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The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the *JACC* author instructions page.

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Relationship of Altmetric Attention Score to Overall Citations and Downloads for Papers Published in *JACC*

Dissemination of scientific content has been amplified with increasing use of social media (SoMe) in cardiovascular (CV) medicine (1). Traditionally, the performance of a scholarly journal paper is measured by the number of times it is cited. A newer metric, the Altmetric Attention Score (AAS), is a real-time, automatically calculated, weighted count of the online attention a research output receives. AAS thus provides information around impact and performance of a paper on social media platforms, news or media outlets, blog-spots, and podcasts.

The objective of this study was to determine whether there was a correlation between AAS and its components, with citations and overall article downloads published in the *Journal of the American College of Cardiology (JACC)*.

All papers published in the *Journal* from January 2016 through December 2017 were included in our analysis. For each paper, the number of citations and AAS were recorded as of December 2018. The full text of every paper was examined for article type and topic. We examined the Pearson's correlation between each component of AAS and total downloads/citations. We fit a linear regression model with total paper download count from onlinejacc.org or citation count as the outcome, with AAS (and its components), months since publication, and type of article as covariates. Because total downloads/citations and the AAS (and components) are non-negative, we log-transformed these variables (adding 1 to each before transformation because log [0] is not defined). The degree of association was interpreted using the linear regression coefficients with their corresponding 95% confidence intervals (CIs). As paper metrics did not contain patient information, institutional review board approval was not required.

There were in total 773 *Journal* papers included in the analysis; of these, 472 (61.1%) were original articles. Median AAS was 42 (interquartile range [IQR]: 20 to 78), whereas the median number of citations was 19 (IQR: 10 to 34). The median downloads and twitter mentions were 1,381 (IQR: 775 to 2,454) and 42 (IQR: 20 to 88), respectively.

The Pearson's correlation between overall AAS and downloads was 0.138 ($p < 0.001$). Correlation between overall AAS and citations was 0.159 ($p < 0.001$). Across all AAS components, Twitter mentions, and policy documents numerically had the highest Pearson's correlation with article downloads of 0.257 ($p < 0.001$) and 0.458 ($p < 0.001$), respectively.

The adjusted associations between log(AAS + 1) and log(twitter mentions + 1) with log(downloads + 1) for the included studies are shown in **Figure 1**. Overall, a unit increase in log(AAS + 1) increased the log(downloads + 1) by 0.261 (95% CI: 0.206 to 0.316), and increased the log(citations + 1) by 0.208 (95% CI: 0.154 to 1.825), while a unit increase in log(twitter mentions + 1) increased log(downloads + 1) by 0.375 (95% CI: 0.324 to 0.425) and increased the log(citations + 1) by 0.191 (95% CI: 0.137 to 0.245), demonstrating a positive association between these metrics.

This is the first study to examine the relationship of AAS and its components with download and citations for the papers published in the *Journal*.

This study shows that, for papers published in the *Journal*, there was correlation between AAS and

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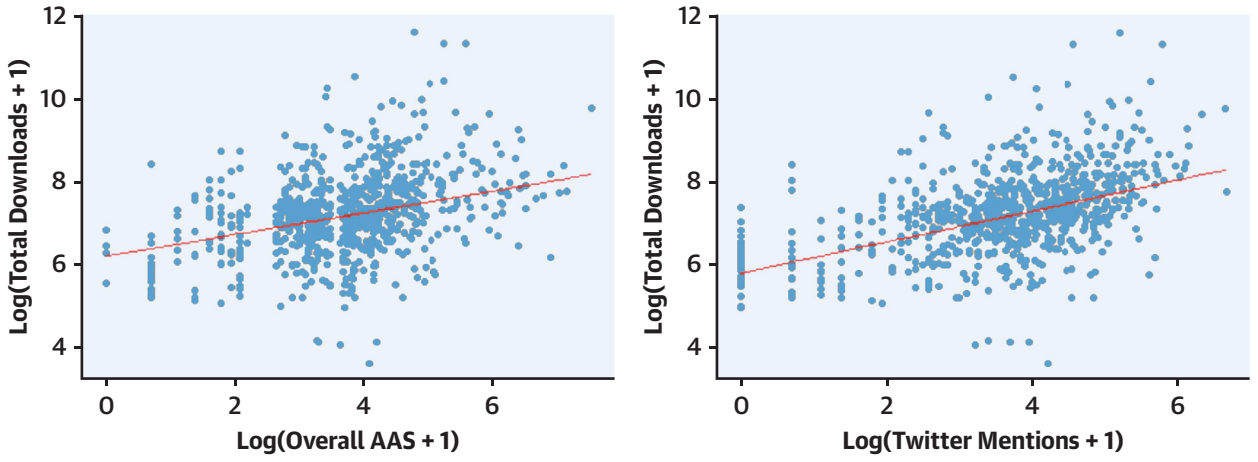
FIGURE 1 Scatter Plots Showing the Adjusted Associations Between Logarithmic Downloads and Logarithmic AAS/Twitter Component of AAS



Scatter plots examining the associations between log(AAS + 1) and log(twitter mentions + 1) with log(downloads + 1). **Red line** represents the linear regression model. Overall, a unit increase in log(AAS + 1) increased the log(downloads + 1) by 0.261 (95% confidence interval: 0.206 to 0.316) while a unit increase in log(twitter mentions + 1) increased log(downloads + 1) by 0.375 (95% confidence interval: 0.324 to 0.425).

article downloads. Of all of the AAS components, Twitter mentions and policy documents had the highest numerical correlation with article downloads compared with the other SoMe components that are part of AAS.

In past few years, there has been emerging data in understanding the impact of newer metrics such as the AAS on more traditional measures of scholarly performance of a paper. A randomized controlled trial published in 2015 failed to demonstrate a benefit of SoMe promotion on 30 days views and downloads of papers (2). In contrast, a more recent randomized controlled trial reported that papers with a proactively applied SoMe strategy were more widely accessed with significantly higher downloads up to 60 days after publication compared with those without SoMe promotion (3). In a study published in the *Journal*, AAS had a moderate correlation of 0.42 with citations at 3 years after publication for original cardiovascular research articles (4). Another study showed that the top performing contemporary papers in major cardiovascular journals had weak correlation between Altmetric scores and number of citations ($r = 0.16$; $p = 0.006$) (5). Our study extends these previous findings, and in addition, shows the individual correlation of AAS components with total downloads, demonstrating that the largest correlations were seen with Twitter and policy components compared with the other SoMe tools that are part of AAS.

Papers published in the *Journal* often receive social media attention. The AAS correlates with overall downloads of published papers, with Twitter engagement being one of the strongest individual parameters. Twitter engagement provides a dynamic initial assessment of popular papers in the *Journal*.

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Suspected Borderline Aldosteronism in Hypertension

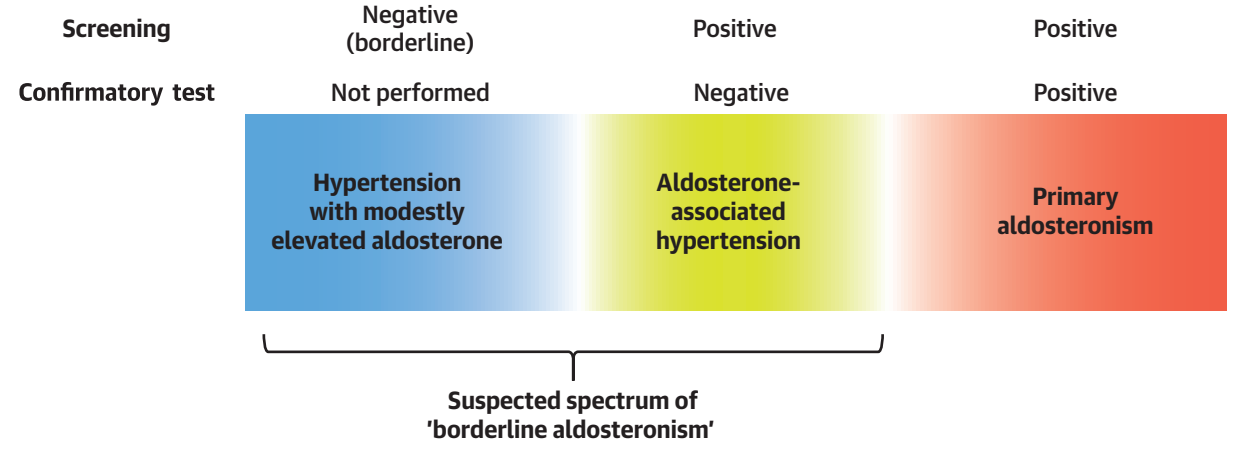
The Next Target?

Xu et al. (1) investigated the actual frequency and clinical outcomes of primary aldosteronism (PA) in newly diagnosed hypertensive patients in China. At least 4% of patients were confirmed to have PA, whereas 7% including patients who screened positive but declined confirmatory testing had PA or probable PA, emphasizing the importance of PA screening at initial medical examinations in hypertensive patients (2). The study showed clearly that the incidence of cardiovascular events over 1-year follow-up was similar in PA, non-PA, and probable PA. This indicates the importance of early diagnosis and treatment for PA, which has a worse prognosis than essential hypertension, and suppression of long-term exposure to elevated aldosterone levels to improve patient outcomes.

Interestingly, 21 patients (2%) screened positive and confirmatory-test negative in the study, resulting in 34.4% being diagnosed as non-PA. Presumably, a similar proportion of patients with probable PA had a similar status. Sartoli et al. (3) defined hypertensive patients who screened positive and confirmatory-test (captopril challenge test) negative as aldosterone-associated hypertension. They also found that a similar number of patients with aldosterone-associated hypertension to that of patients with definitive PA developed resistant hypertension over 22-month follow-up. Shibata et al. (4) defined hypertensive patients with hyperaldosteronemia who did not satisfy the diagnosis criteria for PA as a subtype of mineralocorticoid receptor-associated hypertension, probably resulting in pathophysiological activation of the aldosterone-mineralocorticoid receptor axis.

During screening, we occasionally observe hypertensive patients with borderline values of PA criteria, who do not typically proceed to the confirmatory test. No specific diagnosis or treatment guidelines have been established for these borderline patients and

FIGURE 1 Suspected Spectrum of Borderline Aldosteronism



The spectrum of "borderline aldosteronism" includes hypertension with modestly elevated aldosterone and aldosterone-associated hypertension.