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A Journal Usage Analysis During the COVID-19 Pandemic: Serials Trends and Implications

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A Journal Usage Analysis During the COVID-19 Pandemic: Serials Trends and Implications

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ABSTRACT

The 2020 COVID-19 pandemic had wide-reaching effects throughout all of society. For libraries, this often translated to a quick pivot to support activities that moved to almost-exclusively online and remote for all patrons. Although the LSU Health Sciences Center New Orleans Library was somewhat unique in that it never closed during the 2020 height of the pandemic, the majority of its patrons were accessing its resources remotely. Spurred by local anecdotal evidence journal usage had surprisingly declined at a significant rate during 2020, this study aims to determine whether this decline could be demonstrated through statistical analysis of COUNTER 5 usage reports for 2019 and 2020 for a sampling of titles. It also illustrates how COUNTER statistics may provide just a window of overall serials use.

KEYWORDS

Analyses; COUNTER 5; COVID-19; electronic resources; journals; paired *t*-test; pandemics; Serials; statistics; univariate linear regression

Introduction

The Library of the Louisiana State University Health Sciences Center New Orleans provides resources and helps with the information needs of the patrons of the six schools of the institution. The Library and its staff provide services to students, academic faculty, clinical faculty, research personnel, and support staff of the Schools of Allied Health Professions, Dentistry, Graduate Studies, Medicine, Nursing, and Public Health. Journal content is, of course, vital to the research and clinical information needs of our patrons, and the serials acquired and maintained by the Library range from the "traditional" health sciences disciplines to education to criminology.

The journal collection of the Library is also indicative of the impact online delivery of information has had on the world of serials in general. The print collection started with the opening of the Library in 1931 and was the dominant format for the Library's journal acquisitions until 2005. In the aftermath of Hurricane Katrina and an inability to get to the print collection for close to 10 months, when preparations for the 2006 journal subscription year commenced the decision was made to change the majority of titles to electronic. In the 15 years since that trend has continued, with just a handful of current print journal subscriptions.

The Library's electronic journal holdings were and continue to be a mixture of subscription models from various sources and platforms. Subject-specific packages are received from a variety of publishers, as well as a la carte individual subscriptions. Additionally, the Library subscribes to a handful of packages including titles both within and out of the traditional subjects handled by a health sciences library. These are complemented by titles available through full-text aggregators and other journal packages made available through LOUIS, the academic library consortium for Louisiana.

Budget issues tend to govern renewals, but when determining which journals to keep or add each subscription year the Library analyzes COUNTER statistics to help guide its decisions. Although they are by no means the only way to evaluate use, COUNTER statistics are a widely accepted metric for evaluating journals (Stewart, 2011). Currently, the Library looks at the COUNTER 5 TR_J1 Journal Requests (Excluding OA_Gold) total and unique item requests as well as TR_J2 Journal Access Denied reports to guide these decisions (Mellins-Cohen). Renewal decisions informed by this analysis of usage statistics has helped the Library pivot to address changing research and information needs of the patrons at the Health Sciences Center.

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Table 1. OpenAthens total logins by permission set.

	2019	2020
April	3203	8455
May	1759	5519
June	2615	5545
July	3677	5757
August	5415	8585
September	5545	10266
October	5707	9252
November	4943	7611
December	2668	4126

Library staff consider the COUNTER statistics very useful as the reports help to consolidate usage from the various ways journals are made available to the Health Sciences Center's patrons. The Library employs myriad options to deliver the journals and their content: direct access through the Library OPAC; linking from citations via a link resolver; a listing of electronic resources through EBSCO's Publication Finder; deployment of the entire Third Iron LibKey suite of LibKey Link, LibKey Discovery, LibKey Nomad, and LibKey.io; as well as through the Library's instance of EBSCO Discovery Service Health. The Library also uses EZproxy and OpenAthens to facilitate off campus access to resources.

Since so much of the collection has been available online and remotely for many years already, when the interruption of normal services occurred in March 2020 because of the COVID-19 pandemic the Library was already in a good position to handle this change. On March 16, 2020, the Health Sciences Center implemented measures that included remote learning and work from home arrangements (Hollier, 2020). Although no outside visitors were allowed, the campus never closed, and the Library remained open albeit with modified hours. Even though campus was still open, there was a considerable jump in off campus logins to Library resources from April through December 2020 as demonstrated by the total OpenAthens logins via permissions set (Table 1) as compared to the same time in 2019.

Even though the OpenAthens logins could suggest the potential for increased use of Library resouces including journal articles, when embarking on the journal renewals for 2021, anecdotal evidence of significant declines in usage for a number of titles for 2020 was noticed. Were those titles with decreasing usage anomalies or was this downturn more widespread? What trends with regards to the Health Sciences Center's users can analysis of COUNTER 5 reports from 2019 and 2020 provide given that 2019 was a year conducted under normal operating conditions and 2020 was radically affected by the pandemic? Also, did interlibrary loan (ILL) requests impact usage?

The journals included for this analysis are just a sampling of the total subscribed to by the Library at the LSU Health Sciences Center New Orleans. Included in the analysis are the Taylor and Francis Medical Library, a la carte subscriptions from various publishers available on the HighWire Press platform, all journals available in the American Physiological Society's Journals Digital Library, and a combination of the Medical Collection and individually subscribed titles from Oxford University Press (OUP).

Methods

The platforms analyzed were Oxford University Press (OUP), Taylor & Francis (T&F), American Physiological Society (APS), and HighWire Press (HWP). These four platforms were chosen because they were the largest entirely in-scope platforms that have consistently been accessible on- and off-campus. Other in-scope platforms were not as reliable locally, such as the Ovid/Lippincott Williams and Wilkins Total Access Collection, so they were excluded from our dataset. Next the COUNTER 5 statistics for calendar years 2019 and 2020 were independently exported by platform. Then, in each platform, the 2019 and 2020 years' usages were matched by journal title; this was done for two reasons: (1) to ensure that a journal did not change platforms between the calendar years which could change ease of access, and (2) to form a longitudinal dataset for the journals in order to compare pre- and post- COVID-19. In COUNTER 5, both Unique Item Requests and Total Item Requests are options in the Metric Type field. This analysis used only Total Item Requests.

Because this analysis wanted to see how local users' electronic serial usage had changed pre- and post-COVID-19, interlibrary loan (ILL) usage had to be corrected for, since the inclusion of ILL statistics could inflate serials usage both in 2019 and 2020. Anecdotally, 2020 had been a busy year for ILL, but we had not verified quantitatively. Regardless journal usage by month was exported from ILLiad. This software has no quality control for journal titles and does not require ISSN. Therefore, the user submitting the request has a lot of leeway, and a lot of possible error, when entering journal titles. This unfortunately had to be manually corrected in most instances, though a couple of string manipulations, such as the removal of a terminal period or of an initial titular "The," could be done to assist the reconciliation.

Table 2. Journal title counts across platforms by time.

Platform	Count of titles 2019	Count of titles 2020	Count of identical titles
OUP	199	173	151
T&F	367	359	280
HWP	101	95	89
APS	15	15	15
		TOTAL	535

The journal titles were corrected, deduped, etc. in order to match the ILL usage with the existing database. Once this was done, the dataset was considered complete. This was our master dataset from which all analyses were based and derived.

From this point, additional variables had to be calculated according to the research question. This research aims to examine how electronic serial usage changed pre- and post- COVID-19. The governor declared an emergency on March 13, 2020, so March 2020 was our delineator between pre and post (Bel Edwards, 2020). Because of the available COUNTER 5 statistics, we counted April to December 2019 as our pre-group and April to December 2020 as our post-group. January and February 2020 were not included in the pre-group due to no corresponding post-group months in the master dataset. Their unmatched inclusion could ignore seasonal variation in resource usage. Furthermore, researchers could not go back further than the 2019 calendar year due to COUNTER 5 not being widely implemented prior to then. Cross-walking between COUNTER 4 and COUNTER 5 is not easily done because of methodological variations in how uses are counted (Hendry, 2021).

Due to these timeframes, each journal had several new variables calculated. Total number of uses from April to December was calculated for each 2019 and 2020 per journal. Then a new variable was calculated that subtracted the ILL usage during those same time periods. The distribution of usage had a strong positive skew, so a logarithmic transformation was conducted in order to normalize the data. To determine if the ILL usages had a significant impact on the number of journal usages, a paired *t*-test was run for each calendar year comparing the means of journal usage total and of journal usage minus ILL usage. This same analysis was run stratified by platform.

Once ILL usage was corrected for, paired *t*-tests were run to see if there was a significant difference in use between April–December 2019 and April–December 2020. Afterward, univariate linear regressions were run to assess the difference in usage per title between the 2 years during the same period. These models were developed overall and for platforms. All analyses were run in IBM SPSS Statistics 25.

Results

We needed to analyze the characteristics of the individual publishing platforms before aggregating them. As mentioned in the Methods, only journals that stayed on the same platform in 2019 and 2020 were included in this analysis. These counts also reflect those journals that logged use in either year as COUNTER 5 and does not list journals with no use in the Title Reports (Hendry, 2020). Table 2 shows those results, limited to Total Item Requests.

Looking over the ILL numbers, the usage statistics were matched with the corresponding journal title to yield Table 3, which shows the counts of the number of journals by platform for calendar year 2019 and 2020.

The total number of uses per journal were summed for April to December 2019 and April to December 2020. Afterward a new set of variables examined the impact of ILL usage. The plots of usage, overall and by platform, were strongly positively skewed, and a log transformation was performed to normalize the usage distribution to assess if ILL usage had any impact on the mean usage, as shown in Table 4.

OUP and T&F were significantly impacted by ILL usage in both 2019 and 2020 for April–December. The smaller platforms, HWP and APS, showed no such relationship. While the overall usage was impacted by ILL use, this could simply be a result of the factor impact of T&F and OUP compared to HWP and APS.

Once determining whether ILL usage significantly affected the mean log of title use in each platform, we moved onto the aim of the research—to determine if there was a significant difference between the usage stats for serials titles pre- and post- COVID, as shown in Table 5.

For these latter two platforms, it should not make a statistical difference if we compare 2019 and 2020 adjusting for ILL usage or not. Analyses however were performed to assess if that is actually the case.

Now we can try to determine trends in the overall usage, given that we have a more focused approach. Overall, comparing ILL-adjusted usage for April–December 2019 vs 2020, the results are strongly related (R^2 Linear = .938), which means that high usage in 2019 predicted ~94% of usage in 2020. The models were rerun by platform. The results are in the graph below, as well as in Table 6 and Figure 1.

Table 3. ILL uses and titles across platforms by time.

	Count of ILL titles 2019 (April–December)	Count of ILL titles 2020 (April–December)	Count of ILL uses 2019 (April–December)	Count of ILL uses 2020 (April–December)
OUP	50 (38)	40 (37)	101 (69)	81 (58)
T&F	156 (142)	146 (130)	859 (612)	700 (479)
HWP	14 (11)	9 (8)	58 (39)	38 (28)
APS	3 (2)	2 (2)	3 (2)	3 (3)

Table 4. Mean difference in log use vs. log use without ILL.

Platform	April–December 2019	April–December 2020
Overall	.05674***	.04921***
T&F	.10217***	.08910***
OUP	.01463***	.01033***
HWP	.00433	.00216
APS	.00108	.00128

***p-Value $< .001$.

Table 5. Mean difference in log use for April–December, 2019 vs. 2020.

Overall^{+}	−.03749***
T&F^{+}	−.00131
OUP^{+}	−.14882***
HWP^{+}	−.16173***
APS^{+}	−.03940
HWP$^{\#}$	−.16387***
APS$^{\#}$	−.03927

$^{+}$Controlled for ILL usage.
$^{\#}$Uncontrolled for ILL usage.
***p-Value $< .001$.

Table 6. Summary of univariate linear regression models, 2019 vs. 2020.

	β-Coefficient	R^2 linear
Overall	.79	.938
HWP	.94	.941
OUP	.57	.866
T&F	.72	.731
APS	.94	.896

Discussion

This analysis found many nuances in the data, especially how COVID-19 has impacted libraries and how libraries, users, and platforms have responded. All of these stakeholders have a role in the results we found.

Platform titles & ILL

The initial part of this research sought to understand the serials data and how they were impacted by ILL. Looking at how titles migrated across platforms or were canceled was necessary to remove possible confounders from platform access variations. The smaller platforms tended to remain stable with no change in APS titles and about a 10% change in HWP. OUP and T&F had between 15% and 25% turnover in the same period. These statistics were pulled from the publishers' interfaces.

We use Atlas ILLiad for our interlibrary loan, and these statistics were pulled from that software, matched to platform titles, and then analyzed. Because this research was focused on how local users engaged with electronic serials, these ILL data were not used any further than to adjust the platform usage data. However, glancing over Table 2 shows an overall marked decline in article usage by platform pre- and post- COVID. Journal usage seems to have declined as well.

Once the ILL usage was subtracted from a journal's total usage for the same time period and log transformed, the paired t-test of article requests prior to adjusting for ILL usage and after adjusting for ILL usage, by year from April to December, revealed that ILL requests do have a significant impact on average number of total article requests overall and in T&F and OUP, consistent with Scott (2016) and Knowlton et al. (2015). This ILL effect was observed pre- and post-COVID; in fact, the mean difference is smaller in 2020, though there could be mitigating factors.

Usage differences in platforms

Comparing the average number of total article requests in log transformed platforms from April through December of 2019 and 2020, adjusting for ILL usage, there was a significant difference pre- and post-COVID in the overall category, OUP, and HWP. Neither T&F nor APS showed a statistically significant difference. Because adjusting for ILL was shown to be unnecessary for the smaller platforms, APS and HWP were analyzed controlling for ILL usage and not. These subsequent analyses did not change the results. The mean difference between 2019 and 2020 is negative across all groups, which means that usage declined. No research has been published with similar results, though a number of papers have been published regarding responses to COVID-19 (Hendal, 2020; Koos et al., 2021; Mehta & Wang, 2020). None have measured the impact of these measures. To determine the magnitude of our research's 2020 decline in serials usage, we had to perform additional analyses.

Linear univariate regression models were run on the overall dataset in addition to the individual platforms, adjusting for ILL usage, as has been detailed in Wang and Mi (2019). The regression model findings

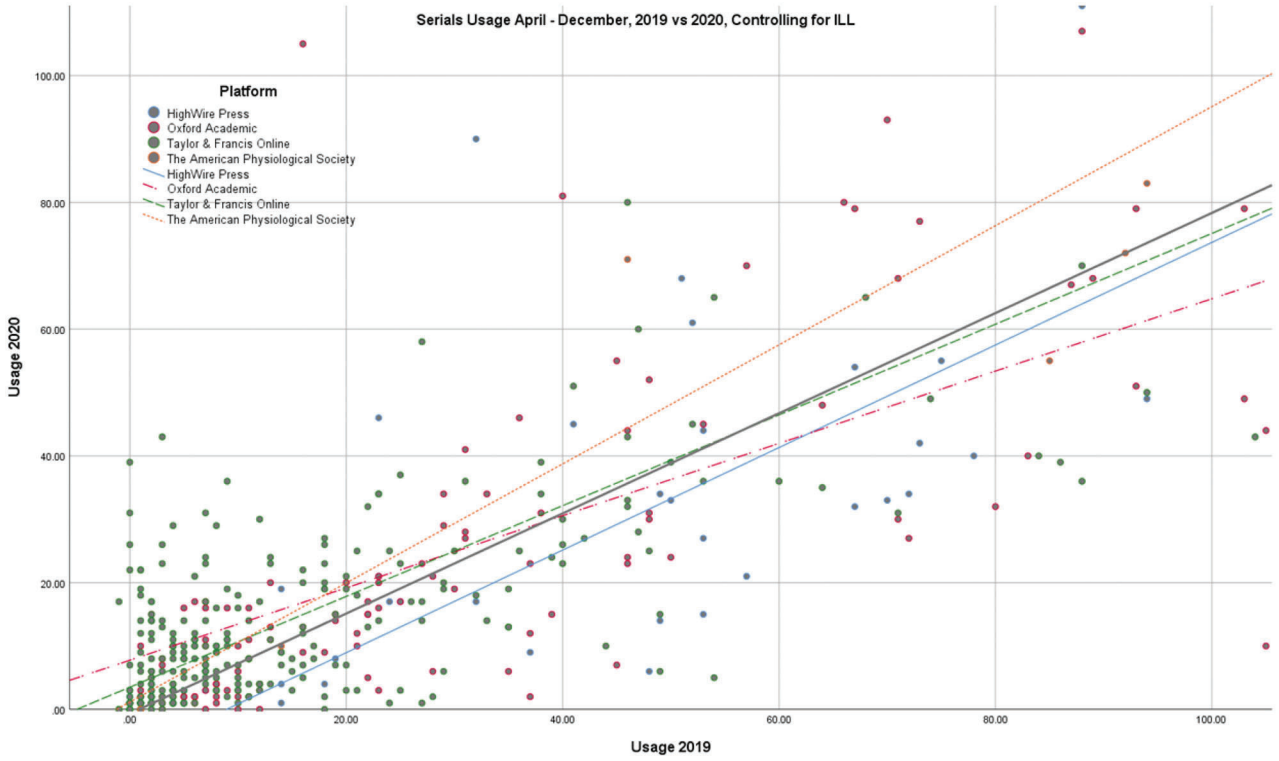

Figure 1. Bolded line is overall trendline.

corroborate the paired *t*-test results, that is—usage declined in 2020 compared to the same time period in 2019. The coefficients suggest quite a stark decline, with the proverbial "bottom falling out." Overall total article requests were down 20%, with a R^2 linear of .938. This R^2 linear means that ~94% of the data points match the regression model. Among the platforms, the findings were more surprising. Among the larger platforms, OUP and T&F has declines of over 40% and almost 30%, with R^2 linear scores of .866 and .731 respectively. That T&F R^2 linear score is noteworthy, because almost a quarter of the T&F data points do not agree with the regression model. A multivariate model could account for other variables that might contribute to a more robust predictor of usage. Unfortunately, given the dataset's parsimoniousness, such modeling is not feasible at present.

Proprietary & platforms

After the Results had been completed and as we were working on this Discussion, an important consideration came to light that completely altered the interpretation of this study and can shape the larger narrative around the impact of COVID-19 on serials usage. According to COUNTER 5 guidance, if a publisher made its resources freely available, then the use of journals and articles would not be captured unless the user was on-campus (Hendry, 2021). Bulock (2021) noted problems that arose when libraries had temporary free access; this current problem was not among them. This revelation has massive implications for the applicability of our study's results.

Locally, although the library never closed, the health sciences center encouraged all affiliates to stay away from campus. Around this same time, publishers across platforms opened up their collections, especially as they pertained to health and specifically COVID-19. As a health sciences center, this means that our COUNTER 5 statistics do not reflect what our users accessed because said users were possibly not navigating to these resources via the library. This increased availability of resources could also explain the decline in ILL requests previously noted. As colleagues anecdotally observe increases in research and in library resource usage, the data do not support these observations—probably because the normal statistics did not record it.

The larger issue is one that ties into the usage of electronic resource usage statistics, which has been a field of massive confusion. In 2011, Stewart warned of the challenges in measuring these data accurately—"[t]he tools available for this task are evolving and improving, but they are far from ideal" (p. 175). That same year, Pesch noted the need for standards when collecting these very data. In their review of electronic

resource usage, Tripathi & Jeevan observed the absence of unity across the field (2013). The same review asserts the possibility of better electronic resource usage data to allow library services to be better honed. Conversely, Perrin et al. (2017) stake that digital collection "use statistics have complexities that prohibit meaningful interpretation and assessment" (p. 185). From a narrow perspective, this assessment rings true, save the odd exception (Bourgeois & Bealer, 2020); however, using multiple metrics has the possibility to identify evidence of demand (Jabaily, 2020). Regardless of the literature's equivocation on the matter, an overarching theme of the necessity for consistent and reliable methods for data collection appears (Hopkins and Summers-Ables, 2013). A basic failure to have standardized statistics emphasizes the exceptionality of COVID-19 and how our normal methods, which have evolved over the decade, are unsuited to meet our current situation.

Conclusion

Clearly to say that this COUNTER 5 information is inconsequential for our research is simply false. It is massively important for several reasons. First publishers turned off free access at different points; to see how serials usage was impacted after that point may be helpful. For example, if Publisher A placed its content behind a paywall again in September 2020, was there a corresponding uptick in October 2020? A more granular analysis that takes the platform and publisher responses to COVID-19 into account could yield more applicable results to COVID's true impact on library serials usage.

Second this work highlights to importance of the effect of information bias in studies. Because our normal data collection systems were no longer collecting data as they normally had, findings were made which may not be true. One of the main problems with information bias in this instance is that we cannot adjust for it, cannot correct the data to better reflect actual usage. Since articles were accessed by a variety of affiliates from various geographical locations on a multitude of devices and with the reasonable potential of no library authentication, it would take a massive surveillance effort to gather information that would probably be neither accurate nor useful.

Even if one platform did not freely share content, it could not be used as a reference for serials usage during the pandemic. Because so many other platforms did share their content, if users encounter a paywall for one platform, they may simply use another article on a temporarily free platform, thus artificially suppressing usage and not resolving the underlying information bias.

Any serials decisions made using COUNTER 5 or ILL data from the current COVID-19 pandemic should be contextualized in the realization that those statistics may not be capturing what they previously had in a manner consistent with the past. Even though this analysis did confirm the overall decline in usage of the sampled publishers and platforms for 2020 as had been previously noticed, decisions about the future should draw on alternative statistics, such as OpenAthens logins or chat transcripts, although no change would probably be the best course until serials surveillance statistics normalize again.

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