



The Relationship between Academic Library Design and Library Anxiety in Students

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abstract: The amount of library anxiety—feelings of discomfort and stress in a library environment—that students face is intimately connected with the design of academic library spaces. However, until this point, most research into library anxiety and the physical environment of academic libraries has not considered the relationship between the two. This literature review discusses the current research available about library anxiety and academic library design. It highlights points of overlap where, despite the best of intentions, libraries may have failed to address the antecedents of library anxiety when making design decisions and suggests that more research is needed to fully understand the correlation between the two.

Introduction

The design of academic library spaces and the level of library anxiety that students face—feelings of discomfort and stress in a library environment—are closely linked. Until now, however, most research into library anxiety and the design of academic libraries has not investigated the relationship between the two. In most cases, library anxiety researchers only consider the physical library space, including lighting, décor, and furniture. Meanwhile, research into the layout and furnishing of library spaces tends to focus on services or pedagogical changes that affect how students will use the area in a functional sense, without considering the effects physical environments have on human mental and

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emotional needs. This literature review discusses current research regarding library anxiety and library design and identifies a gap in the literature.

This article begins with an overview of the concept of library anxiety, including how the brain is involved, and a historical review of library design. Next, it identifies a gap in the research literature where these concepts have not been fully explored. Despite good intentions, libraries may have failed to address the antecedents of library anxiety when

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making design decisions. Academic library space planning has become so focused on the creation of social, informal, active learning spaces that libraries may no longer meet students' expectations for a library setting, thereby increasing their library anxiety. Finally, the article suggests that more research is needed to fully understand the correlation between these fundamental components of academic libraries.

Background of Library Anxiety

Constance Mellon was the first researcher to identify and name library anxiety. In her groundbreaking 1986 study, Mellon found that 75 to 85 percent of students describe their first experience in an academic library in terms of anxiety and fear. Mellon analyzed students' writing in introductory composition classes about what they felt using the campus library. Three recurrent themes emerged from her analysis: (1) students' feelings that their library-use skills were inadequate in comparison to those of their classmates; (2) students' feelings of shame about their perceived inadequacy, leading them to try to conceal their weakness; and (3) students' fear that their deficiency would be revealed by asking for help.¹ Although these three main themes do not explicitly mention the physical space of the library, and Mellon's work significantly lacks reference to library space, a clear connection can be seen in her definition of library anxiety: "an uncomfortable feeling or emotional disposition, *experienced in a library setting*, which has cognitive affective, physiological, and behavioral ramifications" (italics added for emphasis).²

Library anxiety is situation specific. It can affect any person at any time, and change can trigger it. For example, a student who was not previously library anxious can experience significant unease after an alteration to the library space. Qun Jaio and Anthony Onwuegbuzie, two leading researchers in the study of library anxiety, identified three antecedents of library anxiety: dispositional, situational, and environmental. Dispositional antecedents are internal factors, such as self-esteem and self-concept, tendencies toward perfectionism, or study habits and proclivity toward procrastination. Situational antecedents are factors related to the immediate environment. These generally relate to the nature of libraries and range from knowledge of libraries and the information search process, to physical library characteristics, including "the layout and decor of the library, as well as whether the library has appropriate signs and floor plans, uncluttered aisles, and appropriate access for physically challenged users."³ For example, flooring colors



and patterns may create unnecessary obstacles for users with diminished sight, who often rely on such cues for navigation.

The third antecedent of library anxiety identified by Jiao and Onwuegbuzie is environmental factors, such as demographics and experience. Although not as clearly determinative as dispositional antecedents for a student's propensity to experience library anxiety, the library environment can greatly affect students' levels of library anxiety.⁴ One common example is the language used in academic libraries.⁵ One student in Mellon's study commented that being in the library was like "being in a foreign country and unable to speak the language."⁶ James Elmborg concurs, stating that students "learn that their words do not work in the library. Many will be intimidated or lose confidence, a reasonable explanation for the age-old problem of 'library anxiety.'"⁷ Library classification systems, in particular, function as linguistic obstacles for many students.⁸

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In the decades since Mellon's study, studies about library anxiety and its causes have ranged in focus from ESL (English as a second language) students to graduate and professional students, and multiple instruments have been created to measure students' anxiety.⁹ The best-known and most widely used instrument is the Library Anxiety Scale (LAS) developed in 1992 by Sharon Bostick.¹⁰ The LAS is based on the five factors most commonly identified as hindrances to library use and triggers for library anxiety: (1) barriers with staff, (2) affective barriers, (3) comfort with the library, (4) knowledge of the library, and (5) mechanical barriers.¹¹ Many of these elements relate to challenges using the online public access catalog and databases, difficulty working with library staff, and a lack of appropriate information literacy skills.¹² Marisa McPherson expanded these institutional factors to include the size, layout, and organization of floors of the library and its collection; noise levels; poor ventilation; lighting and air conditioning; signage; and computer facilities.¹³ Feelings of anxiety associated with physical characteristics of the library tend to increase procrastination and reduce the time students spend there.¹⁴ This, in turn, increases anxiety levels related to navigating the library, boosting the likelihood that students will overlook or misinterpret signs and directions while looking for materials.¹⁵

The relationship between library anxiety and physical spaces can also be inferred from Mellon's findings regarding students' first experience in an academic library. She notes, "Most of the students who discussed their fear of the library talked about feelings of being 'lost.'"¹⁶ Jiao and Onwuegbuzie suggest that not only are students feeling lost but also they fear that asking for help will be perceived as a failure, exacerbating their anxiety.¹⁷ As a result, discomfort while navigating the library amplifies students' conceptions that other students do not struggle, that requesting assistance will reveal their shortcomings, and that they need to hide any

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weaknesses they feel while using the library.¹⁸ This cycle greatly increases the probability for students to do poorly on library-centric assignments, such as research papers and presentations.¹⁹ Jiao, Onwuegbuzie, and Bostick explain this phenomenon when they state, "When searching for books or periodicals, a high-anxious student may misread or overlook signs and maps, misinterpret directions and cues, refrain from asking for help, or give up their search relatively quickly."²⁰ As Mellon asserts, "Many students become so anxious that they are unable to approach the problem effectively."²¹

Library Anxiety and the Brain

The symptoms of library anxiety are much the same as those of other types of anxiety. Physiological symptoms include increased heart rate, respiration, and blood pressure.

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library searches. These perceptions can culminate in shame, concealment, and subsequent avoidance behaviors.²⁴

Anxiety is an emotional state or affect.²⁵ Unlike biologically based emotions, such as joy, fear, surprise, disgust, anger, and sadness, emotional states or affects are the body's physiological response to an emotion. They are fleeting and can change second-by-second.²⁶ Every aspect of human behavior is dependent on emotional states. As Eric Jensen writes in *Teaching with the Brain in Mind*, "Emotions organize and create our reality."²⁷ Emotions help us orchestrate our attentional priorities, support persistence or retreat, provide us with information about the outside world, associate our learning with pain or pleasure, push the pursuit of rewarded behavior, and allow us to enjoy and celebrate successful learning experiences.²⁸ Because emotional states are not static, library anxiety is also not a constant condition. Changing the emotional triggers of the physical environment can change the experience of the library.²⁹ A student whose emotional state hinders

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Affective symptoms include apprehension, frustration, and learned helplessness.²² Feelings of anxiety associated with the physical characteristics of the academic library may increase students' tendency to delay and fall behind in their academic work and make them leave the library sooner.²³ Furthermore, highly anxious students often lack confidence about general library use and conducting

effective use of the library may find it impossible to study or do research until the emotional state changes.³⁰ Properly designed spaces can help manage the flow of emotional states and set up students for positive library experiences.³¹

The biologically based emotion related to library anxiety is fear, the first emotion triggered when the brain perceives a threat, which leads to stress and uneasiness. The perception of danger travels on the most

direct route through the brain from the thalamus to the amygdala, an area deep within each temporal lobe that processes threats, to respond quickly and provide protection from the perceived peril. High levels of stress and anxiety put the brain into distress, causing heightened excitability or arousal, perception of the event as aversive, and a loss of controllability. During periods of library anxiety, students experience decreased awareness of alternate paths to access information, thereby increasing their feelings of failure and hopelessness. Distress also triggers the release of corticosteroids, chemicals that decrease the brain's ability to respond rationally to threatening situations. Those chemicals decrease blood flow to the top of the frontal lobes, where "on your feet" thinking takes place, and so force reliance on our basest survival instincts.³² While this response is appropriate when facing a life-or-death situation, it is not conducive to effective library use.

To quote Eric Jensen, our "emotions drive attention, create meaning, and have their own memory pathways. They regulate behaviors, and they help us to organize the world around us."³³ Human beings are highly susceptible to subtle environmental cues, and even small changes can influence emotional states. Because emotion can either hinder or improve learning, and surroundings can constrain or encourage behavior, it is imperative that we understand "what kinds of library environment provoke negative reactions so that intervention measures can be properly tailored."³⁴

The brain's natural response to fear and threat can greatly affect cognition and negatively impact academic success. Library anxiety is "characterized by negative emotions including tension, fear, feelings of uncertainty and helplessness, negative self-defeating thoughts, and mental disorganization, all of which have the propensity to debilitate information literacy."³⁵ Distress impairs verbal, working, and episodic memory, and prolonged or chronic stress can impede the ability to determine what is important and what is not.³⁶

Library anxiety can have multiple lasting impacts on students' library interactions, and severe library anxiety can lead to failure.³⁷ To protect itself, the brain remembers stressful situations and learns from them. Strong emotions, like those associated with threatening circumstances, increase brain stimuli and cause the creation of more explicit memories.³⁸ Because the brain is set up to experience pain and sadness longer than feelings of joy, students will more likely dwell on negative library experiences than positive ones.³⁹ A student whose first library visit is unrewarding will more likely feel library anxiety on the next attempt.

Fear of having another bad experience commonly causes students to reduce their time in the library, which in turn, prevents the development of appropriate library skills. On the other hand, nonthreatening library environments increase awareness of available and active ideas, and boost subconscious synthesis of information, which decreases anxiety.⁴⁰

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Library Design Overview

Intentional academic library design can be traced to the advent of the library itself in the monasteries of the Middle Ages. Monastic library traditions were adopted with the creation of the first Western universities in the Middle Ages and evolved slowly until the twentieth century. During the first half of the twentieth century, most library design adhered to the traditional ideals of space for collections and quiet reading and contemplation. In the 1960s and 1970s, however, library collections expanded to include new nonprint resources. To make room for these new materials, many libraries underwent large renovations or moved to new buildings.⁴¹ In the 1980s and 1990s, library design changed rapidly. New pedagogical practices and progress in information technology, particularly word processing advancements and the invention of the World Wide Web, led to a period of renovation and new construction. From 1992 to 2001, across the United States, an average of 2,874,000 gross square feet of academic library space were renovated or built annually, with an annual price tag of roughly \$449 million.⁴²

As information technology became a necessity for academic research and teaching styles evolved, the look of libraries changed drastically, as did students' learning behaviors and expectations.⁴³ Students could easily access content and contact librarians electronically, so they no longer needed to go to the library to meet their research needs. Gate counts and circulation statistics decreased, leading to the creation of the Information Commons, a popular addition to library design in the 1990s. Information Commons were meant to be "a physical convergence of digital or technological tools and assistance with traditional reference services, resources, and areas."⁴⁴ Spaces devoted to learning the newest technology meant libraries took the lead in digital humanities projects.⁴⁵

Conception of library spaces during this period typically fell into two categories, service-oriented spaces that prioritized holding, organizing, and making information available; and learning-oriented spaces, where the main goal was to encourage scholarship and the acquisition of new knowledge.⁴⁶ As active and social learning models that focused on collaborative learning and problem-solving came to dominate pedagogical practices, the primary objective of the library became to facilitate the learning of the university community.⁴⁷

In the early 2000s, it became clear that students not only needed access to rapidly developing technology but also required collaborative spaces where they could work together. Libraries created more group study areas and encouraged nontraditional uses of library space. The Information Commons evolved into the Learning Commons, an "informal learning space" intended to function as an open and flexible space where multiple student learning needs could be met through easy reconfiguration.⁴⁸

Many building renovations featured open floor plans that brought "the promise of ongoing reconfiguration as the building learns, through use and emerging trends, what is required of it as a space."⁴⁹ The University Center Library (now the Johnson Center Library) at George Mason University in Fairfax, Virginia, was one example. The planning committee aimed to design a building with "space for collections but not dominated by its collections."⁵⁰ As a result, the library's planners focused on creating spaces for students with different learning styles to succeed, including a mix of carrels, tables, and lounge seating.⁵¹ Georgia Tech (Georgia Institute of Technology) in Atlanta took flexibility to an



even higher level with the renovation of its Library East Commons. It created a mixed-use space in which all the furniture, and even many walls, were movable. Students could rearrange the space and even change the lighting levels to fit their needs.⁵²

Another feature was a reconfigured layout of the library stacks. The James B. Hunt Jr. Library at North Carolina State University in Raleigh integrated a library robot to house its collections in a smaller footprint and increased the space available for student use and different configurations of study areas.⁵³ Still other schools removed most of their holdings from their on-campus library buildings altogether. The University of Denver's Anderson Academic Commons, the school's main library space, houses roughly one-third of the library's collections on rolling stacks on one floor. The remaining materials are stored off campus, and students use digital browsing software to request resources from the collection.⁵⁴ By removing the traditional stacks, libraries have increased the portion of their building's footprint dedicated to commons areas and better provided for multiple learning styles and preferences.⁵⁵

The latest trend in library design is the evolution from Learning Commons to Academic Commons. Unlike the Information Commons or Learning Commons, an Academic Commons is not just a library space but a convergence of university learning service providers under one roof. Academic Commons are integrated student hubs where learners can conveniently access everything they need. Such facilities are considered an efficient and effective way to support students and have taken inspiration from trends in public libraries, coworking spaces, and even airport terminals.⁵⁶ Rather than simply providing information technology or computing help as the Information Commons did, or collaborative social learning spaces as the Learning Commons did, these integrated hubs coordinate personal support for students. They provide services ranging from health and wellness to career and financial advising, tutoring, and more traditional library services such as research support.⁵⁷ For example, a "services mall" on the zero level of the Saltire Center at Glasgow Caledonian University in Glasgow, Scotland, offers multifunctional social-learning spaces, a café, and individual carrels.⁵⁸

Understanding students' desires and expectations is one way the library can attract and enhance the academic community.⁵⁹ Academic Commons are tools for recruiting new students to campus.⁶⁰ Ronald Beckers, Theo van der Voordt, and Geert Dewulf declare, "It is expected that higher education institutions have to offer their students more of these alternative learning spaces," and Academic Commons can do so.⁶¹ They provide a physical representation of the educational mission of the parent institution.⁶² As Les Watson points out, "The design of the library is about more than the sum of its functions, and becomes the embodiment of the academic values, moral and ethical framework that form the substance for the 'idea of the university' and 'the idea of the student.'"⁶³ The library is one of the only entities that touches all other parts of the university community. It often occupies a central location on campus and has consistently been called the "heart of the university."⁶⁴

The technological advances that sparked renovations in the 1990s continue to be a primary motivator of library design. Technology-rich spaces that enable widespread use of both wired and wireless devices are a necessity. Students today expect their campus facilities to reflect and support state-of-the-art technology.⁶⁵



Educational innovation also consistently motivates changes in library design.⁶⁶ Movement toward the creation of a “student-centered” library renewed emphasis on understanding how students acquire knowledge, to better facilitate their learning in the space they choose.⁶⁷ Libraries are uniquely situated as third spaces—that is, spaces which cannot be classified as either home or work—to impact student achievement and provide an ideal environment for experimenting with new learning models.⁶⁸ These priorities will continue to drive design as the future of learning places more emphasis on the use of technology, knowledge integration, and viewing learners as producers, generating new knowledge to share with the world.⁶⁹

A Gap in the Literature

Although the library literature provides abundant research about library anxiety and a thorough description of changes to physical library spaces over time, connections between library anxiety and library design have, until this point, not intentionally been studied together. One explanation for this gap may be that learning is a highly individualized change in personal knowledge, reliant on such variables as experience, personal distractions, or learning styles. It is difficult to identify and assess the influence of space on student learning. However, as participatory design studies show, it is not impossible (see the discussion later in this paper).⁷⁰

Despite advances in information technology, shifts in pedagogical practices, and adaptive design trends, the psychological and emotional aspects that affect student learning have remained relatively static. As Jensen points out, “One of the first things students do when they walk onto a school campus is look around. They also listen, breathe in the air and form judgments about the environment. Students then decide whether their surroundings feel familiar, safe, and friendly—or not.”⁷¹ These judgments are made continuously and automatically and play a large part in cognitive performance. Jensen identified five variables that have the greatest effect on academic success: (1) seating, (2) lighting, (3) noise, (4) temperature, and (5) building design, which is further broken down into different aspects (see Appendix A). All these variables combine to create a positive or negative experience and directly influence the amount of library anxiety that students experience (see Figure 1).⁷²

Where Library Design Misses the Mark

One of the most prominent ways that library spaces fail to address the antecedents of library anxiety is through reactionary library design, meaning that large-scale renovations take place only in reaction to spaces that have become dysfunctional. As Scott Bennett observes, “It is, after all, commonly the case that severe problems with library space go unaddressed for years, or even decades, ensuring that most members of the academic community have vivid, firsthand experience of them.”⁷³ An example is Delaware State University’s William C. Jason Library in Dover, which underwent a large renovation in 2015. A failure to keep up with building maintenance and a lack of funding had combined to create an unappealing space plagued by mold and mildew, interiors that badly needed paint and new carpeting, broken lighting fixtures so out of date that

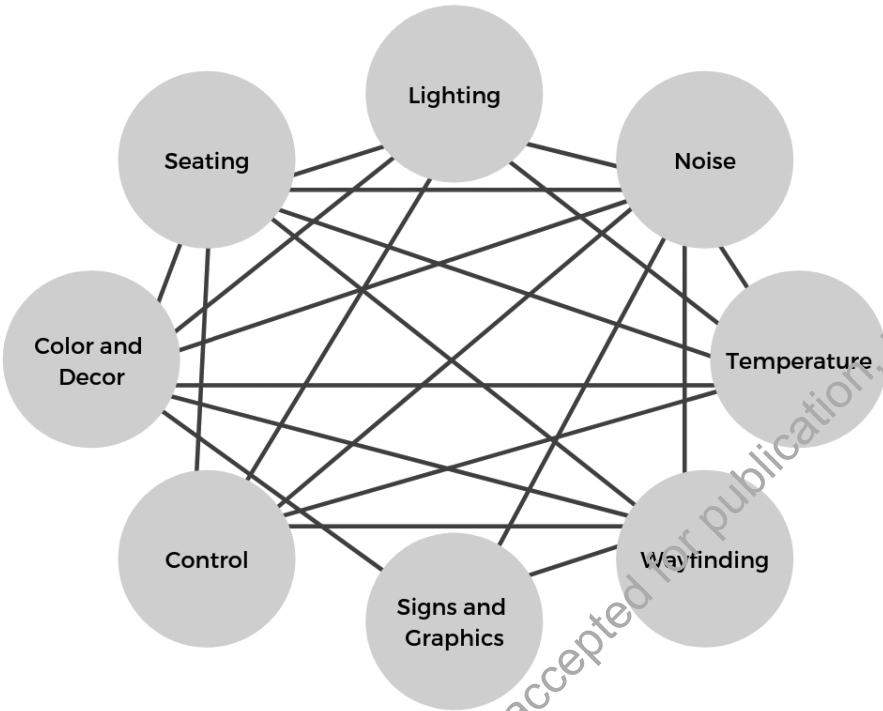


Figure 1. Connections between environmental variables that affect student success, according to Eric Jensen in *Teaching with the Brain in Mind*.

replacement parts could not be found, and an overall feeling of decrepitude. Regular small-scale renovations and maintenance might have greatly improved the perception of the library environment.⁷⁵

There are legitimate explanations why problems with library space persist longer than they should, including budgetary constraints, available building technology, and the inflexibility of existing building footprints. However, much library design focuses narrowly on reacting to specific problems rather than creating a library environment that is continuously functional and allows students to feel comfortable.⁷⁵ Furthermore, much of the physical space evaluation done by designers, architects, and library practitioners comes in the form of post-occupancy evaluations completed after a space has been redesigned and renovated, when changes are more difficult and costly.⁷⁶

One identified issue with an overly conservative and reactionary approach to library design is the number and placement of electrical outlets. Although students increasingly rely on personal technology devices, and wireless Internet access has become the

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norm, the number and location of outlets often remain the same. Outlets were originally placed on walls or columns, and furniture was chosen and arranged based on intended

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use rather than accessibility to electric power.⁷⁷ For example, in a 2009 investigation of student preferences for study space at Indiana University–Purdue University Indianapolis, Christina Applegate found that areas with limited or no electric service would less likely be used.⁷⁸ Thus, regardless of the intended purpose of an area or its

practicality for the student's needs, spaces with access to electrical outlets are consistently at a premium.⁷⁹

Another main area where library designs miss the mark is maintaining an appropriate balance between different types of learning spaces.⁸⁰ Learning spaces can be broken into four general types: (1) active or engaging communal space; (2) interactive collaborative areas for individual research or group work; (3) quiet, less active space; and (4) out-of-the-way contemplative settings.⁸¹ Each of these types of learning space has, at one point or another, been dominant in academic libraries. Academic Commons are active or engaging communal spaces, and Learning Commons are classified as interactive collaborative spaces. More traditional library settings, such as reading rooms or study lounges, fall into the quiet, less active category, while carrels are out-of-the-way contemplative spaces.

Learning space preference depends on the learning activity taking place. In most cases, Beckers, Van der Voordt, and Dewulf say, "Students' preferences regarding learning

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spaces are more influenced by their perceived effectiveness, such as being able to conduct the learning activities in a particular way."⁸² The diversity of students' interests, expectations, and needs makes it difficult but not impossible to design spaces that will satisfy everyone.⁸³ Providing multiple learning environments and encouraging a diversity of learning styles are crucial to the creation of continuously effective library spaces in which students feel comfortable and confident in their abilities to use the library effectively.⁸⁴

Asking students what is important in an academic library space sheds light on the areas of library design that affect library anxiety. Bennett states that successful space planning requires thoughtful and attentive consideration of "what students tell us about the behaviors they use to discipline themselves successfully for study."⁸⁵ Participatory design is a method that gathers and analyzes specialized knowledge from all users of a space and incorporates it into the plans to ensure that the users' needs are met.⁸⁶ Participatory design offers a unique "opportunity to understand the learning culture of one's own institution and how it may resonate with and differ from the cultures of other colleges and universities."⁸⁷



Similarly, case studies offer library designers unique insight into the way students think about library spaces. In 2008, Michelle Twait, a reference coordinator at Gustavus Adolphus College in St. Peter, Minnesota, taught a course in which undergraduate students were charged with designing their ideal academic library. Prior to beginning the design process, Twait asked her students to clarify why they did not study in the library. Responses ranged from the “institutional eggshell white” of the walls, to the lack of individual study rooms, to the ticking clocks throughout the library, indicating that students are intensely affected by the physical spaces where they study and that something as simple as a ticking clock can diminish concentration and elicit library anxiety.⁸⁸

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In a planning survey for the renovation of the Jessie Ball duPont Library at Sewanee: The University of the South in Sewanee, Tennessee, students identified quiet as an important aspect of the physical library space. They referred to quiet as both the audible noise level and the level of activity within the environment. Interestingly, the students stressed that a space may be too quiet, causing them to feel isolated and uncomfortable, two of the emotional responses identified by Erin McAfee as indicators of shame, which is one of the main causes of library anxiety.⁸⁹ This distinction of quiet as both a function of the amount of noise and the level of activity emphasizes the need for a balance of different types of learning spaces.

Twait's students' needs and desires echoed the requests of Sewanee students. Common responses were natural lighting to combat the harsh fluorescent lights; a café; traditional reading rooms that offer quiet spaces without feeling secluded; ways to access the library 24 hours a day, 7 days a week, so students could study whenever it was convenient; a conference room for collaborative work; individual lamps for the study carrels to increase personalization of study spaces; longer couches where students could power nap; and more individual study rooms.⁹⁰

Participatory design studies and discussions with students about their expectations for academic libraries disrupt some commonly held notions that guide library planners in designing libraries.⁹¹ By listening to students' voices in the planning of the building from the beginning, designers, architects, and planners can understand more deeply the expectations of students and how they function within academic libraries, including removing anxiety-evoking factors such as ticking clocks.⁹²

Expectations, Aura, and Anxiety

The expectations of students, faculty, and staff about what a library “is” and “should be” are perhaps the largest contributors to the library anxiety students experience. These expectations are built upon portrayals of academic libraries in the media and past experiences with libraries in general. Common depictions of academic libraries in books, films, and television show spaces that are old, stately, and meant to be used by serious scholars for serious scholarly work. They shape how students approach their academic library experiences. For many, this creates the “aura argument,” which holds that being in the sober and scholarly academic library, surrounded by other serious scholars doing



earnest scholarly work, students are transformed into serious and productive scholars. The provost at George Mason University took advantage of the effect of the aura argument in the design of the University Center. He requested that students engaged in social activities see other students studying. Students can see into library areas from all floors of the University Center, thereby creating the illusion that the entire building is a space dedicated to learning.⁹³

Students draw on their previous experiences to create expectations of what an academic library is and should be.⁹⁴ Most students' library experiences prior to entering college take place in a public library or an often small and ill-equipped K-12 school library.⁹⁵ In either case, students' expectations do not align with the reality of what the academic library has become, increasing a feeling of unfamiliarity which, in turn, increases the likelihood that they experience library anxiety. McPherson found that first-year students' feelings of anxiety, even at a relatively small academic library, "seemed to have been influenced largely by unfamiliarity with the library on their first visit, the size of the building, and the fact that students had to maneuver multiple floors."⁹⁶

Unfortunately, the expectations of library professionals, faculty, and scholars of what students know about using academic libraries are similarly mismatched. Beckers, Van der Voordt, and Dewulf suggest that "modern students are supposed to be self-directed

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learners, who take responsibility for their own learning process, learn how to build and use networks, cooperate with others, and use information and communication technology to find appropriate information."⁹⁷ Instead, decades after Mellon's original study, students continue to report that they were never taught to use the academic library; rather, their professors expect them to just know how to do so.⁹⁸ With previ-

ous experiences that leave a majority of students lacking of information-handling skills to guide their academic library use, and their expectations for physical library spaces failing to match the reality, it is no surprise that the performance expectations placed on students increase their library anxiety.⁹⁹

Further, there is a divide between the expectations of library professionals and scholars and students regarding what learners need and want in library spaces. This disconnect is well-documented in the literature. Library professionals and scholars continuously express the belief that students want social spaces where they can meet up with friends and take a break from the rigors of their coursework, comfortable lounge furniture, and areas where they can access everything the university offers.¹⁰⁰ However, these beliefs are repeatedly challenged by students' responses when asked what they need and want in an academic library space.

Silas Oliveira's 2016 study on students' space preferences at the James White Library of Andrews University in Berrien Springs, Michigan, illustrates this difference. Oliveira found that "contrary to popular understanding today, the subjects of this research did not value social spaces as it had been profusely promoted and accepted by library professionals and scholars."¹⁰¹ Oliveira's study confirms the findings of Cindy Pierard and Norice Lee's 2011 study: "Our team had expected that we would see a stronger desire



for small or large group space, as well as social space. Yet, large group spaces, social spaces and coffee shop received lower rankings than individual spaces."¹⁰²

In fact, 65 percent of respondents to Oliveira's study sought areas or spaces where they could concentrate without being bothered.¹⁰³ Students' preferred spaces where they would not be disturbed and would not distract others. Even when students worked in groups, they desired a quiet environment.¹⁰⁴ Oliveira asserts that, based on students' responses, "Socialization is not an important factor that would lead or influence students to frequent the library to a significant degree, if and when this type of space is offered."¹⁰⁵ In additional support, 52 percent of students surveyed at Loughborough University in Loughborough, United Kingdom, said they chose to study in the library because of the quiet environment.¹⁰⁶ These findings echo those of Sewanee's students and are not surprising when one takes into account the fact that the human brain processes 20,000 bits of auditory stimuli per second.¹⁰⁷

Further evidence of the divide in expectations is found in the literature regarding students' seating preferences. Christina Applegate found a "surprisingly high use of the traditional carrels," which had long been considered out-of-date and unpopular.¹⁰⁸ Lounge furniture, a popular choice aimed to create comfortable spaces, was specifically labeled by one student as "not suitable for studying" in Çağrı İmamoğlu and Meltem Gürel's 2016 study on student seating preferences and territoriality. İmamoğlu and Gürel found that, although open seats were available in the library study hall, students would not use them because they perceived the space as full.¹⁰⁹ Consistent with personal space theory, which holds that most people feel discomfort or distress when their personal space is encroached, students preferred to sit diagonally from another student rather than directly across from or next to each other at a shared table.¹¹⁰ A personal "bubble" is widest at the front and narrows around the sides and back, and students who feel anxious tend to seek spaces that are more spread out.¹¹¹ Rectangular tables make it easier to mark out an individual's territory and tend to be preferred for study activities, particularly with dividers that create a sense of privacy without isolation.¹¹² Although these examples are not specifically from studies of library anxiety, the mismatch in expectations provides some insight into how physical space and anxiety intersect.

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Moving Forward

Alison Cleveland argues that changing the academic library environment is one way to reduce students' library anxiety levels and in turn increase the potential for successful student use.¹¹³ By integrating the findings from current research into library anxiety and



library design, case studies, and the psychological aspects of learning, a library can begin to decrease students' anxiety (see Appendix B for suggestions). One of the simplest and most cost-effective changes is to clearly communicate the behavioral expectations within each library area and create contexts where appropriate behavior is instinctual rather than enforced.¹¹⁴ Onwuegbuzie, Jiao, and Bostick say:

If the library is to be a pleasant space where opportunity to socialize is expected, space and furnishings should be arranged with that in mind. A combination of small and large round tables should be put intermittently so that some people can talk and be physically close to one another. If the library is intended as a research facility where serious concentration is the goal, the layout should consist primarily of small rectangular tables to help preserve personal space.¹¹⁵

A lack of clear and proper signage has consistently been identified as one of the institutional antecedents of library anxiety, which can be eased by updating library signage and ensuring proper placement of signs and wayfinding information.¹¹⁶ Signs and graphics funnel and simplify the environment for the user.¹¹⁷ Too much distance

A lack of clear and proper signage has consistently been identified as one of the institutional antecedents of library anxiety, which can be eased by updating library signage and ensuring proper placement of signs and wayfinding information.

between help desks, finding aids, and materials can be a psychological and spatial barrier to location and delivery of library resources.¹¹⁸ Considering the finding that two-thirds to three-fifths of library users hesitate to seek help and dislike revealing their perceived ignorance, updating signage can also help to alleviate dispositional antecedents of library anxiety.¹¹⁹ Onwuegbuzie, Jiao, and Bostick emphasize that the "user has the right to use the library without having

to ask for assistance."¹²⁰ Similarly, careful naming of spaces helps to clarify behavioral expectations and limit the types of activities deemed acceptable there.¹²¹ As Watson points out, spaces should "speak" to their intended use, conveying a clear expectation.¹²²

Another strategy for decreasing library anxiety is to focus on the experience created by a space and students' needs as learners in conjunction with the services provided there.¹²³ The experience of a space is created by what it suggests subliminally or overtly.¹²⁴ It is "dependent on the quality of the space, how it is organized and the services provided within the space."¹²⁵ Traditionally, library and other non-classroom spaces are intended to provide services rather than attend to students' needs as learners.¹²⁶ As a result, however, library designs often fail to consider the effects that sound, furniture, or the density of people have on the user's experience within a space.¹²⁷

By prioritizing student experience and learning needs, and remaining flexible as students' requirements and expectations change, libraries can be designed to better fit the expectations of students for their academic library environment.¹²⁸ The East Commons at Georgia Tech is an example of how focusing on the experience provided to students has helped to manage their expectations. Students do not expect to enter a static space in which everything remains the same each day. The customizability of the space creates a



feeling of ownership for students that is seldom found in an academic library setting.¹²⁹ Similarly, the individual carrels in the Saltire Center at Glasgow Caledonian University, within the larger, open services mall, offer students the ability to work quietly and independently without distraction while still feeling that they are amid the “buzz” of a busy and productive space.¹³⁰

Academic libraries must strive to strike the correct balance between social learning and individual, quiet learning spaces, which may seem difficult. Academic library spaces that focus too heavily on social learning assume students’ preferences and needs (accurate or not) over current trends, expectations, and common beliefs. Social and collaborative areas are valuable, but without offering equal space for more traditional, quiet, group and individual learning, the needs of a large segment of the student population are not satisfied. Furthermore, spaces that overly focus on social and collaborative learning remove the “aura” of the library that many students desire and seek. Students consistently report their preference for areas “designed to accommodate patrons who want or need to study by themselves”; that are quiet but not silent; and where they feel that they are a part of the community, not isolated.¹³¹ The fact that students often use areas intended for social or group study for quiet individual study space is evidence of this phenomenon.¹³²

...spaces that overly focus on social and collaborative learning remove the “aura” of the library that many students desire and seek.

Conclusion

Since Constance Mellon first identified library anxiety in the mid-1980s, scholars have worked to better understand the antecedents, symptoms, and implications of this phenomenon. Library professionals and scholars have found common triggers for library anxiety and learned more about its lasting effects on student success. Studies have focused on the needs of different populations of students, changing understanding of student learning styles and pedagogical practices, and how the cycle of library anxiety can be disrupted through different interventions. However, these studies have focused heavily on the theoretical aspects of library anxiety, such as interpersonal communication and library instruction, while ignoring the physicality and psychology of anxiety and the effects of the physical environment on students’ neurological processes.

Research related to the design of library spaces has been influenced by the effects of technological advances and changes in pedagogical practices. Studies focus on service provision and function, without giving equal consideration to how students will perceive and respond to the physical environment in terms of their emotions and learning needs. Despite changes in technology and teaching and learning philosophies, the psychological and emotional aspects of students’ learning have remained much the same. Recognition of students as human beings with bodies, whose actions are governed by instinct and need, has been left out of the discussion.

More research is needed to fully understand the intricacies of the relationship between library anxiety and library space design explored in this literature review. Valuable connections can be made by conducting more qualitative studies like Constance



Mellon’s and by analyzing students’ responses from experiences like those in Michelle Twait’s case study. Increasing the depth of knowledge within the field of library and information science about the psychological explanations for students’ behavior will increase library professionals’ and scholars’ understanding of and ability to address library anxiety. A better grasp of the psychological causes of library anxiety will also help to increase the number of explicit connections made to features of library design. Although there are implied links in current research, little empirical evidence supports them. Finally, it is imperative that contemporary library anxiety and design research be added to the literature. Most of the research on library anxiety and library design dates from the early 2000s. With the ever-increasing rate of technological developments, more research in both these areas, and particularly the intersection of the two, will ensure that academic libraries remain relevant regardless of what the future holds.

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Appendix A

Environmental Variables That Have the Greatest Effect on Academic Success, according to Eric Jensen

Note: The citations included here offer support for Jensen’s list of factors that affect academic success.

Factor	Why it matters
Seating	<p>According to personal space theory, most people feel discomfort or stress when their personal space is encroached.¹³³</p> <ul style="list-style-type: none">◦ Each person’s individual “bubble” is widest at the front and narrows around the sides and back.¹³⁴◦ Anxiety tends to increase the amount of space considered comfortable and causes people to seek spaces that are more spread out.¹³⁵• Seating choices are most often made based on the task being completed.¹³⁶<ul style="list-style-type: none">◦ If the seating does not meet students’ needs or expectations, it may cause stress and anxiety.¹³⁷• Seating can make or break students’ decision to use library spaces.• Avoid inefficient use of space.¹³⁸<ul style="list-style-type: none">◦ Students may perceive an area as full even when it is not.¹³⁹◦ According to the 50 percent rule, library users will choose not to sit at a table when it is close to 50 percent full.¹⁴⁰• Seating near power sources is more frequently used.



- Lighting**
- The best light for learning is indirect natural light.
 - Insufficient access to natural light has been connected to development of academic and health deficiencies.¹⁴¹
 - Light level and quality affect students' seating choices.¹⁴²
 - Fluorescent lighting affects noise levels.¹⁴³
 - Buzzing and flickering fluorescent lights can hinder reading performance.
 - Glare and eyestrain decrease students' ability to concentrate.¹⁴⁴
 - Blue light emitted by personal devices, such as mobile phones, tablets, and computers, is a common cause of eyestrain.
 - Reflection of overhead lighting on screens increases eyestrain and discomfort.
- Noise**
- The brain processes 20,000 bits of auditory stimuli per second.¹⁴⁵
 - Buzzing and humming fluorescent lights can reduce concentration.
 - Most prominent background noise comes from heating and cooling systems.¹⁴⁶
 - Students regularly choose quiet, private study areas when they are available.¹⁴⁷
 - Noisier areas are linked to higher blood pressure and heart rate and increased stress.¹⁴⁸
 - Students often cite feelings of fear that they will disturb others or be disruptive when discussing noise levels in libraries.
- Temperature**
- The brain consistently monitors temperature levels to ensure proper body temperature regulation.¹⁴⁹
 - Warm environments cause heightened levels of norepinephrine and serotonin—chemicals related to feelings of depression and relaxation—causing students to feel sleepy.¹⁵⁰
 - Overly warm environments can lead to increased anxiety and, in some cases, aggression, while cold environments tend to be distracting and uncomfortable.¹⁵¹
 - Reading and math comprehension decline when room temperatures rise above 74 and 77 degrees Fahrenheit, respectively.¹⁵²
- Color and décor**
- Affect perception of light and temperature.
 - Can be used to create a particular environment.¹⁵³
 - Affect the perceived identity of a space.¹⁵⁴
 - Warm, bright, vibrant colors stimulate the brain and insinuate louder, more social and active spaces. Cool, dark, or more muted colors suggest calmer, quieter areas.¹⁵⁵
- Wayfinding**
- Facilitates the users' journey through and experience of the space.¹⁵⁶
 - The "user has the right to use the library without having to ask for assistance."¹⁵⁷
 - Distance between help desk or finding aid and materials can be a psychological and spatial barrier to location and delivery.¹⁵⁸
 - Everyone must familiarize themselves before they can use the space effectively.¹⁵⁹



- Signs and graphics
- The language of libraries is exclusive.¹⁶⁰
 - Call numbers and library jargon can be difficult for users to understand.
 - Classification systems used in libraries function as linguistic obstacles, obscuring access to information that white, middle-class society finds threatening.¹⁶¹
 - Signs and graphics ensure the users' "right to use the library without having to ask for assistance."¹⁶²
 - Two-thirds to three-fifths of library users hesitate to seek help.¹⁶³
 - Users must encode, decipher, and process environmental cues before they become meaningful.¹⁶⁴
 - Insufficient and unclear signage is known to trigger anxiety and create confusion and frustration for library users.¹⁶⁵
 - Signs and graphics funnel and simplify the environment for the user.¹⁶⁶
 - Unfamiliar surroundings threaten the user's self-esteem, which has been identified as an antecedent of library anxiety.¹⁶⁷
 - Effective signage reduces "traffic-director" tasks for librarians and combats barriers with staff that cause library anxiety.¹⁶⁸
 - Poor signage increases anxiety and negatively impacts the library's credibility, which increases possible avoidance of the library in the future.¹⁶⁹
- Control
- Personal control refers to the degree of autonomy in deciding what to do, where, and when.¹⁷⁰
 - People who experience anxiety tend to try to control or reduce their levels of stress through such methods as repression, denial, and projection.¹⁷¹
 - Ability to control one's environment increases comfort on both an emotional and physical level.¹⁷²
 - Users will force the space to act as they want it to regardless of the intended use.
 - Humans "manipulate their environment to better serve their needs and purposes."¹⁷³
 - For example, "use of shorter bookshelves as 'standing desks' or chairs as footrests; slouching and leaning back in chairs; sitting or sleeping on the floor."¹⁷⁴



Appendix B

Suggestions for Library Design Changes to Decrease Library Anxiety

Factor	Suggestions
Seating	<ul style="list-style-type: none">• Integrate different of types of seating to support different learning styles.• Utilize zoning practices and movable furniture.<ul style="list-style-type: none">◦ Offer students the ability to control their environment and make it work for them.• Use table shapes to define behavioral expectations.<ul style="list-style-type: none">◦ Round tables for social, collaborative areas and rectangular tables for research and study.• Apply personal space theory.<ul style="list-style-type: none">◦ Use territorial dividers to increase comfort and space use efficiency.• Incorporate appropriate power sources to support students’ needs.<ul style="list-style-type: none">◦ Offer a power source in tables and chairs.• Choose seating that reduces physical stress and encourages physical movement.<ul style="list-style-type: none">◦ Provide standing desks, ball chairs, adjustable height and back support.• Where furniture is meant to be moved and rearranged, ensure that it is both easy and quiet to move without disrupting other library users.
Lighting	<ul style="list-style-type: none">• Ensure a constant level of bright light and maximize daylight.• Capitalize on natural light by locating study areas in areas with lots of windows.• Colors affect perception of light. In areas without natural light, use wall, floor, and furniture colors to create the right light levels.• Include personal reading lamps in carrels and on desks to allow students to control light levels.
Noise	<ul style="list-style-type: none">• Create zones with designated noise levels through the arrangement of furniture and color.<ul style="list-style-type: none">◦ Locate furniture that is more conducive to group work and collaboration closer to areas of the building that are naturally louder.• Utilize a “sound gradient” from bottom (noisy) to top (quiet).• Use signage to communicate clear behavioral expectations and noise levels.• Incorporate silent or digital clocks, particularly in quiet areas.• Use “white noise” and music as necessary.• Decrease sound reverberation.<ul style="list-style-type: none">◦ Place solid walls opposite textured or uneven walls that are broken up by doorways.◦ Use fabric or sound-absorbing objects disguised through art selection.◦ Ensure that movable furniture does not make noise when it is moved.



- Include individual carrels in both louder and quieter areas of the library.
 - Allow students to study independently amid the “buzz.”
 - Provide maximum options for different learning styles.
- Temperature
 - Keep temperatures between 68 and 72 degrees Fahrenheit for the comfort of a majority of students.
 - Find a balance between the volume of space and the environment.
 - For example, areas with many computers that generate heat can become too hot.
 - Use warm and cold colors to influence perceptions of temperature.
 - Encourage water consumption.
 - Allow students to adjust light levels (natural and artificial).
- Color and décor
 - Spaces should be full and inviting but not distracting.
 - Avoid décor that creates feelings of a “medical” or “clinical” environment.
 - Use color to create architecturally interesting spaces without distracting from the research and study environment.
 - Include artwork in locations with few windows to break up the monotony of blank walls and create an inviting ambiance.
- Wayfinding
 - Make it easy to find and access help services by including stations on each floor of the library.
 - Create proper “flow” between spaces so that they are not just balanced but also interrelate appropriately.
 - Use landmarks and core attractions as destinations.¹⁷⁵
 - Avoid corridors in favor of gallery access and open circulation.
 - Open circulation increases flexibility of space and allows natural pathways to be utilized.
 - Sightlines that extend from one end of a room or building to another create feelings of more space.
- Signs and graphics
 - Place a directory at each entrance and in highly visible locations.
 - Make users aware of the entire environment from the beginning in a concise way.
 - Provide floor maps showing stack layout and service points, and signage for bathrooms, copy machines, etc.
 - Ease navigation by placing signs at decision points.
 - Never leave users without signage for reference at decision points.
 - Service points should be clearly identified.
 - Create clear, concise signage in the stacks, where there are rarely staff members to ask for help.
 - Use library signage and graphics to reinforce the library’s credibility in the eyes of the user.
 - Makeshift signs, if not done well, can increase library anxiety.
 - Avoid “camouflaged” signs, which are hard to read and can increase library anxiety.
 - Use signs and graphics to create and reinforce positive feelings.
 - Offer affirmations, inspirational quotations, research and study tips, etc.



Control

- Use territorial markers to clearly define study areas.
- Encourage flexibility of spaces through signage, open floor plans, and furniture.
- Use furniture that is quiet and easy to move throughout the space so that students feel they can create the environment that works best for them without disturbing others.

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