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An Analysis of the Effect of Saturday Home Football Games on Physical Use of University Libraries

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Article abstract

Objective – Library science literature lacks studies on the effect of external events on the physical use of libraries, leaving a gap in understanding of would-be library patrons' time use choices when faced with the option of using the library or attending time-bound, external events. Within academic libraries in about 900 colleges and universities in the US, weekend time use may be affected by football games. This study sought to elucidate the effect of external events on physical use of libraries by examining the effect of Saturday home football games on the physical use of the libraries in a large, academic institution.

Methods – This study used a retrospective, observational study design. Gate count data for all Saturdays during the fall semesters of 2013-2018 were collected for the two primary libraries at East Carolina University (main campus' Academic Library Services [ALS] and Laupus, a health sciences campus library), along with data on the occurrence of home football games. The relationship between gate counts and the occurrence of home football games was assessed using an independent samples t-test.

Results – Saturday home football games decreased the gate count at both ALS and Laupus. For ALS, the mean physical use of the library decreased by one third (34.4%) on Saturdays with a home game. For Laupus, physical use of the library decreased by almost a quarter (22%) on Saturdays with a home game.

Conclusion – Saturday home football games alter the physical use of academic libraries, decreasing the number of patrons entering the doors. Libraries may be able to adjust staffing based on reduced use of library facilities during these events.

Evidence Based Library and Information Practice

Research Article

An Analysis of the Effect of Saturday Home Football Games on Physical Use of University Libraries

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Gate Counts_Libraries_FootballSaturdays [Data visualization] Tableau Public. https://public.tableau.com/app/profile/kerry.sewell/viz/GateCounts_Libraries_FootballSaturdays/ALSAverageFootballEffects

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Abstract

Objective – Library science literature lacks studies on the effect of external events on the physical use of libraries, leaving a gap in understanding of would-be library patrons' time use choices when faced with the option of using the library or attending time-bound, external events. Within academic libraries in about 900 colleges and universities in the US, weekend time use may be affected by football games. This study sought to elucidate the effect of external events on physical use of libraries by examining the effect of Saturday home football games on the physical use of the libraries in a large, academic institution.

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East Carolina University (main campus' Academic Library Services [ALS] and Laupus, a health sciences campus library), along with data on the occurrence of home football games. The relationship between gate counts and the occurrence of home football games was assessed using an independent samples *t*-test.

Results – Saturday home football games decreased the gate count at both ALS and Laupus. For ALS, the mean physical use of the library decreased by one third (34.4%) on Saturdays with a home game. For Laupus, physical use of the library decreased by almost a quarter (22%) on Saturdays with a home game.

Conclusion – Saturday home football games alter the physical use of academic libraries, decreasing the number of patrons entering the doors. Libraries may be able to adjust staffing based on reduced use of library facilities during these events.

Introduction

Students, faculty, and staff in higher education inhabit complex social worlds in which choices related to time and resource use are made to satisfy a variety of needs. For students, needs include scholarly work (research and learning), income-driven work, and social connection. Excepting off-campus employment, campus buildings and services often provide the physical spaces in which these needs are fulfilled. Libraries in higher education are one such space, providing areas for individual and group study, serving both social and individual scholarly needs.

Demand for library spaces to support scholarly work spans the entire week and many large academic libraries meet the demand by providing extensive hours seven days per week. The widespread demand for expansive operational hours is not met with even levels of use throughout the week. Shifts in the physical usage rates of academic libraries are broadly documented, with usage rates noted as declining on Wednesdays and reaching a nadir on Saturdays (Dotson & Garris, 2008; Ferria et al., 2017; Scarletto et al., 2013).

Although general patterns of change in physical use of libraries throughout the typical week may be widely observed and documented, less is known about the effects of singular, large community events, many of which occur on weekends, on physical use of libraries. A broad, multi-database search (ProQuest Search, LISA, LISTA, ERIC, EconLit) for studies examining the effect of any major external event (e.g., sports, parades, natural disasters, local festivals) on the physical use of academic and public libraries revealed a dearth of literature in this area. The lack of fruitful searches suggests scholarly inattention to the ways that potential library users alter their behaviours in response to large-scale external events.

The reasons for the paucity of information on the effect of external events on physical use of libraries are unclear. It may be that the effects of such events are assumed as being known and thus not worthy of scholarly attention. However, the test of such assumptions is critical to our understanding of library users and their time use choices, as well as an opportunity to ensure that assumptions are matched by data. Additionally, if tests of such assumptions are verified—or disproved—by data, decisions related to staffing and hours of operation around such external events may be made with more confidence. Studies of the effects of external circumstances and large-scale events and circumstances (Friday the 13th, hurricanes, sporting events) on use of emergency room services and outcomes serve as examples of how

such tests can lead to better decisions about service delivery and staffing (Drobatz et al., 2009; Jena et al., 2017; Jerrard, 2009; Lo et al., 2012; McGreevy et al., 2010; Protty et al., 2016; Schuld et al., 2011; Shook & Hiestand, 2011; Smith & Graffeo, 2005).

One such external weekend event within university life at nearly 900 American colleges and universities (Next College Student Athlete (NCSA), n.d.) is a home varsity football game. Although football games can occur on other weekdays, Saturday home games are an especial draw due to lack of time conflicts with other pursuits. Intramurally, home football games offer various game-related social and financial opportunities for students and faculty (Chen et al., 2012; Coates & Depken, 2006; Hardin, 2019; Lyon-Hill et al., 2015).

Whether economically or socially driven, time dedicated to game-related pursuits is time lost on scholarly activities. Libraries, serving as study spaces and providers of ready access to electronic and print resources, traditionally occupy the role of central physical space for scholarly pursuits. If football games alter scholarly behaviours and outcomes, it would be reasonable to expect a change in the number of individuals entering the library—determined by gate counts—during Saturdays when a home football game occurs. The interplay of physical use of the academic library and the draw of varsity sports, however, has not been studied. The effect of varsity sports on physical use of academic libraries is examined in this study.

Background

East Carolina University (ECU) is a large, public, doctoral university serving roughly 29,000 students (23,081 undergraduate students, 4,739 graduate students, 537 dental and medical students, and 1,383 unclassified students) (East Carolina University, n.d.), located in rural North Carolina. ECU offers 174 different degrees, spanning health sciences and academic campuses. The University has two distinct, though proximate campuses, with operationally independent libraries serving each campus; Academic Library Services (ALS) and its branch Music Library serve the Academic Affairs Campus and Laupus Library (Laupus) serves the Health Sciences Campus. Both libraries serve their respective campuses seven days per week, though the hours offered each day differ.

ECU also includes an athletics department that organizes and funds more than 25 different sports. The largest of the sports sponsored by ECU is the football program, which accounted for 14.5% of ECU Athletics revenue and 19.1% of the operating expenses in Fiscal Year 2019 (ECU Athletics Fiscal Sustainability Working Group, 2020). The ECU football program brings in large crowds each fall, averaging between 30,000-45,000 attendees at home games in the 2019 season (National Collegiate Athletic Association, n.d.-a).

Literature Review

Variations in Physical Use of the Library

Libraries collect and report a variety of statistics on an annual basis. Some of the statistics relate to use of online resources and services, while a small set of statistics relate to the use of libraries' physical collections and spaces, namely in-person reference services, circulation of physical items, and gate counts. Among the statistics documenting physical use of the library, gate counts, defined as "the total number of persons physically entering the library in a typical week" (National Center for Education Statistics, 2017, p. 3), are the sole statistic that provide information on overall building use. Gate counters are common across academic libraries, collecting hourly tallies of the number of people entering the library throughout the day with relatively high reliability (Phillips, 2016). Although some libraries employ card swipe systems for some or all of their opening hours in order to limit entry to campus affiliates and to collect select demographic data on the patrons entering their doors, the statistic reported to

outside stakeholders is nonetheless a simple tally of the number of physical entries. The data are used to communicate the performance and value of the library as well as trends in student behaviours. Typically, the data are sent to internal and external stakeholders including professional organizations, university governing councils, and institutional research departments, who send the data out for periodic national reports on higher education.

While a significant portion of libraries collect gate count data and report it in aggregate to stakeholders, beyond these annual reporting obligations, the data are either not widely reported on library websites, not used, or the exact nature of the data usage is unknown (Driscoll & Mott, 2008; Martell, 2007; Terrill, 2018). The data may otherwise remain entirely unused or be reserved for internal operational decisions only, though one study examining the data used and impetuses for changing operating hours and staff scheduling at medium-sized college libraries found that a low percentage of libraries used gate count data to inform their staffing decisions (Brunsting, 2008). Published library studies that have analyzed gate counts and card swipes did so as part of an assessment of the success of extending hours (Lawrence & Weber, 2012; Scarletto et al., 2013), changing service models (Albanese, 2003; Jones, 2011), or in the context of declining use of print resources and reference services over longer periods of time (Martell, 2007; Opperman & Jamison, 2008). Beyond these studies, libraries publish relatively little on variations in physical use of library spaces, neither as a function of shorter, defined periods of time nor in response to external events.

As previously noted, the studies including gate counts and user surveys for normal (non-exam) weeks in their data collection methods find common patterns. Library usage is highest at the beginning of the week and then progressively declines between Wednesday and Saturday (Dotson & Garris, 2008; Ferria et al., 2017; Scarletto et al., 2013). Similar patterns are observed in the use of library electronic resources usage throughout the week (Clotfelter, 2011). These observations complement student time use surveys that find that, as the week progresses and students begin the "social weekend," comprising Thursday night through Sunday morning (Finlay et al., 2012), time use shifts away from scholarly activities to activities fulfilling psychosocial and financial needs, namely employment activities or formally or informally organized social activities (Finlay et al., 2012; Greene & Maggs, 2015; Moulin & Irwin, 2017; Orcutt & Harvey, 1991).

The Effect of Sports Events on Scholarly Behaviours

Among the formally organized activities available on Saturdays during the fall semester, at universities with large sports programs, home football games provide both economic and social opportunities (Chen et al., 2012). For students employed in service positions, games may lead to more work hours to meet increased consumer volume and spending on game day (Coates & Depken, 2006; Lyon-Hill et al., 2015). More significantly, football games provide various levels of social participation in events and rituals associated with game day (Cohen et al., 2014). This is particularly true for weekend games, which are less likely to conflict with academic and work schedules, therefore drawing larger crowds and allowing for more time-intensive social activities.

Social rituals and events surrounding the home game include tailgates, pregame rituals, and parties, along with remote group viewing via televised coverage. Home game rituals and events consume significant amounts of time. The duration of football games alone in the 2019-2020 season averaged 3 hours and 18 minutes (National Collegiate Athletic Association, n.d.-b). Additionally, pregame events add to the already considerable amount of time dedicated to football games. Data on the duration of many pregame events are lacking. However, studies of student drinking behaviours on football game

days imply considerable time dedicated to pregame activities, with data and anecdotal evidence suggesting that students spend an average of five or more hours drinking on game days (Glassman et al., 2007) and that drinking begins early in the morning (Derringer & French, 2015). Data about tailgating duration is also lacking, though one survey of tailgaters reported most respondents (51%) indicated that tailgate set-up occurs 3-4 hours prior to kickoff (Tailgating Institute, n.d.). The duration of the game itself, combined with the time dedicated to pregame drinking and tailgating suggests that, on Saturdays with home games, most of the day is consumed by football-related activities.

Participation in these events represents a significant time-trade for all participants, producing a diversionary disruption in normal activities for university and local communities. For faculty and students, the disruption in normal activities may mean a disruption in academic pursuits. Time dedicated to watching the home game or to engaging in game-related social rituals is time lost to engagement in scholarly behaviours promoting learning and research, representing an opportunity cost among both students and faculty. Literature from the field of economics provides evidence of the "cost" of university-sponsored sports events in terms of scholarly outcomes, with most studies indicating that university sports impact student and faculty scholarly outcomes.

Most studies examining the effect of college football on scholarly outcomes have examined the effect of football games on various student outcomes. Several economics studies document the effect of winning seasons on the numbers of college applications in the following year along with GPAs and SAT scores of applicants (Pope & Pope, 2009, 2014; Toma & Cross, 1998). Since these studies focus on potential students and do not provide evidence of changed scholarly behaviours among students already attending a university, they are not considered here.

Economics studies examining relationships between university sports and scholarly outcomes among fully enrolled students have focused on changes in GPA and graduation rates during football seasons with higher win percentages. The majority of studies indicate that both GPAs and graduation rates are affected by a successful football season, though the direction of the effect differs across studies. Regarding GPAs, one study indicated that GPA declines during winning football seasons, with a larger decline in male students' GPAs than female students' (Lindo et al., 2012), although another study comparing GPAs among college athletes and non-athletes found that GPA increased during winning seasons (Mixon Jr & Trevino, 2005). Literature on the relationship between football and graduation rates suffers from a similar lack of clear direction of affect. One study reported that winning seasons lead to declines in graduation rates (Tucker, 1992) while another study found no evidence of negative impact of winning seasons on graduation rates (Rishe, 2003).

Faculty members' scholarly behaviours also appear to be influenced by successful sports seasons. One study examining the effect of winning football seasons on the number of pages published among economics faculty in over 100 different economics departments (Shughart et al., 1986) found that a winning season negatively impacted the scholarly output of economics faculty members. The authors note that "a tradeoff exists between success on the gridiron and success in the journals…When the local team is winning, there is more of an incentive for a professor to put off doing research on another academic article" (Shughart et al., 1986, pp. 48–50).

Notably, almost all the studies of the effect of university-sponsored sports events on scholarship among students and faculty have focused on how football games change scholarly outcomes, without examining how university sports events directly alter scholarly behaviours. Only one study captured actual behavioural

changes related to university sports events. Charles Clodfelter's (2011) treatise on the effects of "big-time" university-sponsored sports on various aspects of academic life includes a study of the effect of university sports-related events on the use of a comprehensive, widely-used digital library resource called JSTOR. The study examined how an annual, nationally viewed university sports-related event ("Selection Sunday," prior to the start of the NCAA basketball tournament) affected the use of JSTOR materials at many universities. Clotfelter found that the use of digital materials in JSTOR decreased by an average of 6.7% during the week following Selection Sunday and that the majority of that decline occurred during the first two days of the NCAA tournament following Selection Sunday. As Clotfelter (2011) states:

> Unless there existed other, unmeasured factors at work, the record of JSTOR usage [in the study] implies that the NCAA tournament had a measurable influence on the pattern of work in research libraries… and it reflects the power of the demand for the entertainment provided by this form of big-time college athletics. (p. 64)

Clotfelter's study is the only study examining the effect of sports events on the use of library resources, namely digital resources. No studies have examined the effect of football on library resource usage, or on the effect of sports events on physical use of the library.

Aims

This study seeks to test the effect of external events on physical use of academic libraries by examining the relationship between home football games and gate counts on Saturdays. In doing so, it indirectly examines time use choices among would-be Saturday library users. The study also complements the economics literature on the effect of big-time sports on scholarship. The null hypothesis for this study was that home football games have no effect on physical use of the libraries on Saturdays. The alternative hypothesis was that football games have an effect on the physical use of libraries on Saturdays.

Methods and Materials

This study used a retrospective, observational study design. As the dates of Saturday home games are not prespecified by the libraries and vary each semester, this is a natural experiment.

This study used library hourly gate count data for ALS and Laupus for each Saturday during the fall semesters of the years 2013-2018. The gate counters in both libraries are mounted above the libraries' entry doors and run on Sensource hardware and software (sensourceinc.com). Other collected data points included data on the university's football schedule, namely the occurrence of football games for each Saturday of the fall semesters for the years of interest as well as the location of games (home vs. away) for Saturdays when a game was scheduled. Additional data elements were gathered as well, e.g., total enrollment for each of the years studied, the start time for the football games, the week of the semester for each Saturday recorded, and annual academic calendar events coinciding with football games (e.g., fall break and homecoming). Excepting gate count data, all data points come from publicly available sources.

The years studied included dates when major weather events (Hurricanes Matthew and Florence) severely impacted the area, shutting down the university and its libraries. Those dates were eliminated from the data set. Additionally, data points for Saturdays when holiday weekends occurred and one or both libraries were closed were eliminated from the dataset for the affected library. The full dataset was separated into two unique datasets for each library and a limited set of variables retained for the library-specific datasets. The original raw dataset, the full, cleaned, dataset reflecting the eliminated data points, the library-specific smaller datasets, and the codebook are all

located in an Open Science Framework (OSF) project space for this study (https://osf.io/wpzx7/).

Following data cleaning, the .csv files were loaded into SPSS 25.0.0.1 (64-bit version for Windows 10). Minimal recoding in SPSS was undertaken and data were examined for general patterns of use throughout a typical semester for each library. Initial exploratory analysis of the difference in means for Saturdays with a home game vs. Saturdays with no home game was performed using box plots for simple visual comparison. Subsequently, an Independent Samples *t* test was performed for each dataset. Independent samples *t*-tests are used to determine whether a difference between the means for two groups differ significantly—that is to say that the difference in the means is not due to chance.

The SPSS syntax used for recoding, exploratory analysis, and the independent samples *t*-tests are all also available on the OSF project space for this study. Additionally, information about the sources for the publicly available data points are provided in the wiki for the *Data* component of the project space.

Data visualization was performed in Tableau Public. All visualizations are published on the Tableau Public site for this project.

Results

For the years 2013-2018, of the 15 weeks making up the typical fall academic calendar, most dates were retained. Of the 90 weeks for which data was initially gathered, 87 weeks were retained for analysis of the effect of home football games on physical use of ALS on Saturdays; for Laupus on Saturdays, 85 weeks were retained for analysis of the effect of home football games on physical use. Although no analysis of the additional influence of win percentage on the effect of physical use of the libraries on Saturdays with home games was performed, the years studied included years with higher win percentages as well as lower win percentages (maximum win percentage .769 in 2013 and minimum win percentage of .250 in 2016-2018). In this way, the years studied are representative of years with high and poor football performance.

Regarding overall trends in physical use of the libraries on Saturdays at ECU, the data reveal that physical use of the libraries climbs throughout the first half of the semester (weeks one through six) before falling markedly on the Saturday of the seventh week, a weekend marking the beginning of fall break. During the second half of the semester, physical use of the libraries is generally higher than during the first half, with peaks on the Saturdays of weeks 9, 11, and 15. The Saturday of the 14th week marks a second nadir in the gate count data, coinciding with Thanksgiving break. Regarding the peaks in gate counts during the second half of the semester, it is posited that the looming deadlines for large-scale assignments and exams drive these late-semester peaks. Of the late-semester peaks in usage, the highest average gate count occurs on the Saturday of the fifteenth week, just before the period of final examinations begins. Notably, the rising gate counts and the amplitude of the peaks during the 9th and 11th weeks during the 2nd half of the semester are more pronounced for ALS (Figure 1) than for Laupus (Figure 2).

Football games played at home drive the gate count at both ALS and Laupus. Physical use of the libraries decreased on Saturdays with home games. For ALS, the mean physical use of the library decreased by one third (34.4%) on Saturdays with a home game (639.28 +/- 182.27 (SD) vs. 976.28 +/- 501.67, $p<.001$). For Laupus, physical use of the library decreased by nearly a quarter (22%) on Saturdays with a home game (154.57 +/- 62.66 (SD) vs. 120.63 +/- 33.13, $p=.005$). The effect of Saturday home football games on gate counts is more consistently apparent at ALS (Figure 3) than Laupus (Figure 4), with all weeks showing some evidence of effect. For Laupus,

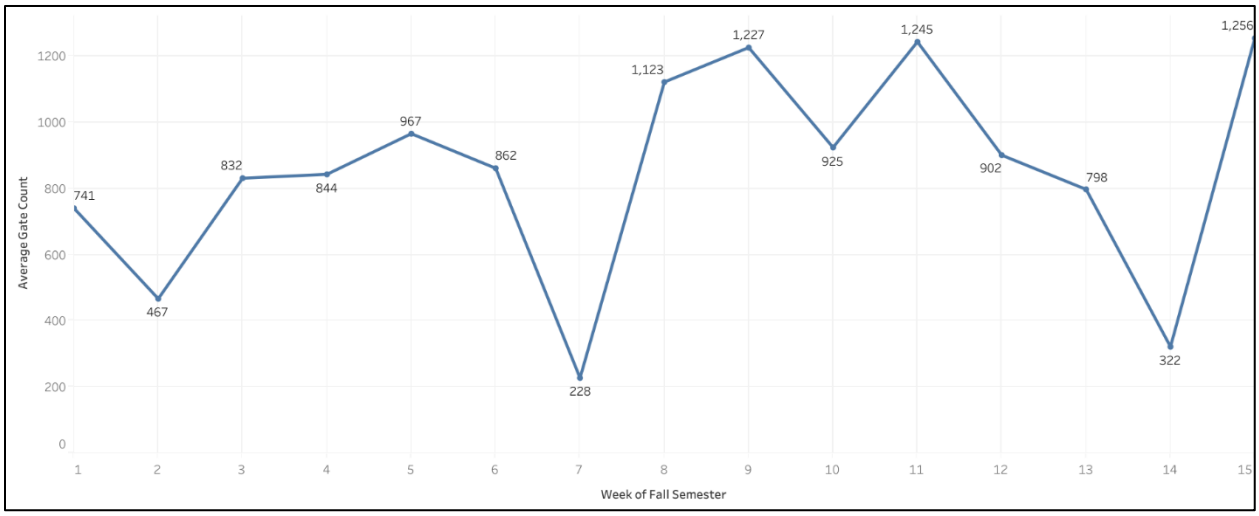

Figure 1
Average Saturday gate counts for ALS, fall semester, 2013-2018.

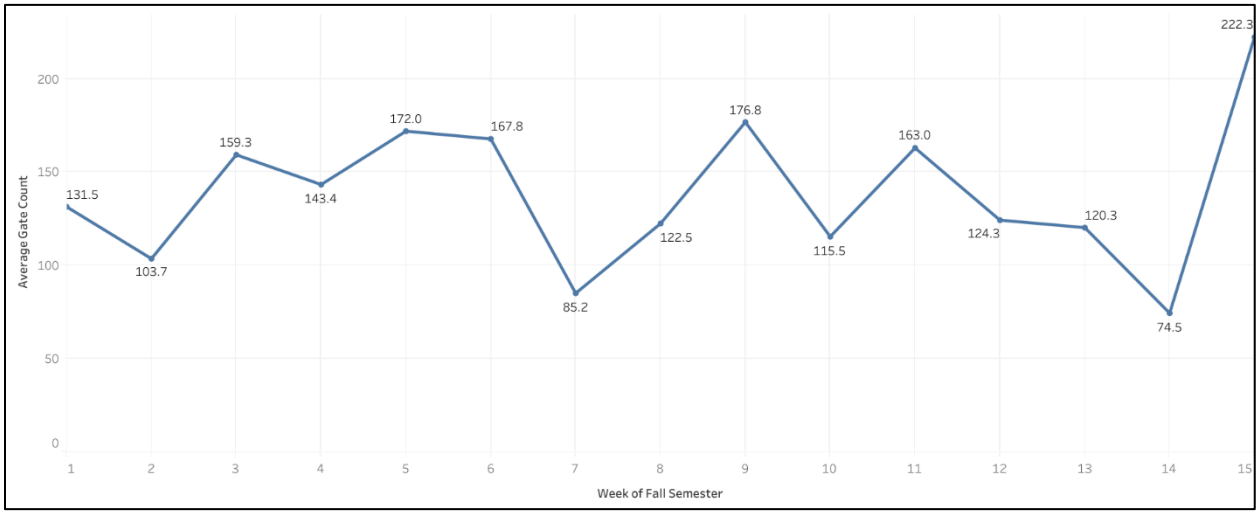

Figure 2
Average Saturday gate counts for Laupus Library, fall semester, 2013-2018.

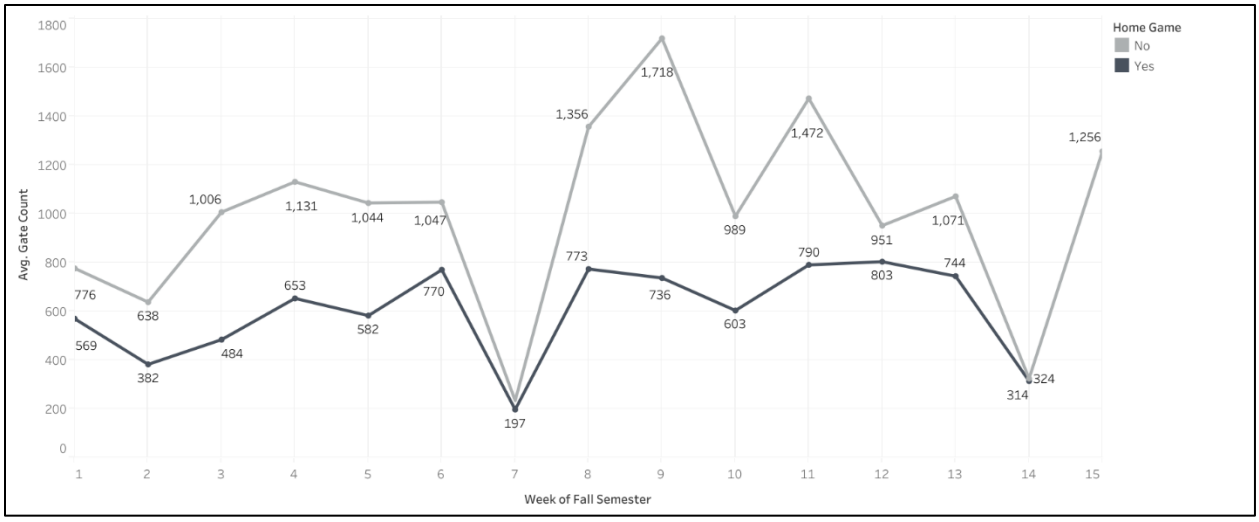

Figure 3
Effect of home football games on average Saturday gate count by week of fall semester, ALS, 2013-2018.

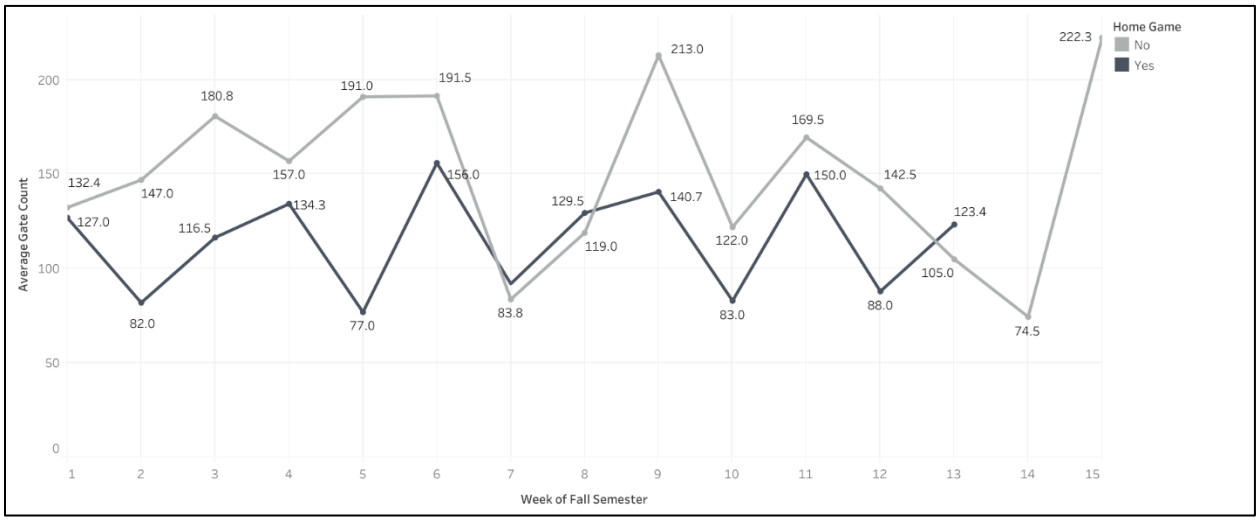

Figure 4
Effect of home football games on average Saturday gate count by week of fall semester, Laupus Library, 2013-2018.

gate counts during weeks 7, 8, and 13 appear to be less affected by home football games.

Discussion

The findings of this study indicate that library patrons are not immune to the events surrounding Saturday home football games. The data indicate that some aspect of Saturday home football games alters time use even among those who might otherwise physically access the library. The exact cause of alterations in time use for regular Saturday users of the library cannot be determined by this study and warrant further study. However, multiple factors (financial, social, environmental) may account for changes in weekend use of the library during home football games.

Financial needs may alter student use of libraries by increasing employment-related opportunities and demands. Would-be patrons may be unable to come to the library due to employer needs for more staff to serve the influx of local and visiting consumers in service industry positions such as food service and hospitality. This same factor may not influence employment-related time demands for students at universities in densely populated metropolitan areas where sports events have less effect on service industries; the relative geographic isolation of ECU may have a more pronounced influence on time use related to student employment (Agha, 2013; Agha & Rascher, 2016; DeSchriver et al., 2021).

The larger effect size of home football games on physical use of the main academic campus library (ALS) than for the health sciences campus library (Laupus) suggests that undergraduates are more likely to be influenced by the events surrounding Saturday home football games. Undergraduate students represent a more substantial percentage of the student population enrolled in degree programs for the main academic campus than for the health sciences campus (83% vs. 60% respectively for years 2016-2019) (East Carolina University Institutional Assessment, Planning, and Research, 2021). Additionally, undergraduate students, particularly freshmen, are more likely to live near the main academic campus and its proximal football stadium and thus have greater access to the social events surrounding the game. The increased effect of games on physical use of ALS may also reflect a stronger need for social connection and university community identity-building for students in the undergraduate cohort, needs which football games are well-situated to fill. As Anderson and Stone (1981) note, "sports teams are symbolic representations of a community and can provide individuals a sense of belonging to that community" (as cited in Robinson et al., 2005, p. 44).

The same proximity to games may change library use in an entirely different manner, through environmental changes affecting decisions to use the libraries. Namely, games may lead to alterations in municipal environments, such as increased noise levels in areas near the stadium (Chase & Healey, 1995) and fraternity or sorority houses, and through changed traffic patterns (Humphreys & Pyun, 2018; Tempelmeier et al., 2020). These environmental and traffic changes arising from football games may alter library user behaviours. For would-be Saturday library users, traffic congestion and campus noise levels related to games would be more pronounced for ALS than for Laupus, given differences in proximity to the stadium (2.7 km driving distance vs. 5.4 km driving distance respectively).

If social, rather than environmental and employment factors, drive variations in use of the libraries on home football game Saturdays, the findings of this study serve as a subtle (and unverified) caveat to published studies examining differences between users and non-users of academic and health sciences libraries (Kramer & Kramer, 1968; LeMaistre et al., 2018; Soria et al., 2013, 2015, 2017; Sridhar, 1994; Thorpe et al., 2016; Toner, 2008; Turtle, 2005). These studies do indicate that meaningful differences between users and non-users of academic and health sciences libraries exist, from demographic and socioeconomic factors (e.g., age, major, class level) to other factors such as lack of awareness of resources, lack of time to use libraries, and use of materials elsewhere (Soria et al., 2015; Sridhar, 1994; Toner, 2008; Turtle, 2005), with differences in library use shown to relate to GPA and dropout rates among undergraduates (Kramer & Kramer, 1968; LeMaistre et al., 2018; Soria et al., 2013, 2017; Thorpe et al., 2016). While these library use factors and outcomes hold true, users of academic libraries on Saturdays may not differ from non-users in one regard—they may be

swayed away from library use by the draw of social events that football games uniquely offer. The effect of football event participation on student outcomes is indicated in published economics literature. As this study did not test the reasons for lower use of the libraries on Saturdays, this cannot be verified by the current study and is worthy of further examination.

Limitations

ECU's libraries do not employ card swipe systems during Saturday operational hours, hindering the ability to determine which user group (undergraduates, graduate students, community users, faculty) is less apt to use the library on Saturdays with home football games. Without more granular data, it is impossible to draw any conclusions beyond a general understanding of the direction and significance of the effect of football games on gate counts. Given more specific data on Saturday library users, a better analysis of the user group likely to be affected by varsity sports would be feasible.

This study did not examine the hours during which library usage was most likely to be affected by a home game. Kickoff times varied considerably, making this analysis difficult. It is therefore unknown if the occurrence of a home game affects whole-day physical use of the library or if hours more closely grouped near the game are most affected. If the effect is time-bound with the game, libraries might consider reduced hours of operation related to kickoff time.

Conclusion

The data from this study lead to the rejection of the null hypothesis. The data make clear that home football games influence would-be library patrons' choice to physically access campus libraries. The lower number of patrons on Saturdays with home football games might justify a reduced or altered level of staffing on those Saturdays, particularly for libraries in proximity to a university's football stadium. Given that the observed reduction in gate counts was still less than 35% for the libraries examined in this study, library closure on Saturdays with home football games would not be justified.

For libraries at universities facing budget cuts in tandem with the ever-present demand for expansive hours from student populations, such data would allow for more informed decision-making about staffing and hours in response to pre-planned, external events within the university as well as justification to student populations for reduced hours and staffing on those days.

Future research on this topic area is recommended. Replication of this study at other universities with large-scale sports programs is recommended to determine the generalizability of this study. Furthermore, an examination of circulation and reference statistics for Saturdays with home football games would determine if circulation and reference interactions decrease in tandem with gate count. Similarly, assessing changes in use of cross-disciplinary, digital library resources (e.g., JSTOR or Scopus) would supplement these findings, providing evidence of overall changed library-related behaviours on Saturdays with home football games. Additionally, further analysis of gate count data would be warranted to determine if users alter the days when they use the library as compensation for time spent in football-related activities on a Saturday, (e.g., using the libraries more heavily on the Friday or Sunday surrounding a home game).

References

Agha, N. (2013). The economic impact of stadiums and teams: The case of minor league baseball. *Journal of Sports Economics*, *14*(3), 227–252. https://doi.org/10.1177/1527002511422939

Agha, N., & Rascher, D. A. (2016). An explanation of economic impact: Why positive impacts can exist for smaller sports. *Sport, Business and Management: An International Journal, 6*(2), 182–204. https://doi.org/10.1108/SBM-07-2013-0020

Albanese, A. R. (2003). Deserted no more: After years of declining usage the campus library rebounds. *Library Journal*, *128*(7), 34–36.

Brunsting, M. (2008). Reference staffing: Common practices of medium-sized academic libraries. *Journal of Interlibrary Loan, Document Delivery & Electronic Reserve*, *18*(2), 153–180. https://doi.org/10.1300/10723030802099251

Chase, J., & Healey, M. (1995). The spatial externality effects of football matches and rock concerts: The case of Portman Road Stadium, Ipswich, Suffolk. *Applied Geography*, *15*(1), 18–34. https://doi.org/10.1016/0143-6228(95)91060-B

Chen, S. S.-C., Teater, S., & Whitaker, B. (2012). Perceptions of students, faculty, and administrators about pregame tailgate parties at a Kentucky regional university. *International Journal of Developmental Sport Management*, *1*(2). http://ijdsm.net/wp-content/uploads/2019/03/Steve-S-Chen-Perception-of-Students....pdf

Clotfelter, C. T. (2011). *Big-time sports in American universities*. Cambridge University Press. https://doi.org/10.1017/CBO9780511976902

Coates, D., & Depken, C. A. (2006). Mega-events: Is the Texas-Baylor game to Waco what the Super Bowl is to Houston. *International Association of Sports Economists Working Paper Series, Paper No. 06–06*. https://ideas.repec.org/p/spe/wpaper/0606.html

Derringer, N., & French, R. (2015, September 29). *College drinking gameday diary: From 8 a.m. - 1 a.m. across Michigan.* The Center for Michigan: Bridge Magazine. https://www.mlive.com/news/2015/09/unconscious_students_on_hospit.html

DeSchriver, T. D., Webb, T., Tainsky, S., & Simion, A. (2021). Sporting events and the derived demand for hotels: Evidence from Southeastern Conference football games. *Journal of Sport Management, 35*(3), 228–238. https://doi.org/10.1123/jsm.2020-0268

Dotson, D. S., & Garris, J. B. (2008, September). Counting more than the gate: Developing building use statistics to create better facilities for today's academic library users. *Library Philosophy and Practice*, 1–13. https://scholarcommons.sc.edu/cgi/viewcontent.cgi?article=1000&context=lib_facpub

Driscoll, L., & Mott, A. (2008). *After midnight: Late night library services: Results of a survey of ARL member libraries*. Association of Research Libraries.

Drobatz, K. J., Syring, R., Reineke, E., & Meadows, C. (2009). Association of holidays, full moon, Friday the 13th, day of week, time of day, day of week, and time of year on case distribution in an urban referral small animal emergency clinic. *Journal of Veterinary Emergency and Critical Care*, *19*(5), 479–483. https://doi.org/10.1111/j.1476-4431.2009.00452.x

East Carolina University. (n.d.). *ECU by the numbers*. https://facts.ecu.edu/

East Carolina University Institutional Assessment, Planning, and Research. (2021). *Enrollment by unit and major* [Data set]. ECU Analytics Portal. https://performance.ecu.edu/portal/?itemId=04309242-b548-43c6-84f4-a757fc7bf4c1

ECU Athletics Fiscal Sustainability Working Group. (2020, May 14). *Athletics Fiscal Sustainability Working Group report*. East Carolina University. https://news.ecu.edu/wp-content/pv-uploads/sites/80/2017/07/Athletics-Fiscal-Sustainability-Working-Group-Report.pdf

Ferria, A., Gallagher, B. T., Izenstark, A., Larsen, P., LeMeur, K., McCarthy, C. A., & Mongeau, D. (2017). What are they doing anyway?: Library as place and student use of a university library. *Evidence Based Library and Information Practice*, *12*(1), 18–33. https://doi.org/10.18438/B83D0T

Finlay, A. K., Ram, N., Maggs, J. L., & Caldwell, L. L. (2012). Leisure activities, the social weekend, and alcohol use: Evidence from a daily study of first-year college students. *Journal of Studies on Alcohol and Drugs*, *73*(2), 250–259. https://doi.org/10.15288/jsad.2012.73.250

Glassman, T., Werch, C. E., Jobli, E., & Bian, H. (2007). Alcohol-related fan behavior on college football game day. *Journal of American College Health*, *56*(3), 255–260. https://doi.org/10.3200/JACH.56.3.255-260

Greene, K. M., & Maggs, J. L. (2015). Revisiting the time trade-off hypothesis: Work, organized activities, and academics during college. *Journal of Youth and Adolescence*, *44*(8), 1623–1637. https://doi.org/10.1007/s10964-014-0215-7

Hardin, T., & Basden, S. (2019, October 28). *Businesses feel impact of ECU's homecoming*. WCTI. https://wcti12.com/news/local/businesses-say-ecu-homecoming-helps-sales

Humphreys, B. R., & Pyun, H. (2018). Professional sporting events and traffic: Evidence from U.S. cities. *Journal of Regional Science*, *58*(5), 869–886. https://doi.org/10.1111/jors.12389

Jena, A. B., Clay Mann, N., Wedlund, L. N., & Olenski, A. (2017). Delays in emergency care and mortality during major U.S. marathons. *The New England Journal of Medicine*, *376*(15), 1441–1450. https://doi.org/10.1056/NEJMsa1614073

Jerrard, D. A. (2009). Male patient visits to the emergency department decline during the play of major sporting events. *The Western Journal of Emergency Medicine*, *10*(2), 101–103. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2691518/

Jones, J. L. (2011). Using library swipe-card data to inform decision making. *Georgia Library Quarterly, 48*(2). https://digitalcommons.kennesaw.edu/glq/vol48/iss2/4

Kramer, L. A., & Kramer, M. B. (1968). The college library and the drop-out. *College & Research Libraries*, *29*(4), 310–312. https://doi.org/10.5860/crl_29_04_310

Lawrence, P., & Weber, L. (2012). Midnight-2.00 a.m.: What goes on at the library? *New Library World*, *113*(11/12), 528–548. https://doi.org/10.1108/03074801211282911

LeMaistre, T., Shi, Q., & Thanki, S. (2018). Connecting library use to student success. *Portal: Libraries and the Academy*, *18*(1), 117–140. https://doi.org/10.1353/pla.2018.0006

Lindo, J. M., Swensen, I. D., & Waddell, G. R. (2012). Are big-time sports a threat to student achievement? *American Economic Journal: Applied Economics*, *4*(4), 254–274. https://doi.org/10.1257/app.4.4.254

Lo, B. M., Visintainer, C. M., Best, H. A., & Beydoun, H. A. (2012). Answering the myth: Use of emergency services on Friday the 13th. *The American Journal of Emergency Medicine*, *30*(6), 886–889. https://doi.org/10.1016/j.ajem.2011.06.008

Lyon-Hill, S., Alwang, J. R., Mawyer, A., Burke, P., & Budzevski, L. (2015). *Economic impact analysis of Virginia Tech football*. http://hdl.handle.net/10919/94598

Martell, C. (2007). The elusive user: Changing use patterns in academic libraries 1995 to 2004. *College & Research Libraries*, *68*(5), 435-445. https://doi.org/10.5860/crl.68.5.435

McGreevy, A., Millar, L., Murphy, B., Davison, G. W., Brown, R., & O'Donnell, M. E. (2010). The effect of sporting events on emergency department attendance rates in a district general hospital in Northern Ireland. *International Journal of Clinical Practice*, *64*(11), 1563–1569. https://doi.org/10.1111/j.1742-1241.2010.02390.x

Mixon Jr, F. G., & Trevino, L. J. (2005). From kickoff to commencement: The positive role of intercollegiate athletics in higher education. *Economics of Education Review*, *24*(1), 97–102. https://doi.org/10.1016/j.econedurev.2003.09.005

Moulin, M. S., & Irwin, J. D. (2017). An assessment of sedentary time among undergraduate students at a Canadian university. *International Journal of Exercise Science*, *10*(8), 1116–1129. https://digitalcommons.wku.edu/ijes/vol10/iss8/3

National Center for Education Statistics. (2017). *Academic Libraries Survey (ALS)*. https://nces.ed.gov/statprog/handbook/pdf/als.pdf

National Collegiate Athletic Association. (n.d.-a). *NCAA statistics*. https://stats.ncaa.org/rankings/change_sport_year_div

National Collegiate Athletic Association. (n.d.-b). *NCAA statistics: Football 2018-2019 FBS miscellaneous reports: Game length*. https://stats.ncaa.org/rankings/change_sport_year_div

Next College Student Athlete (NCSA). (n.d.). *Your comprehensive list of college football teams*. https://www.ncsasports.org/football/colleges

Opperman, B. V., & Jamison, M. (2008). New roles for an academic library: Current measurements. *New Library World, 109*(11/12), 559-573. https://doi.org/10.1108/03074800810921368

Orcutt, J. D., & Harvey, L. K. (1991). The temporal patterning of tension reduction: Stress and alcohol use on

weekdays and weekends. *Journal of Studies on Alcohol*, *52*(5), 415–424. https://doi.org/10.15288/jsa.1991.52.415

Phillips, J. (2016). Determining gate count reliability in a library setting. *Evidence Based Library and Information Practice*, *11*(3), 68-74. https://doi.org/10.18438/B8R90P

Pope, D. G., & Pope, J. C. (2009). The impact of college sports success on the quantity and quality of student applications. *Southern Economic Journal*, *75*(3), 750–780. https://www.jstor.org/stable/27751414

Pope, D. G., & Pope, J. C. (2014). Understanding college application decisions: Why college sports success matters. *Journal of Sports Economics*, *15*(2), 107–131. https://doi.org/10.1177/1527002512445569

Protty, M. B., Jaafar, M., Hannoodee, S., & Freeman, P. (2016). Acute coronary syndrome on Friday the 13th: A case for re-organising services? *The Medical Journal of Australia*, *205*(11), 523–525. https://doi.org/10.5694/mja16.00870

Rishe, P. J. (2003). A reexamination of how athletic success impacts graduation rates: Comparing student-athletes to all other undergraduates. *American Journal of Economics and Sociology*, *62*(2), 407–427. https://doi.org/10.1111/1536-7150.00219

Robinson, M. J., Trail, G. T., Dick, R. J., & Gillentine, A. J. (2005). Fans vs. spectators: An analysis of those who attend intercollegiate football games. *Sport Marketing Quarterly*, *14*(1). https://fitpublishing.com/content/fans-vs-spectators-analysis-those-who-attend-intercollegiate-football-games

Scarletto, E. A., Burhanna, K. J., & Richardson, E. (2013). Wide awake at 4 AM: A study of late night user behavior, perceptions and performance at an academic library. *The Journal of Academic Librarianship*, *39*(5), 371-377. https://doi.org/10.1016/j.acalib.2013.02.006

Schuld, J., Slotta, J. E., Schuld, S., Kollmar, O., Schilling, M. K., & Richter, S. (2011). Popular belief meets surgical reality: Impact of lunar phases, Friday the 13th and zodiac signs on emergency operations and intraoperative blood loss. *World Journal of Surgery*, *35*, 1945–1949. https://doi.org/10.1007/s00268-011-1166-8

Shook, J., & Hiestand, B. C. (2011). Alcohol-related emergency department visits associated with collegiate football games. *Journal of American College Health*, *59*(5), 388–392. https://doi.org/10.1080/07448481.2010.511364

Shughart, W. F., Tollison, R. D., & Goff, B. L. (1986). Pigskins and publications. *Atlantic Economic Journal*, *14*, 46–50. https://doi.org/10.1007/BF02316792

Smith, C. M., & Graffeo, C. S. (2005). Regional impact of Hurricane Isabel on emergency departments in coastal southeastern Virginia. *Academic Emergency Medicine: Official Journal of the Society for Academic Emergency Medicine*, *12*(12), 1201–1205. https://doi.org/10.1197/j.aem.2005.06.024

Soria, K. M., Fransen, J., & Nackerud, S. (2013). Library use and undergraduate student outcomes: New evidence for students' retention and academic success. *Portal: Libraries and the Academy*, *13*(2), 147–164. https://doi.org/10.1353/pla.2013.0010

Soria, K. M., Fransen, J., & Nackerud, S. (2017). Beyond books: The extended academic benefits of library use for first-year college students. *College & Research Libraries*, *78*(1), 8–22. https://doi.org/10.5860/crl.78.1.8

Soria, K. M., Nackerud, S., & Peterson, K. (2015). Socioeconomic indicators associated with first-year college students' use of academic libraries. *The Journal of Academic Librarianship*, *41*(5), 636–643. https://doi.org/10.1016/j.acalib.2015.06.011

Sridhar, M. S. (1994). Non-use and non-users of libraries. *Library Science with a Slant to Documentation and Information Studies*, *31*(3), 115–128.

Tailgating Institute. (n.d.). *Tailgating research—Tailgater statistics and information*. https://tailgating.com/tailgater-research-tailgater-statistics-and-information

Tempelmeier, N., Dietze, S., & Demidova, E. (2020). Crosstown traffic-supervised prediction of impact of planned special events on urban traffic. *Geoinformatica*, *24*, 339–370. https://doi.org/10.1007/s10707-019-00366-x

Terrill, L. J. (2018). Telling their story with data: What academic research libraries share on their websites. *Journal of Web Librarianship*, *12*(4), 232–245. https://doi.org/10.1080/19322909.2018.1514286

Thorpe, A., Lukes, R., Bever, D. J., & He, Y. (2016). The impact of the academic library on student success: Connecting the dots. *Portal: Libraries and the Academy*, *16*(2), 373–392. https://doi.org/10.1353/pla.2016.0027

Toma, J. D., & Cross, M. E. (1998). Intercollegiate athletics and student college choice: Exploring the impact of championship seasons on undergraduate applications. *Research in Higher Education*, *39*, 633–661. https://doi.org/10.1023/A:1018757807834

Toner, L. J. (2008). Non-use of library services by students in a UK academic library. *Evidence Based Library and Information Practice*, *3*(2), 18–31. https://doi.org/10.18438/B8HS57

Tucker, I. B. (1992). The impact of big-time athletics on graduation rates. *Atlantic Economic Journal*, *20*, 65–72. https://doi.org/10.1007/BF02300088

Turtle, K. M. (2005). A survey of users and non-users of a UK teaching hospital library and information service. *Health Information & Libraries Journal*, *22*(4), 267–275. https://doi.org/10.1111/j.1471-1842.2005.00596.x