature within the broader field of student housing research. Similarly, Topic 4 (Student Satisfaction in University Accommodation) demonstrates moderate negative correlations with other topics, particularly with Topic 1 (-0.34), suggesting that satisfaction studies often take different methodological approaches from social impact research.

Topic 5 (Designing and Building Student Housing Facilities) maintains consistent but moderate negative correlations across all other topics, ranging from -0.17 to -0.29, indicating its technical focus may operate somewhat independently from other research streams. The diagonal values of 1.00 represent perfect self-correlation, while the overall pattern of negative correlations suggests that researchers tend to specialize in specific aspects of student housing rather than taking more integrated approaches. This specialization might indicate opportunities for more interdisciplinary research that could bridge these distinct research streams and provide more comprehensive insights into student housing dynamics.

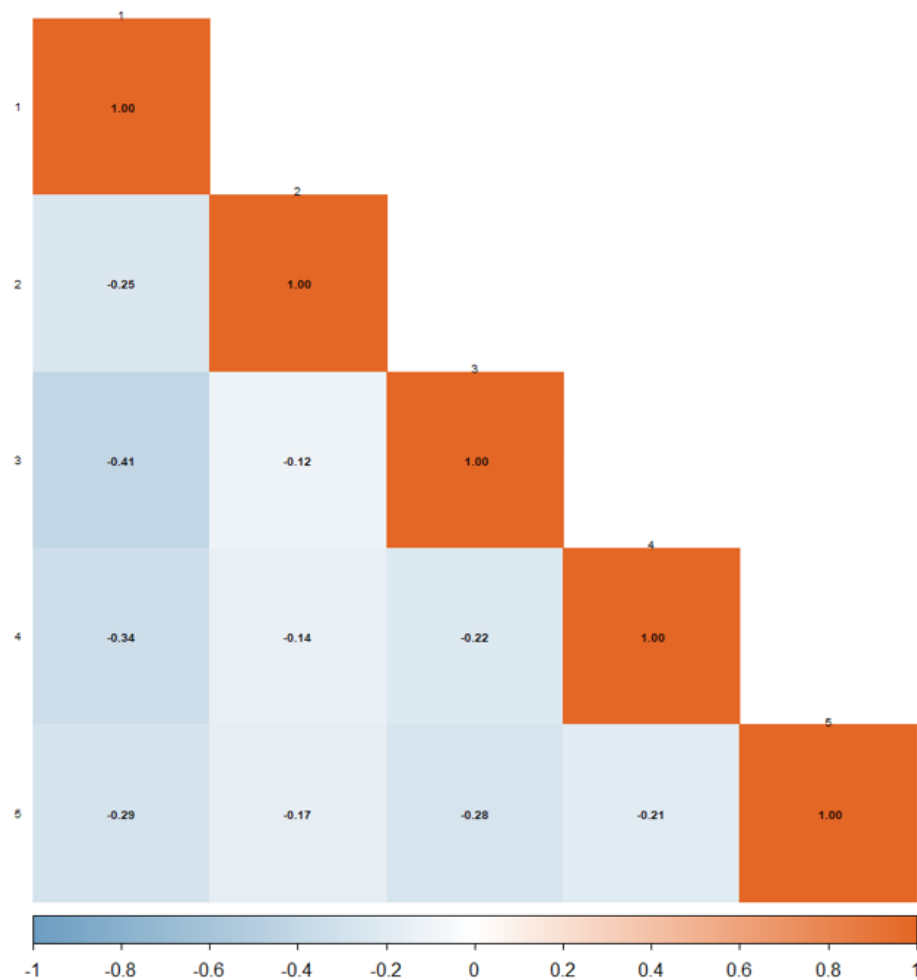


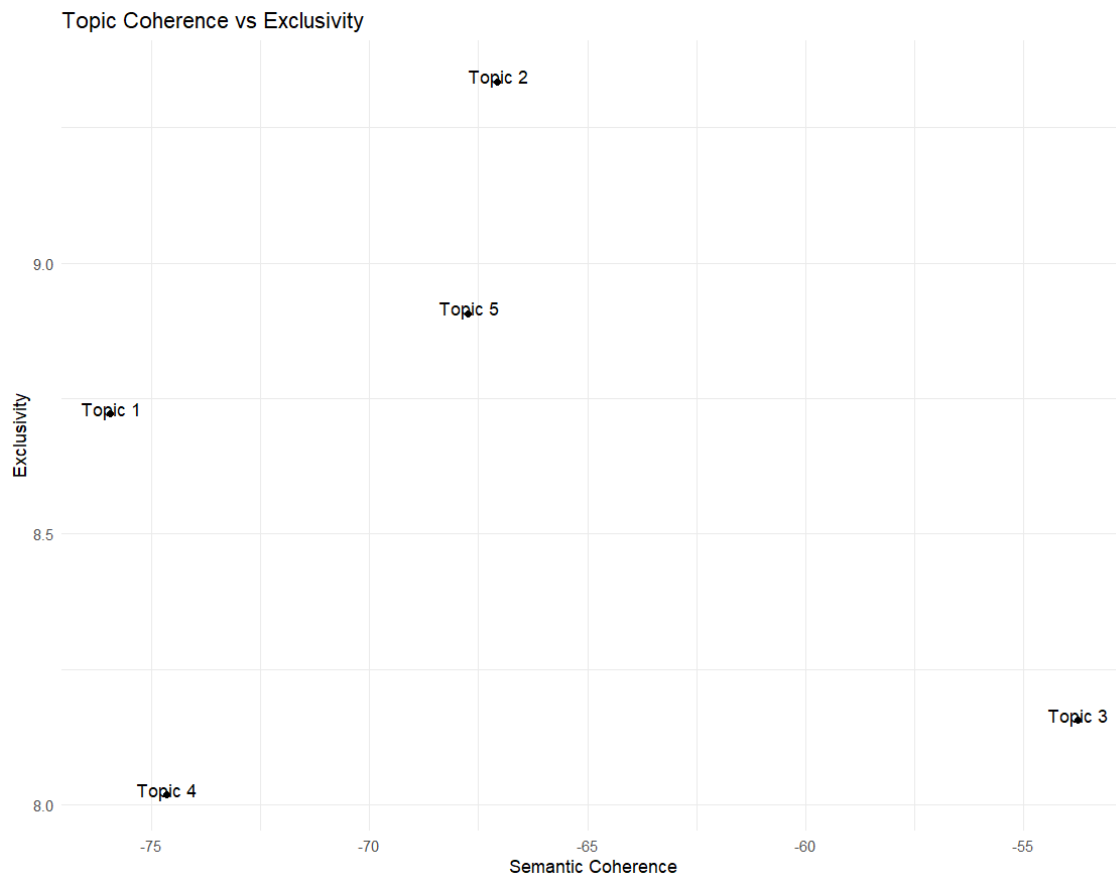
Figure 8.
Correlation matrix of the 5 topics.

The topic coherence versus exclusivity analysis provides valuable insights into the distinctiveness and internal consistency of the five identified research topics in student housing in Figure 9. The visualization plots semantic coherence on the x-axis (ranging from -75 to -55) against exclusivity on the y-axis (ranging from 8.0 to 9.0), revealing interesting patterns in how these research themes are structured and differentiated. Topic 2 (Student Training Programs in Rural Nursing) demonstrates high exclusivity (approximately 9.0) with moderate semantic coherence (-65), indicating it represents a highly distinct research stream with reasonably consistent internal terminology. This positioning

suggests a well-defined, specialized area of research that maintains clear boundaries from other topics while maintaining internal conceptual alignment.

Topic 5 (Designing and Building Student Housing Facilities) shows similarly high exclusivity (around 8.8) with moderate semantic coherence (-70), suggesting another well-differentiated research area that maintains its distinct identity while sharing some conceptual overlap with other topics. Topic 1 (Exploring University Student Housing and Its Social Implications) exhibits comparable exclusivity but lower semantic coherence (-75), indicating a distinct research stream that encompasses a broader range of concepts and approaches.

Topic 3 (Campus Development and University Housing) presents an interesting case with relatively lower exclusivity (8.2) but higher semantic coherence (-55), suggesting it represents a more integrated research area that shares conceptual space with other topics while maintaining strong internal consistency. Topic 4 (Student Satisfaction in University Accommodation) shows the lowest exclusivity (8.0) with relatively low semantic coherence (-75), indicating it may represent a more cross-cutting theme that intersects with multiple other research areas. This analysis suggests that while some topics (particularly Topics 2 and 5) represent highly specialized research streams, others (especially Topics 3 and 4) may serve as bridging themes that connect different aspects of student housing research.



Topic 9.

Topic coherence vs exclusivity.

3.3. Thematic Analysis of Student Housing Research

The analysis of student housing research reveals five distinct but interconnected themes that characterize the field's development and current state in Table 2. The first theme, "Exploring

University Student Housing and Its Social Implications," focuses on the broader societal impacts of student accommodation. As evidenced by the work of Revington and Wray [22] and Smith and Hubbard [23] this research stream emphasizes the social dynamics of student housing, particularly examining processes like studentification and gentrification. The frequent occurrence of terms such as "accommodation," "social," and "community" underscores the theme's focus on how student housing shapes both campus and urban communities.

The second theme, "Student Training Programs in Rural Nursing," represents a specialized but significant area of research. Studies by Morris and Genovese [24] and Ford, et al. [25] highlight the intersection of healthcare education and student housing needs, particularly in rural settings. The prevalence of terms like "healthcare," "rural," and "training" reflects the emphasis on developing effective placement and mentorship programs that support healthcare education through appropriate housing arrangements.

Campus Development and University Housing emerges as the third major theme, with researchers such as Franz and Gruber [26] and Gbadegesin, et al. [27] examining the physical and planning aspects of student housing. The focus on terms like "neighbourhood," "development," and "planning" indicates the importance of integrating student housing with broader campus and urban development strategies. This theme particularly emphasizes sustainability and density considerations in university housing development.

The fourth theme, "Student Satisfaction in University Accommodation," demonstrates a strong focus on the user experience aspects of student housing. Research by Gbadegesin, et al. [27] and Ruiiu [28] examines factors contributing to student satisfaction, with particular attention to comfort, maintenance, and security. The prominence of terms like "satisfaction," "quality," and "services" reflects the increasing emphasis on meeting student needs and expectations in housing design.

The fifth theme, "Designing and Building Student Housing Facilities," focuses on the technical and architectural aspects of student accommodation. Studies by Moore, et al. [29] and Reynolds [30] investigate innovative approaches to housing design, particularly emphasizing sustainability and technological integration. The prevalence of terms such as "construction," "design," and "architecture" indicates a strong focus on the physical implementation of student housing solutions.

These themes collectively demonstrate the multifaceted nature of student housing research, ranging from social impact studies to technical design considerations. The interrelation between these themes, supported by diverse methodological approaches and theoretical frameworks, provides a comprehensive understanding of how student housing influences both individual student experiences and broader institutional outcomes.

Table 2.

Thematic Analysis of Student Housing Research: Topics, Keywords, and Key Contributors.

Topic	Top Words	Frex Words	Key Authors
Topic 1: Exploring University Student Housing and Its Social Implications	Accommodation, Social, Community, Impact, Environment	Studentification, Gentrification, Urban Change, Social Cohesion, Cultural Integration	Adebowale and Simpeh [31]; Ford, et al. [25]; Revington and Wray [22] and Smith and Hubbard [23]
Topic 2: Student Training Programs in Rural Nursing	Healthcare, Rural, Training, Clinical, Education	Placement, Mentorship, Rotation, Competency, Preceptorship	Adebowale and Simpeh [31]; Ford, et al. [25] and Morris and Genovese [24]
Topic 3: Campus Development and University Housing	Neighbourhood, Development, Planning, Infrastructure, Facilities	Zoning, Masterplan, Sustainability, Urbanization, Density	Adebowale and Simpeh [31]; Franz and Gruber [26]; Gbadegesin, et al. [27]; Kurowska, et al. [32] and Leboto-Khetsi, et al. [33]
Topic 4: Student Satisfaction in University Accommodation	Satisfaction, Quality, Services, Amenities, Experience	Comfort, Maintenance, Security, Cleanliness, Affordability	Pendall, et al. [34]; Ruii [28] and Verhetsel, et al. [35]
Topic 5: Designing and Building Student Housing Facilities	Construction, Design, Architecture, Sustainability, Technology	Layout, Materials, Energy-Efficiency, Accessibility, Innovation	Moore, et al. [29]; Padhan [36] and Reynolds [30]

4. Conclusion and Discussion

The systematic review of student housing research from 2000 to 2024 reveals significant insights into the evolution and current state of privacy design in university accommodation. Through comprehensive analysis of 143 documents across 94 sources, our study identified five distinct but interconnected research themes, demonstrating the field's complexity and multifaceted nature. The temporal analysis indicates a clear shift from technical design considerations toward more social and experiential aspects of student housing, with a notable acceleration in research output from 2017 onwards, accounting for 55% of all publications in the most recent five-year period.

Furthermore, the evolution of student housing research demonstrates a significant transformation in how privacy design is conceptualized and implemented. Our analysis revealed a strong negative correlation (-0.41) between social implications and campus development topics, suggesting these areas have developed as distinct research streams, potentially limiting our understanding of their interconnections. This finding aligns with previous studies highlighting the need for more integrated approaches to student housing design. Additionally, the emergence of student satisfaction as a dominant theme, showing the highest growth trajectory from 0.20 to 0.40 between 2005 and 2020, indicates increasing recognition of student experience as a critical factor in housing design. This trend corresponds with broader shifts in higher education toward student-centered approaches and growing awareness of the relationship between living environments and academic success.

In terms of theoretical implications, this study advances our understanding of how privacy design in student housing influences both mental health and academic outcomes. The identification of distinct research streams, coupled with their negative correlations, suggests the need for a more integrated theoretical framework that can bridge these separate domains. Moreover, these findings have important practical implications for university housing developers and administrators, particularly in the integration of privacy design features with social space considerations, implementation of evidence-based design principles, and development of assessment frameworks that consider both technical and social aspects of student housing.

The study makes several unique contributions to the field, providing the most comprehensive systematic review to date of privacy design in student housing, analyzing a substantial dataset spanning 24 years. In addition, the application of topic modeling and correlation analysis offers new insights into the relationship between different research streams, while the identification of shifting research priorities provides a foundation for future research directions. Despite these strengths, several limitations should be acknowledged. The focus on English-language publications may have excluded relevant research from non-English speaking regions. Furthermore, the reliance on Scopus as the primary database, while comprehensive, may have missed some relevant studies indexed elsewhere. Additionally, the temporal analysis might be influenced by publication lag, potentially underrepresenting the most recent developments in the field.

Looking forward, future research should focus on developing integrated methodologies that bridge the gap between technical design and social impact studies. Moreover, there is a need for longitudinal studies to better understand the long-term effects of privacy design on student outcomes, along with investigations into the role of cultural factors in privacy design preferences and impacts. The examination of how emerging technologies might influence future privacy design considerations in student housing also presents an important avenue for future research. Figure 10 below illustrates the key outcomes and future directions for the student housing in privacy design.

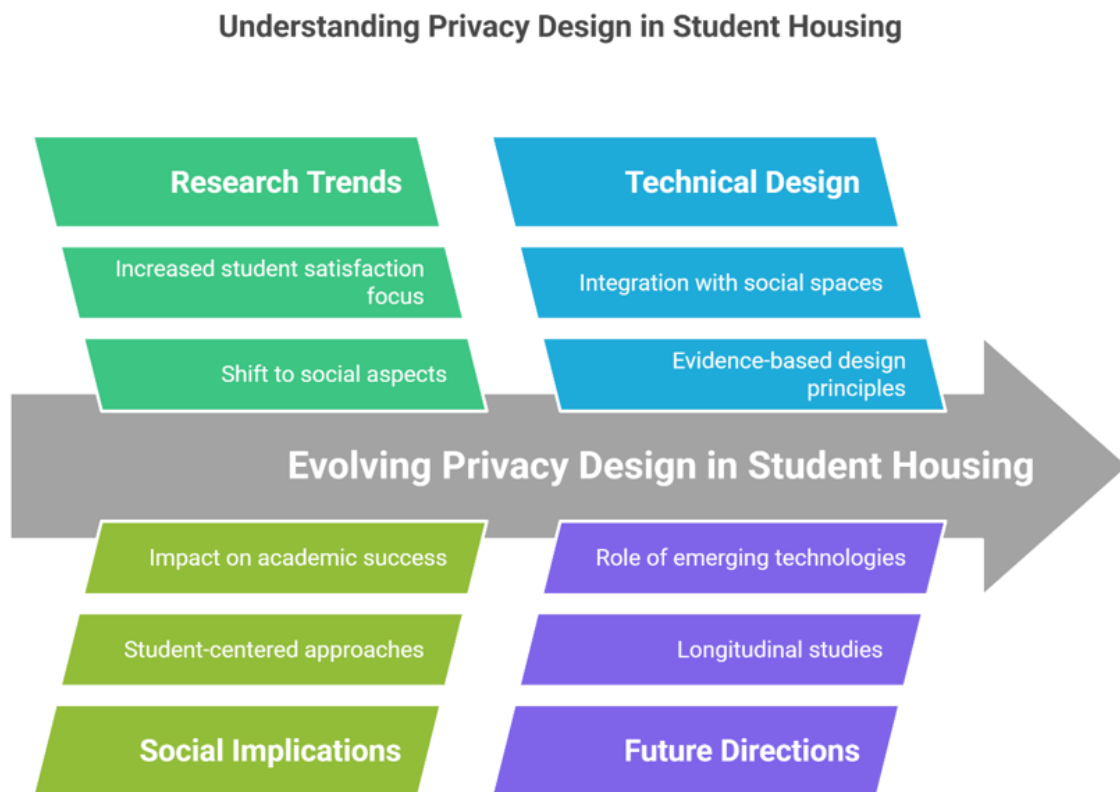


Figure 10.

Key outcomes and future directions for privacy design in student housing.

In conclusion, this systematic review provides compelling evidence of the evolving nature of student housing research and the critical importance of privacy design in supporting student wellbeing. The identification of five major research themes and their interconnections offers a comprehensive framework for understanding how different aspects of student housing design influence student

outcomes. Furthermore, the clear shift toward more student-centered research approaches, coupled with the growing emphasis on social implications, suggests a maturing field that increasingly recognizes the complex relationship between physical design features and student experience. These findings provide a foundation for more integrated approaches to student housing design that can better support both academic success and mental wellbeing in university settings.

The study's contributions extend beyond academic understanding to provide practical insights for housing developers, university administrators, and policymakers. As the field continues to evolve, future research building on these findings will be crucial in developing more effective and responsive student housing solutions that meet the diverse needs of university communities while promoting student success and wellbeing. Ultimately, this research underscores the importance of adopting holistic approaches to student housing design that consider both physical and social dimensions of the student experience.

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.

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