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Assessing the Application of β-Weights and Structure Coefficients in Published Hospitality and Tourism Research

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Abstract

Multiple regression is one of the most powerful analysis techniques available to hospitality and tourism researchers for complex problems that may include prediction, mediation, and moderation. The interpretation of the results requires a two-step hierarchical approach. The first step is to determine whether the researcher has findings worth interpreting and reporting and the second step is to determine the effect(s) origins. This second step involves evaluating both the β-weights and structure coefficients. The purpose of this study is to examine the use of β-weights and structure coefficients while reporting univariate multiple regression results by hospitality and tourism researchers. The findings suggested that while researchers reported β-weights, structure coefficients were not consulted. Additionally, although β-weights were reported, they were misinterpreted in some cases. This study is helpful to hospitality management researchers as they interpret their findings as well as conduct peer reviews.

Keywords: multiple regression, suppressor effects, multicollinearity

Introduction

Multiple regression is a popular statistical analysis among social science researchers (Cohen et al., 2003; Heidgerken, 1999; Janson, 1991; Mai et al., 2018). It is used to test a priori models and theories, establish data-based models and theories (Janson, 1991), and make data-based forecasts (Cohen et al., 2003). Cohen (1968) demonstrated that univariate parametric analyses are special cases of and are subsumed by regression. Multiple regression has been deemed superior to all other univariate parametric analyses such as t-tests, ANOVAs, and Pearson's *r* (Ziglari, 2017). This simply means that regression can be used to analyze data that is often analyzed using univariate parametric analyses (Cohen et al., 2003). Regression is a flexible data analytic methodology that allows researchers to examine the relationship between one or more predictors and one dependent variable (Plonsky & Ghanbar, 2018). This relationship may be simple or complex (e.g., linear, curvilinear, or a combination of both). The predictors used may be quantitative or qualitative, main effects, interactions, or covariates, correlated or uncorrelated, or naturally occurring (e.g., gender) or planned experimental manipulations (e.g., treatment conditions) (Cohen et al., 2003). Essentially, regression can execute the same tasks as a multitude of other univariate parametric analyses.

All parametric statistical procedures, including regression, are special cases of the general linear model (GLM) (Cohen et al., 2003). Thus, they employ the ordinary least squares weights to optimize prediction (Heidgerken, 1999). All GLM analyses have four fundamental characteristics. First, they are correlational and generate additive (e.g., the intercept) and multiplicative (standardized betas (β) and unstandardized betas ("*b*")) weights that are used to create the synthetic variables (predictive scores) (Tong, 2006). Second, because these analyses are correlational in nature, they yield variance-accounted-for effect sizes such as R^2, h^2, w^2, and these effect sizes are analogous to the r^2 (Nimon et al., 2015). Third, the scores on the synthetic variable (or predicted *Y*) are created by applying a system of weights to the predictors. Fourth, it's the synthetic variables that become the primary focus of the analyses (Courville & Thompson, 2001; Yeatts et al., 2017).

Thompson (1997) suggests the use of a two-step hierarchical approach when interpreting the results of a GLM. The first step is to evaluate statistical significance tests, effect sizes, and replicability evidence to determine whether the researcher has anything worth interpreting. Only if there is something worth interpreting should the researcher move to the second step and determine where the effects are coming from. This step involves evaluating both the weights and the structure coefficients. The β-weights are usually interpreted (rather than the beta weights) as they allow the direct comparisons of predictors with different scales (Heidgerken, 1999; Keith, 2019). While the importance of interpreting both β-weights and structure coefficients has been emphasized (Graham et al., 2003; Heidgerken, 1999; Nimon et al., 2015; Thompson, 1997; Tong, 2006; Yeatts et al., 2017), researchers continue to only interpret the β-weights (Courville & Thompson, 2001). The β-weight indicates the amount of credit a predictor is receiving for predicting the dependent variable in the regression equation while holding all other predictors constant (Ziglari, 2017). Therefore, as the β-weight increases, the predictive power of the respective predictor is deemed to increase while predictors with zero or close to zero β-weights are seen as unimportant (Courville & Thompson, 2001; Heidgerken, 1999). However, the sole interpretation of β-weights when predictors are correlated is erroneous (Courville & Thompson, 2001; Yeatts et al., 2017) and insufficient (Heidgerken, 1999). β-weights are highly affected by the presence of multicollinearity and suppressor variables (Heidgerken, 1999). Furthermore, β-weights can substantially change when a predictor is added or deleted or across different samples hence limiting the generalizability of the results (Yeatts et al., 2017; Ziglari, 2017).

The purpose of this study is to examine the use of β-weights and structure coefficients while reporting univariate multiple regression results by hospitality and tourism researchers. Reporting both β-weights and structure coefficients assists researchers to interpret their results correctly and exhaustively. This in turn will help to promote a higher standard of research in the field of hospitality and tourism that can be used for comprehensive meta-analyses of research in our field.

Literature Review

This section is dedicated to discussing what β-weights and structure coefficients are, their importance, and how each is reported in univariate multiple regression results. Four cases of when regression is used are also presented: 1) one independent variable, 2) perfectly uncorrelated independent variables, 3) correlated independent variables without suppressor effects, and 4) correlated independent variables with suppressor effects. These cases are used to demonstrate why it is advisable to interpret both β-weights and structure coefficients.

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β-weights

In regression equations, multiplicative weights are coefficients applied to every predictor to create the synthetic scores ($\hat{Y}$ scores). A multiplicative weight for a predictor *X* is interpreted as the expected change in the dependent variable per unit change in *X*, holding all other variables constant (Cohen et al., 2003; Nathans et al., 2012). When predictor variables are in their original metrics, the regression coefficients applied are unstandardized and are known as betas (*b* or slope). In most cases, however, predictor variables in a regression equation use different metrics thus making it hard to make direct comparisons among the predictors and the betas less useful (Tong, 2006). For example, in an analysis where tourist satisfaction is regressed on tourist's total costs, destination's carrying capacity, and destination image, the scales used to measure the variables will be completely different making it hard to use betas to make comparisons among the variables. The measured variables are therefore standardized (converted to *z*-scores) and the standardized regression coefficients (β-weights) used instead of betas (Nathans et al., 2012; Tong, 2006). The β-weight indicates the expected change in the dependent variable in standard deviations, per one standard deviation increase in a predictor *X*, holding all other variables constant (Nathans et al., 2012). β-weights provide us with information on the amount of credit each predictor is getting in creating the dependent variable (Ziglari, 2017). Because all the measured variables are now in *z*-score form, β-weights can be used to make direct comparisons among the variables.

Similar to other parametric statistical procedures, regression uses ordinary least squares (OLS) to produce an equation obtained from minimizing the residuals (difference between the observed *Y* score and the predicted $\hat{Y}$ score) (Field, 2018). OLS finds β-weights that, when applied to the predictor variables, produce predicted $\hat{Y}$ scores that are very close to the observed *Y* scores (Henson, 2002). Because β-weights indicate the relative importance of predictors in a regression equation (Kieth, 2019), as the β-weight increases, the predictive power of the respective predictor is deemed to increase while predictors with zero or close to zero β-weights are seen as unimportant (Courville & Thompson, 2001; Heidgerken, 1999). β-weight helps answer the research question "what is the contribution of each independent variable to the regression equation, holding all other independent variables constant?" (Nathans et al., 2012, p. 3).

Four Cases of Regression

Multiple regression can be used to make predictions or test theories (Courville & Thompson, 2001). In prediction making, data on a particular criterion and predictors are collected from a group of people and multiple regression is used to derive weights. These weights are then applied to a second group of people who have data on the same predictors as the first group but do not have data on the criterion variable. Thus, predictions of the missing criterion scores for the second group are made (Courville & Thompson, 2001). In theory testing, however, we may have a theory stating that some predictors are more important in contributing to the effect than others (Courville & Thompson, 2001). Multiple researchers (e.g., Graham et al., 2003; Heidgerken, 1999; Henson, 2002; Thompson, 1992) have agreed that relying solely on β-weights to evaluate the importance of variables in such cases could result in erroneous deductions. This next section looks at four cases of regression and why it is generally not advisable to only interpret β-weights.

One Independent Variable

The first case entails one independent variable (Courville & Thompson, 2001; Thompson, 1992). The resulting β-weight in such a simple linear regression equation is analogous to the correlation between the independent variable and the dependent variable (Yeatts et al., 2017). Squaring this correlation yields the effect size of interest, r^2 (Henson, 2002). According to Courville and Thompson (2001), this first case is a special case belonging to the second case presented next.

Perfectly Uncorrelated Independent Variables

The second case involves multiple independent variables that are uncorrelated. This can be viewed as a combination of multiple scenarios of the first case. The β-weights, in this case as well, are analogous to the correlations between the independent variables and the dependent variable (Henson, 2002). When these correlations are squared and added together, they are equal to the effect size of interest, R^2 (Courville & Thompson, 2001; Henson, 2002; Thompson, 1992). In the real world, however, independent variables tend to have some correlation and therefore will explain some common variance in the dependent variable (Henson, 2002; Nimon, 2010; Yeatts et al., 2017). For example, it would be logical to believe that visitor satisfaction, service quality, word of mouth, and customer loyalty would be correlated to some extent and may predict tourists' revisit intentions. This then leads to the question of how the variance explained by each predictor, unique and common, is accounted for.

Correlated Independent Variables Without Suppressor Effects

When independent variables are correlated, then multicollinearity (or collinearity) is said to exist (Heidgerken, 1999). Researchers often encounter multicollinearity when dealing with regression models (Lavery et al., 2019). Though some researchers view multicollinearity as a problem (Assaf & Tsionas, 2019; Assaf et al., 2019; Lavery et al., 2019), Henson (2002) states that it is only a problem if the researchers rely solely on β-weights to interpret their results. β-weights indicate the amount of credit each independent variable is receiving for predicting the dependent variable (Ziglari, 2017). They do not allow for dual credit meaning that the shared variance among the correlated independent variables has to be divided and assigned to each independent variable. The division and assignment of the shared variance are done arbitrarily (Henson, 2002). This can lead to disproportionate division and assignment of the variance among the independent variables (Henson, 2002). For example, a predictor, $X1$, that has a higher correlation with the criterion compared to a second predictor, $X2$, may receive less credit for the shared variance. $X2$ will thus be robbing $X1$ of its fair share of the proportion of variance explained in the criterion. Therefore, it is possible to have predictors that have close to zero β-weights which could mean two things. 1) the predictor could have little predictive power, or 2) it could be that it's being denied its full credit due to the arbitrary division of the shared variance (Heidgerken, 1999). This is the main disadvantage of β-weights (Yeatts et al., 2017). Furthermore, when independent variables are correlated, the sum of the squared correlations between the independent variables and the dependent variables is greater than the R^2 (Henson, 2002; Thompson, 1992; Yeatts et al., 2017). In addition, β-weights have been termed as statistically sensitive in that they may change drastically when the predictors are added or deleted, or when the study is conducted on different samples (Heidgerken, 1999; Yeatts et al., 2017). Henson (2002) also notes that the magnitude of the β-weights of two predictors may change if the study was to be repeated using the same sample.

This unreliable nature of the β-weights has been termed as the “bouncing beta” problem (Heidgerken, 1999; Henson, 2002). To address this issue of multicollinearity, various researchers suggest the reporting and interpretation of additional pieces of information (Heidgerken, 1999; Henson, 2002; Nimon et al., 2015; Thompson, 1992; Yeatts et al., 2017).

Correlated Independent Variables with Suppressor Effects

The last case involves independent variables that have suppressor effects. A suppressor variable is one with a high β-weight but its correlation with the criterion is close to zero (Lancaster, 1999; Ludlow & Klein, 2014; Salgado et al., 2019; Thompson, 1992). MacKinnon et al. define a suppressor variable as “a variable which increases the predictive validity of another variable (or set of variables) by its inclusion in a regression equation, where predictive validity is assessed by the magnitude of the regression coefficient” (2000, p. 174). Let’s take an example whereby a researcher has two predictors $X1$ and $X2$, that are correlated and $X2$ is a suppressor variable. When $X2$ is entered into the regression model, it will partial out the irrelevant variance in $X1$ resulting in an increase in the effect size, R^2, from what it would have been if only $X1$ was used as a predictor (Lancaster, 1999; Ludlow & Klein, 2014; Thompson, 1992). In multiple regression, suppression is a good thing as it increases the overall effect size (Lancaster, 1999). Similar to the third case, the sum of the squared correlations between the independent variables and the dependent variables yields a higher value than the R^2 (Thompson, 1992). Clearly, if we rely solely on β-weights, suppressor effects may go undetected (Graham et al., 2003; Nimon, 2010).

Researchers, therefore, need to consult all the results in order to determine the importance of variables in a multiple regression equation (Courville & Thompson, 2001). Multiple researchers (e.g., Courville & Thompson, 2001; Graham et al., 2003; Heidgerken, 1999; Henson, 2002; Thompson, 1992) have suggested interpreting both β-weights and structure coefficients when the predictors are correlated. The next section looks at what structure coefficients are and how they are interpreted.

Structure Coefficients

In multiple regression, the predicted *Y* is the main focus as it represents the amount of variance explained by all the variables, in other words, the effect. Once the researcher determines that there is something worth interpreting, the next step would be to determine what variables contributed to this effect, and more so, which ones contributed more. Structure coefficients inform us about the “structure” of the predicted *Y*, hence the name structure coefficients (Henson, 2002). A structure coefficient is a bivariate correlation coefficient between a given predictor and the synthetic variable (or predicted *Y*) (Heidgerken, 1999; Henson, 2002; Nimon et al., 2015; Thompson, 1992; Yeatts et al., 2017).

While some researchers (e.g., Heidgerken, 1999) have termed structure coefficients as simply zero-order coefficients indicated in a different metric, others (e.g., Kraha et al., 2012; Nathans et al., 2012; Yeatts et al., 2017) have described them as bivariate Pearson *rs*, and not zero-order correlations. Two key differences between zero-order coefficients and structure coefficients have been put forth. First, a zero-order correlation indicates the relationship between two observed variables, a predictor and a criterion (Kraha et al., 2012; Yeatts et al., 2017). A structure coefficient, on the other hand, indicates the relationship between a predictor and a synthetic variable. A structure coefficient informs us about how a predictor is related to the predicted *Y* (explained variance) and not the total criterion (total variance) (Kraha et al., 2012). Second, a zero-order correlation ignores the presence of other predictors while quantifying the magnitude of the bivariate relationship between the predictor and a criterion (Yeatts et al., 2017). However, because all predictors are used in calculating the predicted *Y* in the regression equation and a structure coefficient represents the bivariate relationship between a predictor and the predicted *Y*, structure coefficients indirectly take into account all other predictors in the equation while quantifying the magnitude of the bivariate relationship (Yeatts et al., 2017).

Structure coefficients range between -1 and +1 unlike β-weights (Heidgerken, 1999). Because structure coefficients are correlations, a squared structure coefficient indicates the amount of explained variance accounted for by the respective predictor (Kraha et al., 2012; Yeatts et al., 2017; Ziglari, 2017). The higher the magnitude of the squared structure coefficient, the stronger the predictive power of the respective predictor and vice versa (Ziglari, 2017). A primary advantage of structure coefficients is that they are not affected by multicollinearity among the predictors because they are bivariate correlations (Henson, 2002; Kraha et al., 2012; Yeatts et al., 2017). When the predictors are perfectly uncorrelated, the squared structure coefficients sum up to 1.00. On the other hand, when the predictors are correlated, the sum of the squared structure coefficients will be greater than 1.00 due to the shared variance (Henson, 2002; Kraha et al., 2012).

Interpreting both β-weights and structure coefficients enables the researchers to obtain different perspectives of the data (Nimon et al., 2015). While β-weights indicate the predictors receiving credit for creating the effect, structure coefficients inform us of the variables that could have received credit for the effect (Henson, 2002). For example, if a predictor has a high β-weight and a near-zero structure coefficient, it shows that the predictor is receiving more credit for predicting the dependent variable than it should have because it does not correlate with the predicted *Y* values. This is a classic case of the presence of suppressor variables (Kraha et al., 2012; Yeatts et al., 2017). On the other hand, if a predictor has a low β-weight and a large structure coefficient, it indicates that the predictors are correlated and share variance with the predicted *Y*. If a researcher consults only the β-weights in such a case, a predictor with a low β-weight and a large structure coefficient may be deemed as a week predictor while in the real sense it may be one of the strongest (Yeatts et al., 2017). Thus, examining both β-weights and structure coefficients allows a researcher to identify whether suppressor predictors exist (Kraha et al., 2012) and avoid the problem of multicollinearity (Henson, 2002). Moreover, structure coefficients help to answer the research question "how much variance in the predicted scores for the dependent variable (*y*) can be attributed to each independent variable when variance is allowed to be shared between independent variables?" (Nathans et al., 2012, p. 7).

Methods

A systematic review, recommended by Liberati et al. (2009), was followed for article selection. The articles reviewed were collected from six hospitality-and-tourism-oriented journals i.e., *Tourism Management, Journal of Travel Research, Annals of Tourism Research, International Journal of Hospitality Management, International Journal of Contemporary Hospitality Management, and Journal of Hospitality & Tourism Research*. Scopus and the Web of Science's Social Sciences Citation Index ranked these journals as the leading journals in the hospitality and tourism discipline. A full-text search using the keyword "*regression*" was then conducted under each journal's website. The search returned a total of 5,315 articles from all six databases. Next, articles were filtered using the year of publication and article type. Research Articles published in all the issues in a six-year period between 2016 and 2021 were considered resulting in a total of 2,089 articles. The 2,089 articles were each examined and assessed for (1) the use of a univariate multiple regression to analyze the data and (2) authors deemed there to be something "worth interpreting" (Thompson, 1997) so that their interpretations of where these effects were coming from could be reviewed. This yielded a total of 150 articles usable articles. Table 1 shows a detailed screening process. Most of the reviewed articles were published in the *International Journal of Hospitality Management* (n = 59) while the least were published in *Annals of Tourism Research* (n = 4).

Table 1: Screening Process

	JTR	TM	ATR	IJHM	IJCHM	JHTR	Total
	n	***n***	***n***	***n***	***n***	***n***	***N***
Articles identified using keyword "regression"	1,131	1,169	625	1,149	786	455	5,315
Articles published between 2016 and 2021	270	508	237	523	516	157	2,211
Article Type (Research Articles)	268	473	170	507	515	156	2,089
Articles included in quantitative synthesis	22	15	4	59	35	15	150

***Note*:** JTR = *Journal of Travel Research*; TM = *Tourism Management*; ATR = *Annals of Tourism Research*; IJHM = *International Journal of Hospitality Management*; IJCHM = *International Journal of Contemporary Hospitality Management*; JHTR = *Journal of Hospitality & Tourism Research*.

Results

The purpose of this study is to examine the use of β-weights and structure coefficients while reporting univariate multiple regression results by hospitality and tourism researchers. Four questions were used as a guide to independently review each of the 34 articles:

1. How many predictors were included in each study?
2. How were the R-squared values reported and interpreted?
3. How were the β-weights reported and interpreted?
4. How were the structure coefficients reported and interpreted?

The results for each question are presented below.

Number of Predictors

The average number of predictors analyzed in each journal ranged from 5 to 10 (see Figure 1). All studies tested regression models that had more than 1 predictor apart from Nanu et al.'s (2020) study that tested 2 models with one predictor in each. Studies that reported bivariate correlations between the predictors indicated correlations existed among the predictors. When a regression model has two or more correlated independent variables, interpreting the β-weights solely could result in misrepresentations. In such a situation, it is important to also consult structure coefficients as they provide information about how each predictor relates to the predicted Y independent of the other predictors (Yeatts et al., 2017).

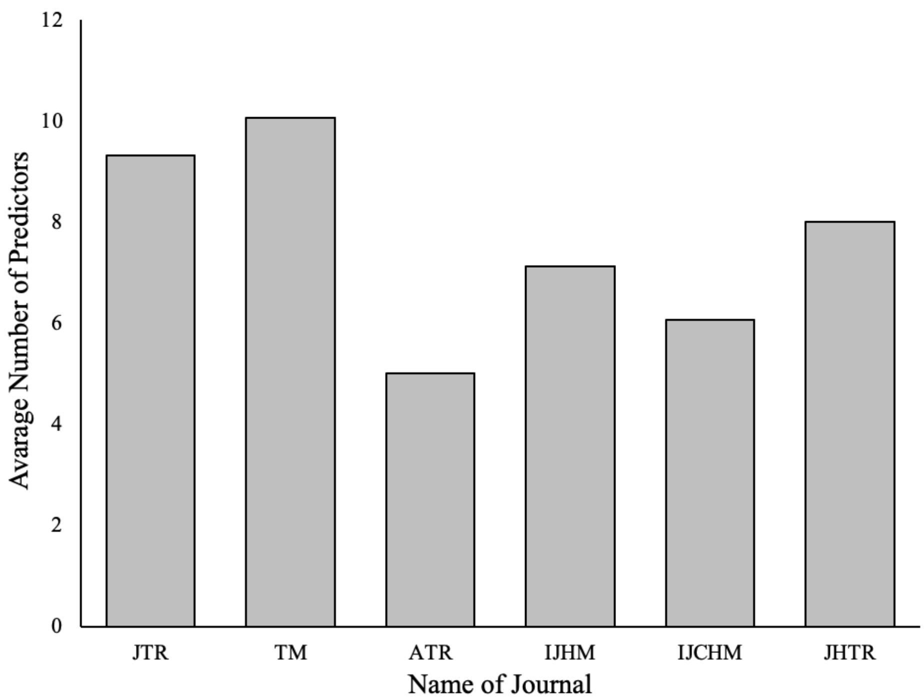

Figure 1. Average Number of Predictors Per Journal

Reporting and Interpretation of the R-Squared

Of the 150 articles reviewed, most (*n* = 71) reported the *R*-squared values in tables and interpretated them within the main body of text. Fifty-nine studies reported the *R*-squared values in tables but did not interpret further what these values meant while 20 studies did not report the *R*-squared values at all (Figure 2). Figure 3 shows that most studies within each journal explained what the *R*-squared values meant apart from studies published in the *Journal of Travel Research* where most studies only reported the values in tables. While tables can be used to summarize the findings, it is important for the authors to interpret what these values mean and not simply assume that readers know the meaning. Spence and Stanley (2018) state that for effective dissemination of research findings to the general audience, including the non-scientific audience, authors must interpret their statistical findings.

Two studies (Xu et al., 2019; Ye et al., 2019) interpreted the *R*-squared as a goodness of fit index. This, however, may be considered incorrect as *R*-squared is a variance-accounted-for effect size (Henson, 2006). Goodness of fit indices include chi-square, the comparative fit index (CFI), the Tucker–Lewis index (TLI), the root mean square error of approximation (RMSEA) among others (Brown, 2015).

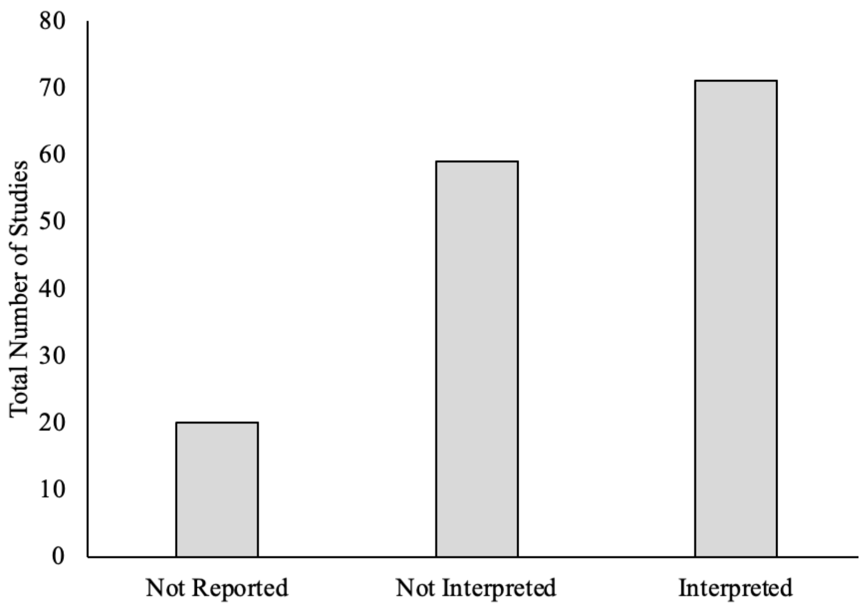

Figure 2. R-Squared Interpretation Across the Six Journals

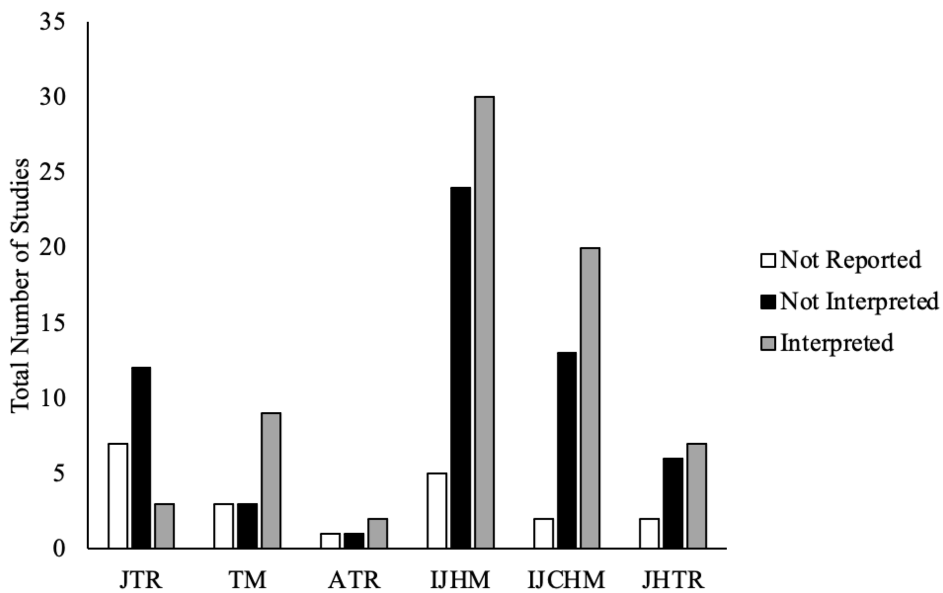

Figure 3. R-Squared Interpretation Within Each Journal

Reporting and Interpretation of the β-Weights

As can be seen in Figure 4, most studies (n = 86) interpreted the β-weights as measuring relationships. Courville and Thompson (2001) stated that in the presence of correlated predictors, β-weights are not equal to the correlation between the predictor and the predicted Y. They should, therefore, not be interpreted as measuring relationships. Words such as negative (or positive) relationships, associations, etc. should be avoided. Of the remaining studies, 53 correctly evaluated the β-weights as the expected change in the dependent variable per unit change in the predictor, 7 reported the weights in tables but did not explain what the weights indicated, and 4 studies did not report the weights despite finding statistically significant *R*-squared. Figure 5 shows that while most studies in each journal reported the weights as correlation coefficients, most studies published in *Tourism Management* reported them as the expected change in the outcome for every unit change in the predictor.

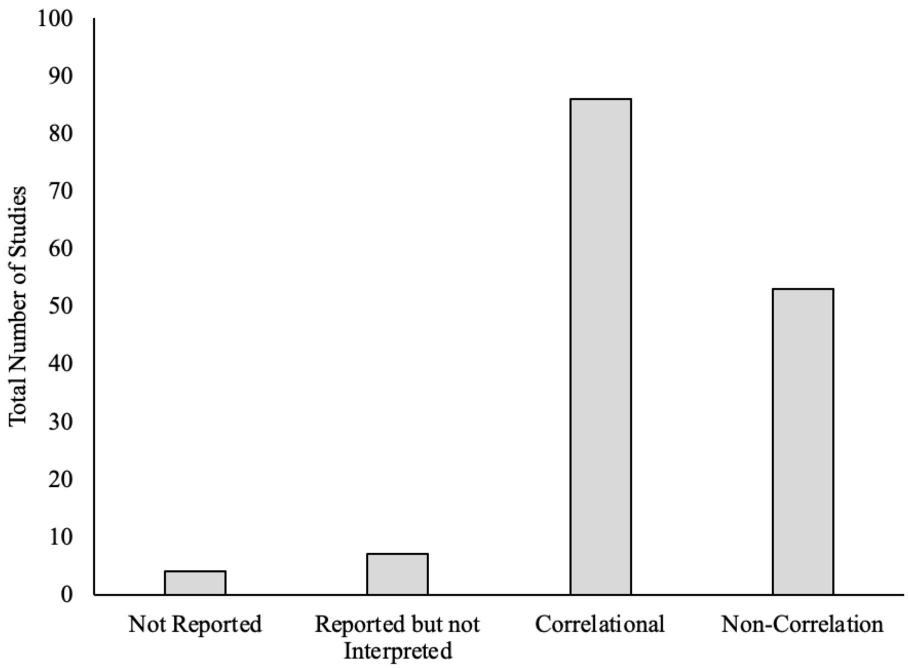

Figure 4. β-Weights Interpretation Across the Six Journals

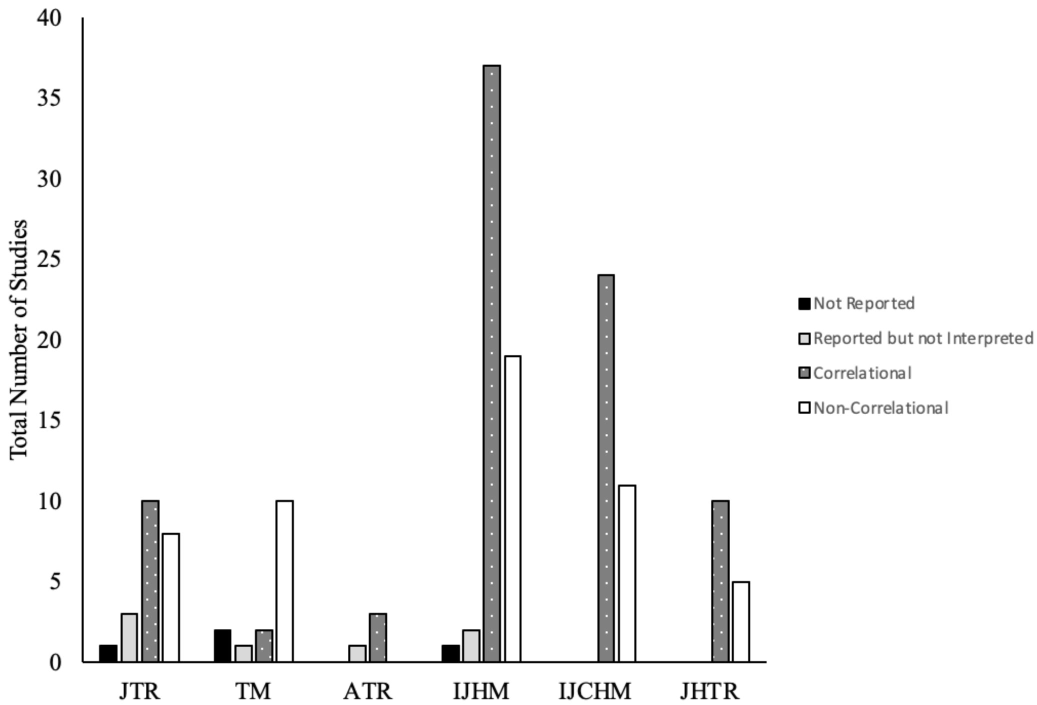

Figure 5. *β*-Weights Interpretation Within Each Journal

Reporting and Interpretation of the Structure Coefficients

Despite clear guidance emphasizing the importance of always reporting structure coefficients (e.g., Courville & Thompson, 2001; Henson, 2006), none of the 150 reviewed articles reported these coefficients.

Discussion and Conclusions

There has been a significantly increased interest in quantitative methodologies among hospitality and tourism researchers in the last couple of years (Assaf & Tsionas, 2019). Similar to all other statistical findings, regression results should be reported correctly and comprehensively. Reporting *β*-weights alone may not be sufficient as they are influenced by the correlations among the predictors in the regression models (Assaf & Tsionas, 2019). The researchers need to interpret both coefficients – *β*-weights and structure coefficients – when trying to establish which predictors have the most influence in creating the overall effect. However, based on the findings of this study, this is not always the case. Among the studies reviewed, none of them consulted structure coefficients while some misinterpreted the *β*-weights. Perhaps, this could be because (1) some hospitality and tourism researchers are not familiar with the coefficients, particularly structure coefficients, (2) they do not view them to be important, or (3) reviewers/journals do not view them as critical for publication of research. With multiple researchers (e.g., Courville & Thompson, 2001; Graham et al., 2003; Heidgerken, 1999; Henson, 2002; Thompson, 1992) demonstrating the significance of the two sets of coefficients, the authors invite researchers, to consult both coefficients, when there is a noteworthy omnibus effect, so as to provide adequate information about all the dynamics of their data. The authors also invite editors and reviewers to use the information presented in this article as they evaluate the results of manuscripts submitted for publication. Readers can also use the information to evaluate whether the interpretation of the findings of published articles is methodologically sound.

Based on the guidance of leading methodologists (e.g., Courville & Thompson, 2001; Henson, 2006; Thompson, 1997), researchers ought to use the two-step hierarchical approach when interpreting results. The first step requires evaluating statistical significance tests and effect sizes. Statistical significance tests provide information about the probability (between 0 and 1.0) of the sample statistics, given that the sample was obtained from a population in which the null hypothesis (H_0) is true. However, these tests do not indicate how important the results were, their replicability, or whether they were due to chance (Henson, 2006; Balkin & Lenz, 2021). Effect sizes, on the other hand, "quantify the degree to which sample results diverge from the expectations (e.g., no difference in group medians, no relationship between two variables) specified in the null hypothesis" (Henson, 2006, p. 602). Norris et al. (2015) stress the importance of reporting effect size estimates. Despite effect sizes playing a significant role, the results of this study indicated that some researchers continue to omit them in their reports while others misunderstand or misinterpret them.

The second step requires interpreting both the β-weights and structure coefficients, only if the researcher found something worth interpreting in the previous step. While structure coefficients are correlations, and therefore range from -1 to +1 and are directional (positive or negative), β-weights are not. First, they (β-weights) are not statistically bound between -1 and +1. Second, Courville and Thompson (2001) demonstrated that, in the event of perfectly uncorrelated predictors, the weights can be positive even when the predictors and criterion have a negative relationship. Third, in the case of correlated predictors, these weights can be large or non-zero even when zero correlations exist between the predictors and the synthetic variable. Therefore, β-weights should not be interpreted as relationship coefficients. They merely inform us of the amount of credit each predictor is getting in creating the dependent variable (Ziglar, 2017). Despite this being the case, the findings of this study indicate that researchers continue to overlook or misconstrue these weights. Additionally, none of the 150 reviewed studies consulted structure coefficients. Structure coefficients help in detecting situations when suppressor variables are present. Also, in the case a predictor is deleted or added, β-weights are likely to change considerably unlike structure coefficients (Courville & Thompson, 2001). Therefore, researchers should always report the two coefficients, β-weights and structure coefficients, in order to provide a sufficient understanding of their data. In addition, providing insufficient information could have an impact on the validity of the data. This is especially important when the predictors are correlated, which is often the case.

Theoretical and Practical Implications

This study has several implications. First, it provides hospitality and tourism researchers with guidelines for interpreting multiple regression analysis. The findings of the study highlight the common mistakes researchers make when reporting their multiple regression results. For example, researchers were found to seldomly report both β-weights and structure coefficients. Researchers should first evaluate statistical significance tests, effect sizes, and replicability evidence. Only when there is something worth interpreting should they move on to the next step which involves evaluating both the weights and the structure coefficients. Second, the study provides applied researchers with insights into a) what structure coefficients are and b) the importance of interpreting them, especially in the presence of correlated predictors. Third, the study helps to advance quantitative research in the field of tourism and hospitality. Overall, the study is beneficial to hospitality and tourism researchers as they conduct peer reviews as well as interpret their findings and make inferences.

Limitations and Future Research

The study is, however, not without limitations. First, our study was limited to a sample size of 150 articles from six top-tier journals. Future studies should widen the scope by including studies published in other journals. Second, this study focused on multiple regression which is a univariate analysis. Future studies could replicate this study but apply it to studies using multivariate analyses such as confirmatory factor analysis (CFA). This will help determine whether such studies report both factor pattern coefficients and factor structure coefficients.

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