

Consumer Brand Engagement in Social Media: A Pre-Registered Replication

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This study presents a pre-registered replication of one of the most influential articles in the customer engagement literature entitled *Consumer Brand Engagement in Social Media: Conceptualization, Scale Development and Validation* (Hollebeek, Glynn, & Brodie, 2014, *Journal of Interactive Marketing*, 28[2], 149–165). By employing the popular social media brand Instagram®, which is often used by marketers to facilitate consumer engagement, this study tested the hypotheses posited by Hollebeek et al. (2014). Although the original model replicated well and similar findings were observed, replication results indicated problems with discriminant validity between consumer brand engagement and self-brand connection constructs. Further exploratory analyses of the dataset also revealed potential gender differences in responses to consumer brand engagement items. Future replication studies are required to address these issues and increase the generalizability of consumer brand engagement theories.

Keywords: Social Media; Consumer Brand Engagement; Replication; Structural Equation Modeling

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Background

The Internet and social media opened new avenues where consumer-brand interactions reached unprecedented levels. Today, online platforms allow consumers to readily share brand-related content with others, comment on a brand's marketing activities, participate in discussions about brands, co-create products, or express word-of-mouth. Companies quickly realized that they could benefit from these inputs consumers made through online channels, and developed strategies such as games, competitions, forums, and brand communities aimed at facilitating consumer engagement with brands.

Academic research picked up this trend, and a stream of literature on the engagement concept emerged. Engagement, or more specifically *customer engagement*, has been defined in the marketing literature as “a customer's particular psychological state induced by the individual's specific interactive experiences with a focal engagement object (e.g., a brand)” (Brodie, Hollebeek, Jurić, & Ilić, 2011, p. 257). The early papers on customer engagement were mainly theoretical (e.g., Brodie et al., 2011; Hollebeek, 2011; van Doorn et al., 2010; Vivek, Beatty, & Morgan, 2012), whereby the issue of operationalizing the concept and developing a measurement scale remained. This problem was later addressed by Hollebeek, Glynn, and Brodie (2014).

In their article, Hollebeek et al. (2014) first conceptualized a “consumer brand engagement” construct that reflected the interactive aspects of online engagement. The authors defined consumer brand engagement as “a consumer's positively valenced brand-related cognitive, emotional and behavioral activity during or related to focal consumer/brand interactions” (Hollebeek et al., 2014, p. 154). In accord with this conceptual definition, the authors proposed that consumer brand engagement construct could be operationalized with three dimensions that correspond to the cognitive, emotional, and behavioral aspects of engagement. These dimensions were labeled as “cognitive processing” (brand related thoughts), “affection” (brand related emotions), and “activation” (brand related behaviors).

Having conceptualized consumer brand engagement construct with three dimensions, Hollebeek et al. (2014) proceeded to develop a measurement scale. Using the Facebook® brand, the authors first developed and validated a 10-item consumer brand engagement scale which comprised three factors: cognitive processing (3-items), affection (4-items), and activation (3-items). This scale was then confirmed in a subsequent study that employed the Twitter® brand.

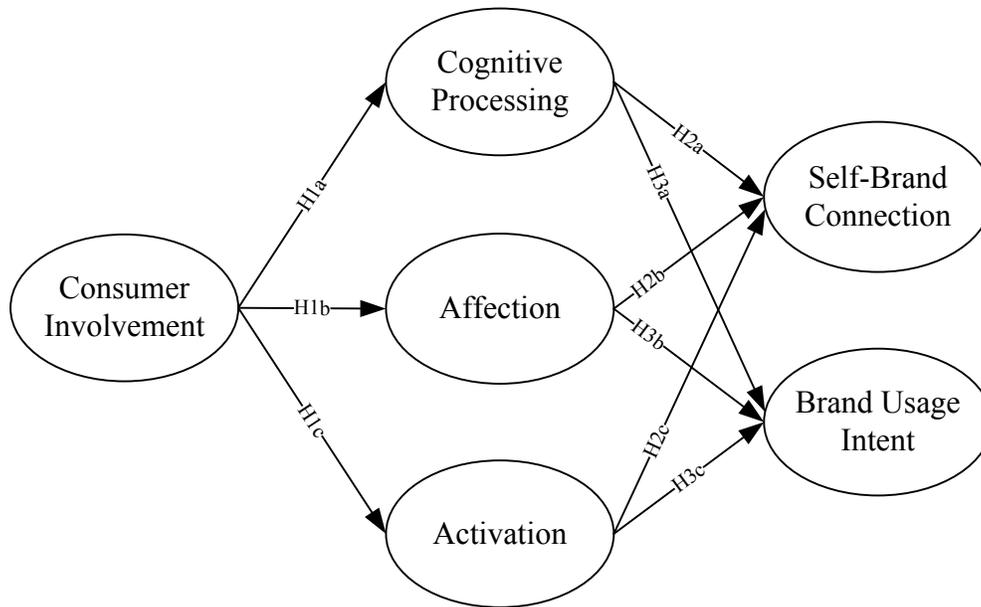
In their final study (study 4), Hollebeek et al. (2014) assessed the nomological validity of the consumer brand engagement construct by testing nine hypotheses (see Table 1) related to its conceptual relationships with other constructs (see Figure 1). The focal constructs in this model were consumer involvement (antecedent), self-brand connection, and brand usage intent (outcomes). In that study, the authors used the LinkedIn® brand and found support for all hypotheses except for the relationship between cognitive processing and brand usage intent (H3a).

Table 1: Main study hypotheses in Hollebeek et al. (2014).

Hypotheses in Hollebeek et al. (2014):

H1a: Consumer involvement has a positive effect on the cognitive processing dimension of consumer brand engagement.
H1b: Consumer involvement has a positive effect on the affection dimension of consumer brand engagement.
H1c: Consumer involvement has a positive effect on the activation dimension of consumer brand engagement.
H2a: The cognitive processing dimension of consumer brand engagement has a positive effect on consumer self-brand connection.
H2b: The affection dimension of consumer brand engagement has a positive effect on consumer self-brand connection.
H2c: The activation dimension of consumer brand engagement has a positive effect on consumer self-brand connection.
H3a: The cognitive processing dimension of consumer brand engagement has a positive effect on consumer-perceived brand usage intent.
H3b: The affection dimension of consumer brand engagement has a positive effect on consumer-perceived brand usage intent.
H3c: The activation dimension of consumer brand engagement has a positive effect on consumer-perceived brand usage intent.

Figure 1: Main conceptual model presented in Hollebeek et al. (2014).



Hollebeek et al.'s (2014) research has been greatly influential, receiving over 295 citations in the Web of Science (designated as “Highly Cited Paper”) and over 750 citations in Google Scholar (as of February 2019). Several studies adopted Hollebeek et al.'s (2014) consumer brand engagement scale to study its associations with other marketing, branding, and consumer behavior constructs such as brand loyalty (Leckie, Nyadzayo, & Johnson, 2016), brand experience (Hepola, Karjaluoto, & Hintikka, 2017), brand advocacy (Bilro, Loureiro, & Ali, 2018), and word-of-mouth (Algharabat, Rana, Dwivedi, Alalwan, & Qasem, 2018). Despite this burgeoning interest in the consumer brand engagement construct, the existing literature did not address a direct or close replication of this seminal study.

The objective of this study was therefore to conduct a close replication of the consumer brand engagement theory presented in Hollebeek et al. (2014), particularly the conceptual relationships proposed in Figure 1 (i.e., Study 4 in Hollebeek et al., 2014). In doing so, this replication study contributes to the consumer engagement literature by providing further evidence regarding the generalizability of one of the major theories in the field.

Method

Data collection and analyses plans were pre-registered before data collection took place. The pre-registration document along with the dataset and reproducible analyses can be found at the Open Science Framework: <https://osf.io/ejybg/>.

The sample size in the original study was 556. For the replication, the data were collected from 605 participants recruited from the UK-based online subject pool Prolific (Palan & Schitter, 2018). Participants were prescreened based on age (minimum 18), social media use (Instagram® account owner), nationality (the UK), and first language (English). Collecting data from participants from the UK allowed replication in a context with a cultural background similar to the original study (New Zealand). The participants received 0.50£ in compensation for their time. The demographics of the replication sample were as follows: Gender: 75% female, 24% male, 1% missing; Age: 18% 18-25, 48% 26-35, 19% 36-45, 10% 46-55, 4% 56+, 1% missing.

The items included in the survey were identical to the original study except for replacing the brand “LinkedIn®” with “Instagram®”. The Instagram® brand was selected as the target brand as it is one of the top marketing platforms for customer engagement (Gallagher, 2017). The survey in the original study included six constructs: consumer involvement (INV), cognitive processing (COG), affection (AFF), activation (ACT), self-brand connection (SBC), and brand usage intent (BUI). These constructs comprised 31 items, but seven items were removed during confirmatory factor analyses in the original study (four items from the involvement construct and three items from the self-brand connection construct). The survey in the replication study was thus based on those 24 items (see Table 3). The items were labeled following the initialism in the original study (e.g., INV2, see Table 4 in Hollebeek et al., 2014, p. 158). The order of the items was randomized for each participant.

Analyses and Results

Confirmatory Analyses

This section presents the results of the analyses undertaken in accord with the pre-registration. As in the original study, confirmatory factor analyses (CFAs) were conducted in the beginning. Although the common practice in latent variable analysis is to evaluate the model as a whole, the original study evaluated constructs separately. The replication analyses followed the methods in the original study and finalized with a CFA of the entire model (see Table 2).

Data were analyzed using the open-source JASP software (JASP Team, 2018). In accord with the original study and the pre-registration, the following cut-off values were used to evaluate model fit: $\chi^2 / df \approx 3$ (or smaller, Iacobucci, 2010), CFI $\approx .95$ (or greater), RMSEA $\approx .06$ (or smaller), SRMR $\approx .08$ (or smaller, Hu & Bentler, 1999). As seen in Table 2, the model fit statistics for the six-item consumer involvement construct were relatively worse in the replication CFA. Other than the involvement construct there were no substantial discrepancies between the original and replication CFAs, and the CFA of the full model indicated a satisfactory fit. Factor loadings, average variance extracted (AVE), Cronbach's alpha (α), and construct reliability (CR) values can be found in Table 3.

Table 2: Model fit statistics from confirmatory factor analyses in the replication study and the original study.

| CFA Model | Replication Study (N = 605) | Original Study (N = 556) |
|--|--|--|
| Consumer Involvement (single factor, 6 items) | $\chi^2(9) = 111.765$ ($p < .001$) $\chi^2/df = 12.418$ CFI = .955 RMSEA = .137 SRMR = .036 | $\chi^2(9) = 23.952^*$ $\chi^2/df = 2.661$ CFI = .994 RMSEA = .055 SRMR = .0126 |
| Consumer Brand Engagement (3 factors, 10 items) | $\chi^2(32) = 137.008$ ($p < .001$) $\chi^2/df = 4.282$ CFI = .979 RMSEA = .074 SRMR = .030 | $\chi^2(32) = 116.699$ $\chi^2/df = 3.647$ CFI = .981 RMSEA = .069 SRMR = .0336 |
| Self-Brand Connection (single factor, 4 items) | $\chi^2(2) = 7.453$ ($p = .024$) $\chi^2/df = 3.727$ CFI = .996 RMSEA = .067 SRMR = .012 | $\chi^2(2) = 2.423$ $\chi^2/df = 1.212$ CFI = 1.00 RMSEA = (not reported) SRMR = .0051 |
| Brand Usage Intent (single factor, 4 items) | $\chi^2(2) = 2.782$ ($p = .249$) $\chi^2/df = 1.391$ CFI = 1.000 RMSEA = .025 SRMR = .006 | $\chi^2(2) = 5.651$ $\chi^2/df = 2.826$ CFI = .998 RMSEA = .057 SRMR = .0079 |
| Full Model (6 factors, 24 items) | $\chi^2(237) = 738.132$ ($p < .001$) $\chi^2/df = 3.114$ CFI = .961 RMSEA = .059 SRMR = .033 | (not reported) |

Note: * p -values for the χ^2 tests were not reported in the original study.

Table 3: Factor loadings, average variance extracted (AVE), Cronbach's alpha (α), and construct reliability (CR) values in the replication study and the original study. *Note:* Factor loadings were not reported in the original study.

| Constructs | Item Description | Replication Study | | | | Original Study | | |
|------------------------------------|---|-------------------|-----|----------|------|----------------|----------|------|
| | | Loading | AVE | α | CR | AVE | α | CR |
| <i>Consumer Involvement (INV)</i> | | | .63 | .907 | .909 | .71 | .938 | .896 |
| | Boring/Interesting (INV2) | .826 | | | | | | |
| | Means nothing/Means a lot to me (INV5) | .853 | | | | | | |
| | Unappealing/Appealing (INV6) | .838 | | | | | | |
| | Worthless/Valuable (INV8) | .769 | | | | | | |
| | Uninvolving/Involving (INV9) | .748 | | | | | | |
| | Not needed/Needed (INV10) | .700 | | | | | | |
| <i>Cognitive Processing (COG)</i> | | | .68 | .866 | .864 | .70 | .878 | .781 |
| | Using Instagram gets me to think about Instagram (CP1) | .799 | | | | | | |
| | I think about Instagram a lot when I'm using it (CP2) | .826 | | | | | | |
| | Using Instagram stimulates my interest to learn more about Instagram (CP3) | .846 | | | | | | |
| <i>Affection (AFF)</i> | | | .78 | .930 | .934 | .76 | .928 | .873 |
| | I feel very positive when I use Instagram (AF1) | .906 | | | | | | |
| | Using Instagram makes me happy (AF2) | .898 | | | | | | |
| | I feel good when I use Instagram (AF3) | .889 | | | | | | |
| | I'm proud to use Instagram (AF4) | .835 | | | | | | |
| <i>Activation (ACT)</i> | | | .79 | .905 | .936 | .69 | .857 | .713 |
| | I spend a lot of time using Instagram, compared to other social networking sites (AC1) | .865 | | | | | | |
| | Whenever I'm using social networking sites, I usually use Instagram (AC2) | .921 | | | | | | |
| | Instagram is one of the brands I usually use when I use social networking sites (AC3) | .852 | | | | | | |
| <i>Self-Brand Connection (SBC)</i> | | | .67 | .890 | .889 | .75 | .926 | .869 |
| | Instagram reflects who I am (SBC1) | .788 | | | | | | |
| | I can identify with Instagram (SBC2) | .818 | | | | | | |
| | I feel a personal connection to Instagram (SBC3) | .807 | | | | | | |
| | Instagram suits me well (SBC7) | .852 | | | | | | |
| <i>Brand Usage Intent (BUI)</i> | | | .73 | .915 | .915 | .76 | .926 | .884 |
| | It makes sense to use Instagram instead of any other brand, even if they are the same (BUI1) | .869 | | | | | | |
| | Even if another brand has the same features as Instagram, I would prefer to use Instagram (BUI2) | .880 | | | | | | |
| | If there is another brand as good as Instagram, I prefer to use Instagram (BUI3) | .858 | | | | | | |
| | If another brand is not different from Instagram in any way, it seems smarter to use Instagram (BUI4) | .808 | | | | | | |

As in the original study, analyses proceeded with discriminant validity assessments following the method outlined by Fornell and Larcker (1981). In this method, discriminant validity is established when the shared variance (squared correlations) between each pair of constructs are smaller than the AVE value for these constructs. As seen in Table 4, problems with discriminant validity were observed for the following pairs of constructs: consumer involvement – affection, consumer involvement – self-brand connection, cognitive processing – self-brand connection, and affection – self-brand connection.

Table 4: Correlation coefficients between the constructs and discriminant validity analyses.

| Constructs | (1) | (2) | (3) | (4) | (5) | (6) | AVE |
|---------------------------|--------------|---------------------|---------------------|---------------------|---------------------|---------------------|--------------|
| (1) Consumer Involvement | - | .50 (.47) | .69 (.70) | .53 (.52) | .81 (.70) | .50 (.45) | .63 (.71) |
| (2) Cognitive Processing | .71 (.69) | - | .66 (.71) | .41 (.45) | .71 (.55) | .42 (.41) | .68 (.70) |
| (3) Affection | .83 (.84) | .81 (.85) | - | .48 (.57) | .88 (.74) | .53 (.46) | .78 (.76) |
| (4) Activation | .73 (.72) | .64 (.67) | .69 (.75) | - | .66 (.46) | .62 (.49) | .79 (.69) |
| (5) Self-Brand Connection | .90 (.84) | .84 (.74) | .94 (.86) | .81 (.86) | - | .61 (.45) | .67 (.75) |
| (6) Brand Usage Intent | .71 (.67) | .65 (.64) | .73 (.74) | .79 (.70) | .78 (.67) | - | .73 (.76) |

Notes: The values below the diagonal are correlation coefficients, and the values above the diagonal (in bold) are squared correlations. Values in the parentheses correspond to the values in the original study. Underlined values represent inadequate discriminant validity for the construct pair.

The original study observed problems with only one construct pair (cognitive processing – affection) and further assessed discriminant validity by comparing the baseline (unconstrained) model with a model in which the correlation between the problematic construct pair was constrained to 1 as proposed by Bagozzi and Phillips (1982). In this method, a chi-square difference ($\Delta\chi^2$) test is conducted to ascertain that the constrained model is significantly different from the unconstrained model ($p < .05$). If the models are not different, that would indicate a lack of discriminant validity for the target construct pair. The same method ($\Delta\chi^2$ test) was also used in the replication analyses. It should be noted, however, that because the chi-square difference test is sensitive to sample size and model complexity, it is recommended to use other fit indices that are more robust such as the change in the comparative fit index (ΔCFI) to compare models (Cheung & Rensvold, 2002). In this approach, a difference of CFI value above .01 indicates that the constrained and unconstrained models are significantly different from each other, thereby supporting discriminant validity (Cheung & Rensvold, 2002). To reach more robust results, both $\Delta\chi^2$ and ΔCFI tests were employed in the replication

analyses.

As seen in Table 5, the baseline model was compared with a constrained model in which the correlation between each construct pair that failed the Fornell and Larcker (1981) test was set to one. $\Delta\chi^2$ and ΔCFI tests were employed subsequently. Table 5 shows that all four $\Delta\chi^2$ tests were significant, indicating that the constrained and unconstrained models were not similar. On the other hand, the ΔCFI test, which is independent of sample size and model complexity, indicated that the constrained models for three pairs of constructs (consumer involvement – self-brand connection, cognitive processing – self-brand connection, and affection – self-brand connection) were not significantly different from the baseline model. Thus, the discriminant validity of the model was inconclusive, particularly regarding the self-brand connection construct. Also, the convergent validity of the constructs was satisfactory in the replication. As seen in Table 3, all factor loadings were above .50 and significant ($p < .001$), AVE values were above 50%, and CR scores were over .70 (Fornell & Larcker, 1981).

Table 5: Model fit differences between the baseline (unconstrained) model and the models which constrained correlations between target constructs to 1 to further test discriminant validity.

| Model Constraint | χ^2 | $\Delta\chi^2$ | $p < .05?$ | CFI | ΔCFI | $\Delta CFI > .01?$ |
|--------------------------|----------|----------------|------------|------|--------------|---------------------|
| <i>cor(AFF, INV) = 1</i> | 1163.601 | 425.469 | <i>yes</i> | .928 | 0.033 | <i>yes</i> |
| <i>cor(SBC, INV) = 1</i> | 874.400 | 136.268 | <i>yes</i> | .950 | 0.011 | <i>inconclusive</i> |
| <i>cor(SBC, COG) = 1</i> | 897.699 | 159.567 | <i>yes</i> | .949 | 0.012 | <i>inconclusive</i> |
| <i>cor(SBC, AFF) = 1</i> | 804.100 | 65.968 | <i>yes</i> | .956 | 0.005 | <i>no</i> |

The analyses proceeded with testing the hypotheses presented in Figure 1 via structural equation modeling (SEM). The structural model had an adequate fit to the data: $\chi^2(243) = 881.503$ ($p < .001$), $\chi^2/df = 3.628$, CFI = .950, RMSEA = .066, SRMR = .045. As seen in Table 6, all hypotheses except H3a received strong support. This finding coincided with the original study, which also did not find support for this hypothesis.

Table 6: Structural equation modeling results from the replication study and the original study.

| Hypotheses and Paths | Replication Study | | | Original Study* | |
|---------------------------|-------------------|------|-----------------------|-----------------|---------|
| | β | SE | z-value | β | t-value |
| H _{1a} INV → COG | .770 | .063 | 15.548 ($p < .001$) | .825 | 19.160 |
| H _{1b} INV → AFF | .875 | .055 | 20.299 ($p < .001$) | .914 | 23.115 |
| H _{1c} INV → ACT | .757 | .066 | 18.276 ($p < .001$) | .808 | 19.332 |
| H _{2a} COG → SBC | .219 | .050 | 4.447 ($p < .001$) | .166 | 3.881 |
| H _{2b} AFF → SBC | .607 | .055 | 10.973 ($p < .001$) | .726 | 13.800 |
| H _{2c} ACT → SBC | .269 | .034 | 6.383 ($p < .001$) | .045 | 1.882 |
| H _{3a} COG → BUI | .095 | .061 | 1.631 ($p = .052$) | .045 | .844 |
| H _{3b} AFF → BUI | .292 | .061 | 4.941 ($p < .001$) | .426 | 6.987 |
| H _{3c} ACT → BUI | .537 | .043 | 10.484 ($p < .001$) | .402 | 7.386 |

Notes: *Exact p -values were not reported in the original study. As with the original study, one-sided p -values were calculated.

The indirect effects of consumer involvement on self-brand connection and brand usage intent were also examined. The original study analyzed these indirect effects for all three customer engagement variables together, presumably via multiple regression analyses. Given that SEM provides more accurate indirect effect estimates by taking measurement error into consideration (Iacobucci, Saldanha, & Deng, 2007), estimates were calculated via SEM in the replication study. As in the original study, 5000 bootstrap samples at the 95% confidence level were used.

Following the original study, the indirect effects through all three customer engagement mediators were estimated first. As seen in Table 7, the findings replicated the original study: consumer involvement had a significant indirect effect on self-brand connection and brand usage intent via customer engagement variables (cognitive processing, affection, and activation). The single indirect paths from involvement to the dependent variables, however, were not analyzed in the original study. As seen in Table 8, replication analyses revealed that all indirect paths were significant except for the one from involvement to brand usage intent via cognitive processing.

Table 7: Indirect effects of consumer involvement on outcome variables via consumer brand engagement variables as a whole.

| Indirect Paths | Replication Study | | | Original Study | |
|-----------------------------|-------------------|----------------|---------------|----------------|----------------|
| | β (SE) | z-value | 95% CI | β (SE) | 95% CI |
| INV → (COG, AFF, ACT) → SBC | 1.092 (.07) | 15.705 | [.962, 1.240] | .776 (.10) | [.600, .984] |
| | | ($p < .001$) | | | ($p < .001$) |
| INV → (COG, AFF, ACT) → BUI | .931 (.05) | 17.299 | [.827, 1.039] | .357 (.08) | [.196, .510] |
| | | ($p < .001$) | | | ($p < .001$) |

Table 8: Indirect effects of consumer involvement on outcome variables via individual consumer brand engagement variables.

| Indirect Paths | β | SE | z-value | 95% CI |
|-----------------|---------|------|----------------------|---------------|
| INV → COG → SBC | .216 | .051 | 4.246 ($p < .001$) | [.126, .321] |
| INV → COG → BUI | .098 | .060 | 1.632 ($p = .052$) | [-.023, .213] |
| INV → AFF → SBC | .681 | .073 | 9.291 ($p < .001$) | [.542, .832] |
| INV → AFF → BUI | .341 | .071 | 4.779 ($p < .001$) | [.204, .485] |
| INV → ACT → SBC | .262 | .045 | 5.829 ($p < .001$) | [.181, .358] |
| INV → ACT → BUI | .542 | .057 | 9.449 ($p < .001$) | [.430, .660] |

The replication analyses concluded with a test of the alternative model presented in the original study (see Figure 3 in Hollebeek et al., 2014, p. 160), in which the activation variable was modeled as an outcome of cognitive processing and affection. As with the original study, all paths were significant in the alternative model ($p < .001$), yet the fit statistics were worse than the initial model $\chi^2(246) = 1375.724$ ($p < .001$), $\chi^2/df = 5.592$, CFI = .912, RMSEA = .087, SRMR = .072.

Exploratory Analyses

This section presents exploratory analyses that were not part of the confirmatory analysis plans in the study pre-registration. The findings in this section should be viewed as preliminary. Future studies can replicate and extend these findings with pre-registered confirmatory analyses.

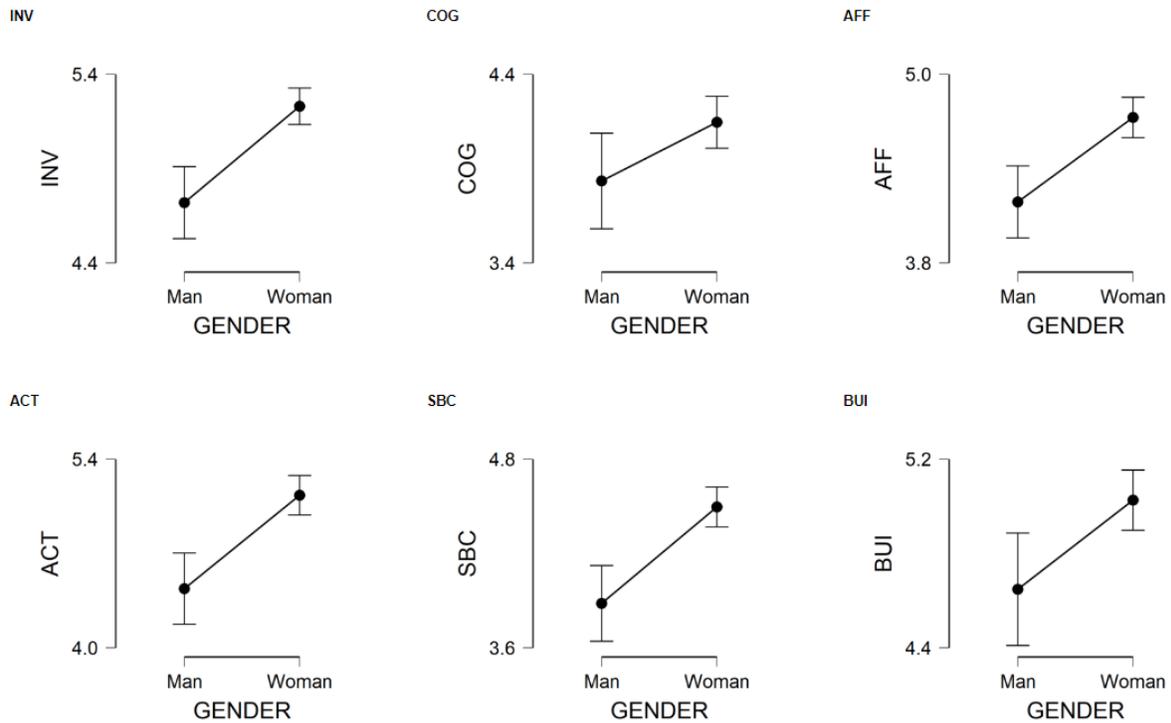
First, possible gender differences in the construct scores were explored. Although there were more women in the sample, the assumption of equality of variances was not violated based on Levene’s tests (all $ps > .091$). Despite these results, Welch’s t -test was employed to explore gender differences as it is overall a more robust alternative than the Student’s t -test (Delacre, Lakens, & Leys, 2017). As seen in Table 9 and Figure 2, females tended to score higher than males on all variables in the study.

Table 9: Differences between men and women subsamples in the replication study.

| | Men ($n = 145$) | | Women ($n = 455$) | | t | Cohen's d | 95% CI for Cohen's d |
|-----|-------------------|--------------|-----------------------|--------------|------------------|-------------|------------------------|
| | M (SD) | M (SD) | M (SD) | M (SD) | | | |
| INV | 4.72 (1.16) | 5.23 (1.05) | -4.713 ($p < .001$) | -0.461 | [-0.640, -0.257] | | |
| COG | 3.83 (1.54) | 4.15 (1.50) | -2.130 ($p = .034$) | -0.205 | [-0.391, -0.015] | | |
| AFF | 4.19 (1.40) | 4.73 (1.40) | -4.036 ($p < .001$) | -0.385 | [-0.575, -0.195] | | |
| ACT | 4.44 (1.61) | 5.13 (1.59) | -4.526 ($p < .001$) | -0.433 | [-0.622, -0.240] | | |
| SBC | 3.88 (1.47) | 4.50 (1.37) | -4.450 ($p < .001$) | -0.431 | [-0.615, -0.233] | | |
| BUI | 4.65 (1.45) | 5.03 (1.39) | -2.759 ($p = .006$) | -0.266 | [-0.451, -0.074] | | |

Note: Welch’s t -test was used.

Figure 2: Graphical representation of the gender differences among variable scores.



Notes: Error bars represent confidence interval for the means. The graphs were produced using the JASP software (JASP Team, 2018).

Given the findings regarding gender differences, the main structural model in Figure 1 was tested separately for men and women subsamples. The model fit the women subsample ($n = 455$) data well: $\chi^2(243) = 730.544$ ($p < .001$), $\chi^2/df = 3.006$, CFI = .949, RMSEA = .066, SRMR = .045. As seen in Table 10, all paths were significant (all hypotheses were supported) in the women subsample.

Table 10: Test of hypotheses for the women subsample in the replication study.

| Paths | β | SE | z-value |
|---------------------------|---------|------|-----------------------|
| H _{1a} INV → COG | 1.017 | .070 | 14.557 ($p < .001$) |
| H _{1b} INV → AFF | 1.178 | .059 | 20.110 ($p < .001$) |
| H _{1c} INV → ACT | 1.266 | .079 | 15.958 ($p < .001$) |
| H _{2a} COG → SBC | .264 | .037 | 7.193 ($p < .001$) |
| H _{2b} AFF → SBC | .549 | .043 | 12.848 ($p < .001$) |
| H _{2c} ACT → SBC | .214 | .027 | 7.941 ($p < .001$) |
| H _{3a} COG → BUI | .146 | .052 | 2.806 ($p = .003$) |
| H _{3b} AFF → BUI | .264 | .055 | 4.766 ($p < .001$) |
| H _{3c} ACT → BUI | .448 | .042 | 10.726 ($p < .001$) |

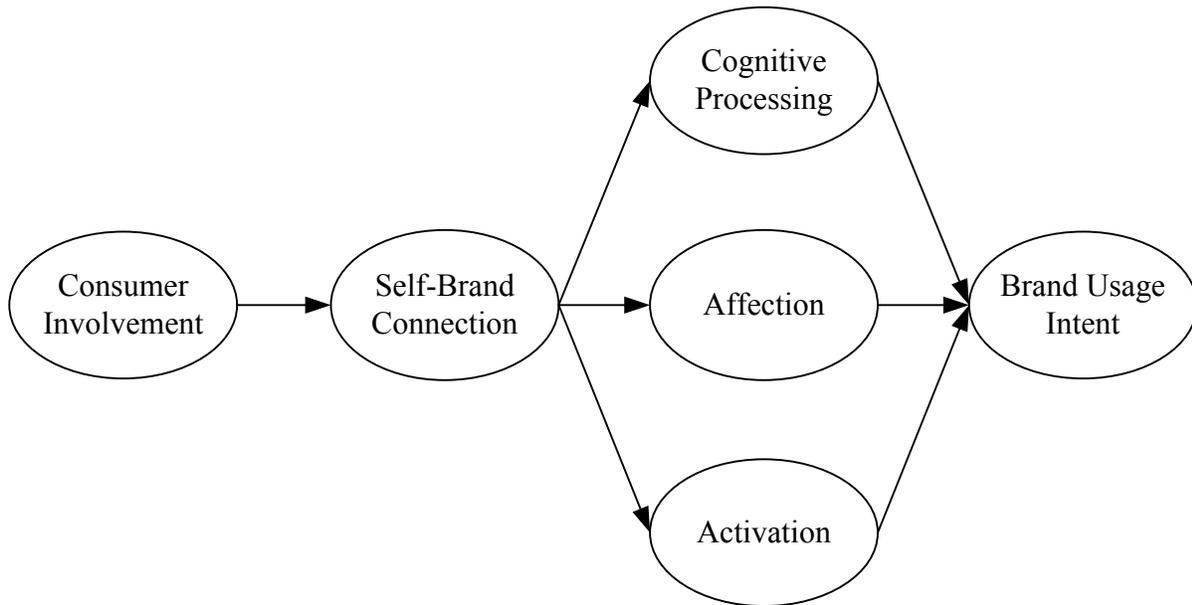
The analyses for the men subsample ($n = 145$) revealed relatively worse fit: $\chi^2(243) = 450.321$ ($p < .001$), $\chi^2/df = 1.853$, CFI = .931, RMSEA = .077, SRMR = .056. Moreover, the two paths from cognitive processing to self-brand connection and brand usage intent were not significant (see Table 11). Alas, it should be noted that the sample size, and thus statistical power, was considerably lower in this analysis.

Table 11: Test of hypotheses for the men subsample in the replication study.

| Paths | β | SE | z-value |
|---------------------------|---------|------|-----------------------|
| H _{1a} INV → COG | .955 | .110 | 8.672 ($p < .001$) |
| H _{1b} INV → AFF | 1.051 | .100 | 10.537 ($p < .001$) |
| H _{1c} INV → ACT | 1.001 | .123 | 8.119 ($p < .001$) |
| H _{2a} COG → SBC | .100 | .076 | 1.322 ($p = .093$) |
| H _{2b} AFF → SBC | .729 | .080 | 9.055 ($p < .001$) |
| H _{2c} ACT → SBC | .248 | .058 | 4.256 ($p < .001$) |
| H _{3a} COG → BUI | -.080 | .106 | -0.755 ($p = .225$) |
| H _{3b} AFF → BUI | .386 | .097 | 3.997 ($p < .001$) |
| H _{3c} ACT → BUI | .554 | .089 | 6.236 ($p < .001$) |

Finally, an alternative model which incorporated self-brand connection as an antecedent to the customer engagement was tested (see Figure 3). The model in the original study proposes that as a consequence of engaging with a brand would consumers integrate the brand into the self-concept. The rationale for this alternative model was that consumers who feel a personal connection to the brand would be more likely to engage with a brand. For example, consumers high on brand identification are more likely to retweet brand messages (Kim, Sung, & Kang, 2014).

Figure 3: Alternative model tested in the exploratory analyses.



This alternative model (Figure 3) had a marginally better fit statistics than the model in the original study (Figure 1): $\chi^2(245) = 774.187$ ($p < .001$), $\chi^2/df = 3.160$, CFI = .959, RMSEA = .060, SRMR = .036. Similar to the original model, the path from cognitive processing to brand usage intent was not significant (see Table 12), and the analyses of indirect paths (5000 bootstrap samples at the 95% confidence level) revealed that the path from involvement to brand usage intent via self-brand connection and cognitive processing was also not significant (see Table 13).

Table 12: Results of the structural equation modeling for the alternative model in the replication study.

| Paths | β | SE | z-value |
|-----------|---------|------|-----------------------|
| INV → SBC | .892 | .072 | 15.962 ($p < .001$) |
| SBC → COG | .838 | .045 | 18.078 ($p < .001$) |
| SBC → AFF | .935 | .042 | 21.622 ($p < .001$) |
| SBC → ACT | .784 | .050 | 18.948 ($p < .001$) |
| COG → BUI | .079 | .070 | 1.209 ($p = .114$) |
| AFF → BUI | .294 | .071 | 4.378 ($p < .001$) |
| ACT → BUI | .530 | .046 | 9.855 ($p < .001$) |

Table 13: Analyses of the indirect effects for the alternative model in the replication study

| Indirect Paths | Estimate | SE | z-value | 95% CI |
|-----------------------|----------|------|----------------------|---------------|
| INV → SBC → COG → BUI | .079 | .065 | 1.206 ($p = .114$) | [-.052, .207] |
| INV → SBC → AFF → BUI | .327 | .077 | 4.257 ($p < .001$) | [.180, .483] |
| INV → SBC → ACT → BUI | .494 | .056 | 8.838 ($p < .001$) | [.391, .611] |

Discussion and Conclusion

The present study presents one of the first pre-registered replication attempts within the customer engagement literature. The target article for replication was the seminal paper by Hollebeek et al. (2014), which first conceptualized co-creative consumer-brand interactions on social media and then developed and validated a consumer brand engagement scale comprising three dimensions: cognitive processing, affection, and activation. The authors also showed, via structural equation modeling, that consumer involvement was an antecedent to consumer brand engagement dimensions, while self-brand connection and brand usage intent were outcomes.

Although this replication study to a large extent confirmed the model in the original study, some findings merit further scrutiny. To start with, the replication analyses were not conclusive with respect to the discriminant validity between self-brand connection construct and consumer brand engagement dimensions (i.e., cognitive processing, affection, and activation). In other words, an important question arises: is consumer brand engagement different from self-brand connection?

Self-brand connection can be defined as the integration of a brand into the self-concept (e.g., I am a BMW® person or Apple® describes who I am, Escalas & Bettman, 2005). Similar to consumer brand engagement, this construct also encompasses cognitive, affective, and behavioral elements. For example, the links between brands and self in cognition were evident in studies that used tools such as Implicit Association Tests (Angle & Forehand, 2016), and it was found that self-brand connection led to emotional attachment (Fedorikhin, Park, & Thomson, 2008) as well as behavioral responses such as loyalty (Eelen, Özturan, & Verlegh, 2017). Thus, future studies could further investigate the discriminant validity of the consumer brand engagement construct, specifically in the consumer-brand identification context.

Even if we assume that consumer brand engagement is different from self-brand connection, another pressing question remains: which one causes which one? In their study, Hollebeek et al. (2014) tested a model in which self-brand connection was an outcome of consumer brand engagement dimensions (see Figure 1). In other words, it was posited that cognitive, emotional, and behavioral engagements enhanced integration of the brand into the self-concept. However, the opposite is also a sensible alternative: consumers are more likely to engage with brands that they identify with. For example, Kim et al. (2014) found that brand identification contributed to retweeting brand content on Twitter®. In the replication analyses, an alternative model was tested

(see Figure 3) where self-brand connection was an antecedent to consumer brand engagement dimensions, and the model fit statistics were equally satisfactory. Given the difficulty of answering this question of the causal order of the variables via correlational designs, future studies might tackle this issue via experimental approaches.

Another notice should be taken of the brand usage intent construct in the original study. By definition, this construct implies the intention to use a social media brand. On the other hand, as seen in Table 14, the items used to operationalize this construct are almost identical to those proposed by Yoo and Donthu (2001) to gauge differences in consumer response in relation to brand knowledge. Thus, it remains unclear whether the study examined the effects of consumer brand engagement dimensions on brand usage intentions or overall brand equity.

Table 14: Similarities between brand usage intent and overall brand equity items.

| Brand Usage Intent Items (Hollebeek et al., 2014) | Overall Brand Equity Items (Yoo & Donthu, 2001) |
|--|--|
| <ul style="list-style-type: none"> • It makes sense to use X instead of any other brand, even if they are the same. • Even if another brand has the same features as X, I would prefer to use X. • If there is another brand as good as X, I prefer to use X. • If another brand is not different from X in any way, it seems smarter to use X | <ul style="list-style-type: none"> • It makes sense to buy X instead of any other brand, even if they are the same. • Even if another brand has the same features as X, I would prefer to buy X. • If there is another brand as good as X, I prefer to buy X. • If another brand is not different from X in any way, it seems smarter to purchase X. |

The exploratory analyses in this study revealed potential gender differences in the consumer brand engagement model. Overall, women tended to score higher on all variables in the model than did men. This result might be due to the nature of the brand stimulus in the replication study. Statistics show that more women than men are using Instagram®, and top-ten followed accounts belong to women (Hootsuite, 2018). This finding indicates that, depending on the type of the social media brand, consumer brand engagement levels might differ by gender. Nonetheless, these are exploratory results and future research should examine gender differences in consumer brand engagement with pre-registered studies.

Although the present study is one of the first attempts to replicate Hollebeek et al. (2014), it should be noted that while this study was in preparation another replication of Hollebeek et al. (2014) has been published by Harrigan, Evers, Miles, and Daly (2018). The present study, however, differs substantially from the replication by Harrigan et al. (2018). First, Harrigan et al. (2018) studied the tourism websites context. Second, the study had a smaller sample size ($N = 195$) and used different analyses methods (exploratory factor analysis and partial least squares structural equation modeling). Third, confirmatory factor analyses were not conducted and therefore discriminant validity analysis in the study was not stringent (AVE scores of each variable were compared with the corresponding R^2 values). Thus, the present replication is a closer replication of the original study than Harrigan et al. (2018), particularly in terms of

brand stimulus, sample size, and analytical approach.

Replications are paramount for empirical generalizability of marketing theories. Although replications have not been popular in the marketing discipline (Uncles, 2011), other fields that greatly influenced marketing such as psychology and social psychology are increasingly focusing on replicating existing studies (Earp & Trafimow, 2015; Lindsay, 2015). Together with the work of Harrigan et al. (2018), this study presents further replications of the seminal paper by Hollebeek et al. (2014) in the growing domain of customer engagement. Both academics and practitioners have strong interests in customer engagement theories and strategies; thus robust and replicable findings are essential to propel this domain forward. Achieving this objective requires pre-registered replications with open data and research materials. This replication study is an attempt in this direction, and it needs to be reinforced with future replications and meta-analyses that rigorously evaluate the domain of customer engagement.

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