

The Effect of Mobile Reviewing on Review Helpfulness: The Moderation of Review Solicitation and Reviewer Popularity

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Abstract

Consumers increasingly read and post online reviews through mobile devices. Drawing upon the Motivation, Opportunity, and Ability framework, we hypothesize the interesting interplay of mobile reviewing, firm review solicitation and reviewer popularity on review helpfulness. Using a large-scale dataset of 1,024,062 reviews from TripAdvisor, we reveal the double-edged sword effect of mobile reviewing on review helpfulness. Compared to non-mobile reviews, mobile reviews are more emotional, less cognitive and more perceptual, which enhances review helpfulness; however, they are also shorter and less readable, which hurts review helpfulness. Furthermore, hotel review solicitation and reviewer popularity moderate on the aforementioned effects. Compared to organic reviewing, solicited reviewing weakens both the negative and positive effects of mobile reviewing and elicits more cognitive, more readable, longer but less experiential (i.e., emotional and perceptual) mobile reviews than non-mobile reviews. Meanwhile, compared to unpopular reviewers, popular reviewers mainly strengthen the positive effect of mobile reviewing and write more experiential, more readable, but less cognitive and shorter mobile reviews than non-mobile reviews. Our findings offer practical guidelines for marketers to leverage the power of mobile reviews and downplay their disadvantages, and meanwhile produce meaningful implications for eWOM marketing.

Keywords: Mobile reviews; review helpfulness; review content feature; review solicitation; reviewer popularity; eWOM.

1. Introduction

Mobile users worldwide have skyrocketed to 6.4 billion (80% of the global population), and mobile internet traffic accounts for half of the total web traffic (Statista, 2023). Consumers increasingly publish and read customer reviews through mobile devices, allowing rapid retrieval of the relevant information needed to make a purchase decision (Hu et al., 2023). Online travel agencies (e.g., Booking.com and TripAdvisor.com) pay more attention than ever to mobile channels for customer reviews submission (Kim & Hwang, 2020). Therefore, this research focuses on mobile reviewing, which involves submitting customer reviews through mobile devices.

Although several many studies have investigated the role and influence of eWOM on consumers' behavior (e.g., Filieri and McLeay, 2014; Stathopoulou et al., 2017), the effect and mechanism of mobile devices on review generation remains unclear (Mariani et al., 2019). Current literature has shown either a positive or negative effect of mobile reviewing (Grewal & Stephen, 2019; Ransbotham et al., 2019), calling for a well-structured framework to explain the contrasting results.

Drawing on the Motivation, Opportunity, and Ability framework (hereafter, MOA; MacInnis et al., 1991), we suggest that mobile or non-mobile devices influence consumers' motivation, opportunity and ability in generating reviews. The portability and accessibility of mobile devices allow consumers to act spontaneously on thoughts,

desires, and curiosity (Andrews et al., 2016)(*reviewing motivation*), prompting the real-time production of reviews (Ransbotham et al., 2019)(*reviewing opportunity*). Also, mobile devices' small screens and keyboards constrain the review composition (*reviewing ability*). Therefore, this research adopts the MOA framework to reconcile these contradicting findings regarding the effects of mobile reviewing.

Furthermore, we incorporate the other important players in the mobile channel: reviewers and firms, and identify two significant moderators that can change consumers' motivation, opportunity, and ability in mobile reviewing: review solicitation and reviewer popularity. These moderators, which stem from other entities in the eWOM ecosystem, are often overlooked by previous mobile reviewing studies. Review solicitation by hotels invites consumers via emails to submit a review after consumption, which may change the opportunity and motivation locus of reviewing (Botti & McGill, 2011). Reviewer popularity, indicated by the number of followers, determines the network position and implies a reviewer's ability and motivation to exert social influence on the audience (Goes et al., 2014). Previous research on influencer marketing mainly focuses on its pervasive effectiveness (e.g. Filieri, Acikgoz, Li, & Alguezaui, 2023), neglecting the role of influencers as opinion leaders and how this shapes the way they express themselves. We aim to enrich the mobile reviewing literature by evaluating the interplay of mobile reviewing, review solicitation and reviewer popularity.

Relying on a large-scale dataset (1,024,062 reviews for 2,302 hotels in six major US cities) crawled from TripAdvisor, we investigate how the mobile reviewing, review solicitation and reviewer popularity jointly influence reviewers' motivation, opportunity, and ability in generating helpful reviews. First, we assess how mobile reviewing shapes review content features, which ultimately impact the review helpfulness. Second, we explore whether and how review solicitation and reviewer popularity moderate the aforementioned effects.

Our findings demonstrate that mobile reviews tend to be more emotional, less cognitive, more perceptual, shorter, and less readable than non-mobile reviews. These content features mediate the impact of mobile reviewing on the review helpfulness, comprising three positive mediations (emotionality, cognitivity, and perceptuality) and two negative mediations (review length and readability). Interestingly, after considering the mediations of content features, the remaining effect of mobile reviewing turns insignificant. Moreover, we reveal that review solicitation and reviewer popularity significantly moderate the effects of mobile reviewing on the content features. Review solicitation, which change the reviewing motivation and opportunity, weakens both the negative and positive effects of mobile reviewing. Compared to organic reviewing, solicited reviewing elicits more cognitive, more readable, longer but less emotional and less perceptual reviews through mobile devices than through non-mobile devices. Meanwhile, popular (vs. unpopular) reviewers, who may possess higher (lower) motivation and reviewing ability, tend to write more emotional, perceptual and readable, but less cognitive and shorter reviews via mobile devices than via non-mobile devices. Our findings demonstrate the complex interplay among the platforms, hotels and consumers in the era of m-commerce and offer practical guidelines on mobile WOM marketing.

2. Literature Review and Theoretical Background

2.1 Review Helpfulness and Mobile Reviewing

Consumers increasingly rely on online reviews to inform their purchase decision (Lei et al., 2021). The explosion of online reviews leads to information overload

(Leung, 2021), motivating consumers to rapidly identify those most helpful reviews (Ghose & Ipeiroitis, 2011). Therefore, review helpfulness is widely regarded as an important dependent variable to validate the consumption value of online reviews (Filieri, 2015; Filieri, McLeay, et al., 2018)(Appendix Table A1). Review helpfulness is the extent to which consumers perceive a review as helpful in facilitating their purchase decision (Lei et al., 2021; Susan M Mudambi & David Schuff, 2010; Yin et al., 2014). Substantial studies have identified the antecedents of review helpfulness, including review characteristics (e.g., Filieri et al., 2019; Shin et al., 2019), reviewer characteristics (e.g., Filieri et al., 2019, Filieri, Raguseo, et al. (2018), and review channels (e.g., Ransbotham et al., 2019) (Appendix Table A1). Among them, review characteristics (e.g., review length or various linguistic features) have been extensively investigated, whereas reviewer characteristics (e.g., reviewer identity disclosure and reviewer expertise), also shape review helpfulness (e.g., Chatterjee, 2020; Liu et al., 2019).

With the rapid immersion of mobile devices in daily life, mobile reviewing has become popular and common, attracting research to assess its influence on review helpfulness. Mobile reviewing has an impact on review content features (Mariani et al., 2019). Mobile devices have functional superiority in mobility and easy accessibility, facilitating the real-time creation. They enable consumers to easily and instantaneously report emotions and feelings during or shortly after the consumption; such spontaneity prompts less reflection but more emotional responses (Ransbotham et al., 2019). Thus, mobile reviews tend to be more emotional than non-mobile reviews (Melumad et al., 2019; Zhou et al., 2020). However, the constrained screen size and keyboards of mobile devices impose physical limitations on composing reviews (Zhou et al., 2020). Therefore, the generation of mobile reviews necessitates greater cognitive effort (Grewal & Stephen, 2019) and discourages detailed elaboration (Melumad et al., 2019).

The real-time creation process and physical constraints of mobile reviewing have both positive and negative effects on review helpfulness. For example, Ransbotham et al. (2019) suggest that consumers perceive mobile reviews as less helpful because the real-time creation process tends to generate more affective and concrete, yet less extreme reviews. In contrast, Grewal and Stephen (2019) reveal that mobile reviews are more helpful, because the physical constraints of mobile reviewing require more physical effort, leading consumers to associate this perceived effort with higher review credibility. Like a coin has two facets, a more comprehensive framework is needed to reconcile these differing perspectives. Furthermore, previous research seldom considers the contingency of mobile reviewing, leading to the issue of omitted moderating factors (Filieri, Galati, et al., 2021; Filieri, Raguseo, et al., 2021). Thus, current literature calls for an integrated theoretical framework to address these important questions.

2.2 The Motivation, Opportunity, and Ability framework

According to the MOA framework developed by MacInnis et al. (1991), motivation refers to the internal force including one's readiness, willingness, interest, and desire that directs individuals towards certain goals and behavior. Opportunity represents the extent to which a situation is conducive to achieving a desired outcome, and such situational factors as time available, attention span, or possible distractions can either facilitate or impede the goal achievement. Ability is the extent to which individuals possess the necessary skills, capabilities, resources, and proficiencies to undertake actions to achieve goals. Previous studies either focus on how mobile

devices influence consumers' motivation and opportunity (Ransbotham et al., 2019) or their ability (Grewal & Stephen, 2019) in reviewing, but producing contrasting results. Moreover, seldom research integrates the moderation effects of review solicitation and reviewer popularity into the effect of review devices, despite the fact that both affect consumers' motivation and ability in reviewing. Below, we developed a comprehensive framework to thoroughly investigate the complex interplay of review devices, review solicitation, and reviewer popularity on reviewers' motivation, opportunity and ability in reviewing.

2.3 The Double-edged Sword Effects of Mobile Reviewing

2.3.1 *The enhanced consumer motivation and opportunity in mobile reviewing*

Mobile devices provide a greater opportunity for real-time reviewing. In contrast, non-mobile channel places constraints on the opportunity to participate immediately in review generation, as it induces the temporal discontinuity between evaluation formation and reviewing (Ransbotham et al., 2019). As a result, the convenience of mobile devices motivates consumers to use them to share thoughts, desires, and curiosity in time (Andrews et al., 2016). Such spontaneity engenders less reflective reviews (Ransbotham et al., 2019) because consumers rely more on their feelings rather than cognitive reasoning (Chang & Tuan Pham, 2013; Pham et al., 2001). Therefore, we contend that mobile (vs. non-mobile) reviews contain more emotional responses and fewer cognitive components.

Consistently, we postulate that mobile (vs. non-mobile) reviewing engenders reviews with more sensory depictions. Consumers interact with and form perceptions of products or services through sensory channels (Krishna, 2012). During the accommodation experience, our brain registers the various sensory perceptions involved, such as “a wonderful view of the bay,” or “a terrible musty smell”. Mobile devices enable consumers to describe their immediate perceptual experiences rather than engaging in a more thorough cognitive interpretation, which they would then share via non-mobile devices afterward (Melumad et al., 2019). Therefore, we argue that mobile reviewing elicits more perceptual descriptions.

For hotel booking, consumers tend to regard emotional reviews as helpful because emotional elements are valued more for hedonic consumption (Moore, 2015; Rocklage & Fazio, 2020). The sensescape plays a critical role in affecting consumer experience and judgment toward the business (Krishna, 2012). Therefore, consumers may regard mobile reviews with more perceptual descriptions as helpful. Contrarily, cognitive elements are valued less for hedonic consumption (Moore, 2015; Rocklage & Fazio, 2020), implying that for hotels less cognitive reviews are more welcomed by consumers. Thus, we posit that:

Hypothesis 1: Mobile (vs. non-mobile) reviewing induces more emotional (H1a), less cognitive (H1b), and more perceptual (H1c) reviews, which are considered to be more helpful than non-mobile reviews.

2.3.2 *The constrained consumer ability in mobile reviewing*

Usually, longer reviews are believed to carry more information about the product or sellers and thus positively related to review helpfulness (Susan M. Mudambi & David Schuff, 2010). More concrete and well-written reviews are more understandable and valuable for consumers (Ransbotham et al., 2019). However, consumers may suffer from the small screen and keyboard of mobile devices that confine their ability to create content (Zhou, Tian, Mo, & Fei, 2020). These

constraints include difficulties in writing on the less visible screen and typing on a small keyboard (Grewal & Stephen, 2019), detailing the thoughts (Melumad et al., 2019), or amplifying consumers' negative emotions (Zhou et al., 2020). Moreover, consumers are easily distracted by the vast sources in the modern mobile environment (Batra & Keller, 2016), making it difficult for them to generate well-written reviews in fragmented time (Melumad et al., 2019). Therefore, we expect that consumers perceive shorter and less readable mobile reviews as less helpful.

Hypothesis 2: Mobile (vs. non-mobile) reviewing induces shorter (H2a) and less readable (H2b) reviews, which are perceived to be less helpful than non-mobile reviews.

2.4 Interacting with Hotel Intervention and Reviewer Characteristics

2.4.1 The moderation of hotel review solicitation

Due to the growingly competitive environment, managers increasingly solicit reviews from their customers via emails after consumption to gain a better ranking and appearance on online platforms. Such a proactive review solicitation is also an important tool for hotels to better manage customers' WOM. Usually, customers write reviews in their spare time to satisfy their need for self-expression and personal pleasure (Mathwick & Mosteller, 2017), which is qualified as a hedonic goal (Botti & McGill, 2011). However, after receiving a solicitation email requesting a review of their stayed hotels, the locus of the consumers' choice to write a review shifts from internal to external (Botti & McGill, 2011). The transition to an external locus of choice alters the motivation behind reviewing from hedonic to utilitarian goals (Botti & McGill, 2011). Contributing a review out of a request by an external force (e.g., solicitation email from hotels) rather than self-expression and personal pleasure demotivates consumers from pursuing hedonic goals in reviewing. Such psychological mechanisms are well documented in consumer behavior literature; however, seldom does research consider the potential moderation of hotel review solicitation on the effects of mobile reviewing (Karaman, 2021).

Drawing on the MOA framework, we posit that review solicitation decreases the internal reviewing motivation, and thus weakens the impact of mobile reviewing on cognitivity, emotionality and perceptuality. That is, hotel review solicitation transits the originally hedonic nature of reviewing to be more utilitarian so that hedonic characteristics of mobile reviewing (as characterized by more experiential and less cognitive content feature) would be suppressed. Furthermore, we postulate that review solicitation weakens the impact of mobile reviewing on review length and readability. When solicited by a hotel, consumers perceive reviewing as an important task, which must be accomplished in the best possible way. The utilitarian goals activated by review solicitation will drive consumers to act more responsibly by writing longer and more readable reviews. Accordingly, they become more effortful in counteracting the physical constraints of mobile devices. In other words, review solicitation alleviates the constrained consumer capability caused by mobile reviewing. In sum, we expect that solicited (vs. organic) reviewing moderates the effect of mobile reviewing on content features by weakening the effect of the internal reviewing motivation and that of constrained ability, which causes mobile reviews to be less emotional, more cognitive, less perceptual, longer and more readable than non-mobile reviews. Thus, we hypothesize that:

Hypothesis 3: Review solicitation moderates the effect of mobile reviewing on

review content features; solicited (vs. organic) mobile reviews are less emotional (H3a), more cognitive (H3b), less perceptual (H3c), longer (H3d), and more readable (H3e) than non-mobile reviews.

2.4.2 The moderation of reviewer popularity

Previous research on reviewer characteristics mainly concentrates on the personality traits that confer credibility and reputation to make the reviewer's recommendation more convincing and valuable (e.g., Chatterjee, 2020; Liu et al., 2019). Only limited research focuses on how reviewer popularity shapes their reviewing behavior. Influencer marketing research shows that popular members in an online community are more motivated and skillful in creating content compared to non-popular ones (Casaló et al., 2020). Nevertheless, it remains unknown whether and how reviewer popularity and mobile reviewing jointly shape review content features.

Mobile reviewing requires greater motivation and skills of reviewers due to the physical constraints and possible distractions, compared to non-mobile reviewing. Popular reviewers hold stronger motivation to create well-written and persuasive reviews and are more experienced to overcome any inconveniences or difficulties. They are also more adept at seizing the instant reviewing opportunities provided by mobile devices. Moreover, reviewer popularity is an essential indicator of reputation and embeddedness in the online community, affecting what and how community members contribute (Goes et al., 2014). The greater number of followers, the greater online visibility the reviewers have (Goes et al., 2014). Therefore, popular reviewers have stronger motivation to make an effort to produce valuable and persuasive content to maintain a good image as opinion leaders and to keep their followers interested (Casaló et al., 2020; Woolley & Sharif, 2021). Meanwhile, individuals with solid persuasion motivation tend to shift their language towards more emotional, more sensory, and less cognitive appeals (Filieri et al., 2023; Rocklage et al., 2018). Thus, we expect that reviewer popularity strengthens the positive impact of mobile reviewing on review emotionality, cognitivity and perceptuality, to benefit from the advantages of mobile reviewing.

Furthermore, more popular reviewers tend to be more experienced and skillful in contributing high-quality reviews. For instance, to overcome the difficulties of mobile reviewing, reviewers may spontaneously focus on the overall gist of their experience (Melumad et al., 2019). To ensure the quality of reviews, popular reviewers may sacrifice details while reviewing through mobile devices, because their experience enables them to focus on the more important part, which is the readability and understandability. Therefore, we posit that, whereas the reviewer popularity strengthens the negative effects of mobile reviewing on review length, it mitigates its negative on review readability via enhanced mobile reviewing ability of popular reviewers. In sum, we posit that:

Hypothesis 4: Reviewer popularity moderates the effects of mobile reviewing on review content features; mobile reviews submitted by popular (vs. less popular) reviewers are more emotional (H4a), less cognitive (H4b), more perceptual (H4c), shorter (H4d), and more readable (H4e) than non-mobile reviews.

Overall, we aim to test the effect of mobile reviewing on review helpfulness through the meditations of five content features. We further identify the moderation effects of review solicitation and reviewer popularity. The theoretical framework is illustrated in Figure 1.

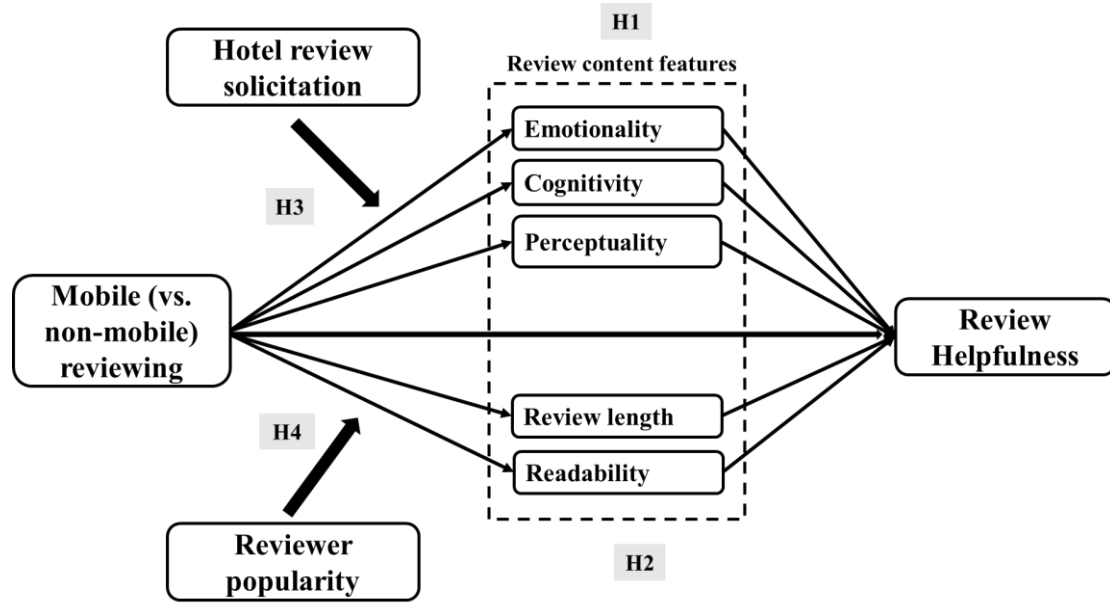


Figure 1 The theoretical framework of this research

3. Empirical Sample and Variables

3.1 Data Collection

This research relies on a self-developed crawler to collect customer reviews from TripAdvisor.com on April 2020 for all the hotels in six US cities (Los Angeles, New York, San Diego, San Francisco, Seattle, and Washington DC). TripAdvisor launched its first smartphone application on April 15th, 2013. As it takes reasonable time for a review to accumulate helpfulness votes, we keep the dataset between April 15th, 2013, and December 31st, 2019, as our sample. The final sample included 1,024,062 reviews for 2,302 hotels. The dataset contains each hotel's information (e.g., name or location), review characteristics (e.g., star rating, text content, or helpfulness votes for each review), and reviewer information (e.g., username or contributions).

3.2 The Measures for Focal Variables

3.2.1 Mobile reviews and review helpfulness

We dummy code (Mobile reviewing) the reviews with 1 for mobile reviews and 0 otherwise. The sample contains 324,222 mobile reviews and 699,840 non-mobile reviews (see Table 1). Figure 2 demonstrates that the weekly percentage of mobile reviews has increased over time and has reached above 40% since 2018. Review helpfulness is measured by the total number of votes a review receives, following previous studies (e.g., Filieri, Raguseo, et al., 2021; Ransbotham et al., 2019; Yin et al., 2014).

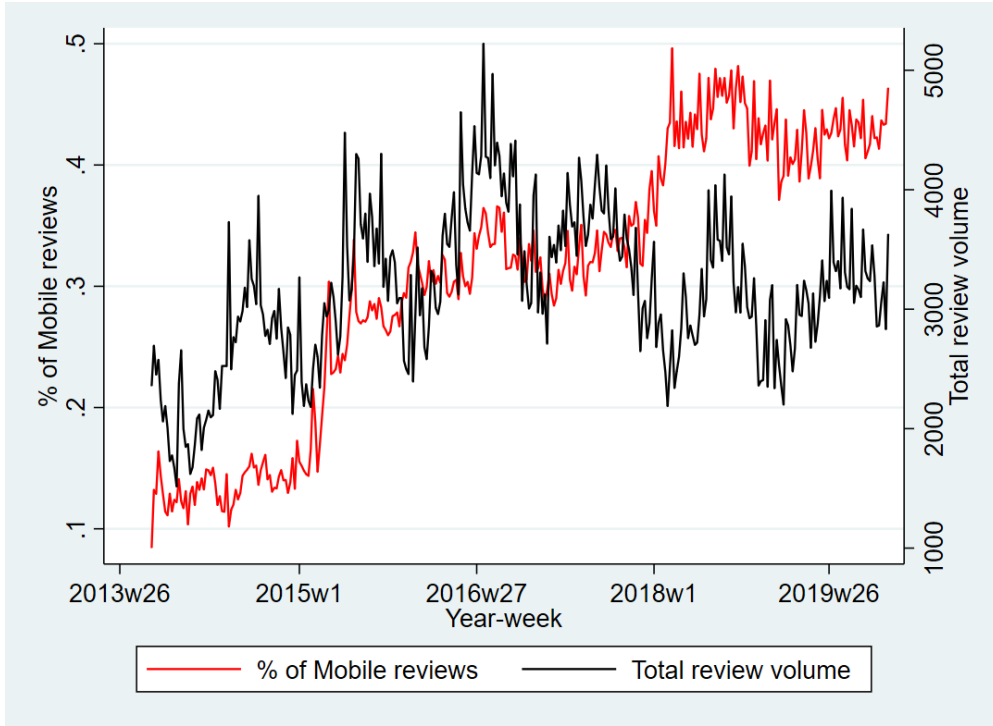


Figure 2 Percentage of mobile reviews across time

3.2.2 Content features of review text

We measure five content features. Flesch-Kincaid readability index (FKI) gauges review understandability (log-transformed) and is one of the best-known and most popular readability indicators (Singh et al., 2017). The more readable the review texts are, the more likely the readers can understand them (Ghose & Ipeirotis, 2011). We measure review length by the word count (log-transformed). Moreover, we rely on Linguistic Inquiry and Word Count (LIWC) (Tausczik & Pennebaker, 2010) to generate the measures for emotionality, cognitivity, and perceptuality. LIWC can perform text analysis on customer reviews to detect the presence of words referring to a specific conceptual category (e.g., emotionality) and provides numerical data about its relevance in the data corpus. LIWC scans textual documents and returns a quantitative output (percentage) that indicates the ratio of the words for each conceptual category over the total word count.

According to Tausczik and Pennebaker (2010), emotionality captures the extent to which people express emotion, how they express emotion, and the valence of emotion, indicated by the usage frequency of affective process words in LIWC (e.g., nice, sweet, ugly or nasty). Cognitivity states the depth and complexity of thinking, which varies across people and situations. LIWC captures the cognitive processes by various categories of words, such as causal words (e.g., because, effect, hence), insight words (e.g., think, know, consider), or filler words (e.g., I mean) (Tausczik & Pennebaker, 2010). Thus, we gauge the cognitivity by the proportion of cognitive process words. LIWC identifies the sensory cues (i.e., seeing, hearing, feeling, smelling, and tasting) to denote the perceptual processes. Thus, perceptuality is measured by the proportion of words in the perceptual process category. Following previous research (e.g., Ransbotham et al., 2019), we take the natural log of each content feature (adding 1% to avoid taking the natural log of zero).

3.3 Control Variables

We consider several covariates that account for possible confounds at the review, reviewer, and hotel levels.

3.3.1 The controls at the review level

- **Rating:** the star level of a review, with 1 for the lowest and 5 for the highest rating.
- **Review contiguity:** the temporal difference between the review date and stay date.
- **Sequence:** the order of a review (log-transformed) since the first review of a hotel.
- **Dimension:** the number of attributes that a reviewer rates besides an overall rating. In our dataset, only the non-mobile reviews have multi-dimension ratings.
- **Trip type:** the type of the trip (“Business”, “Couple”, “Family”, “Friends”, “Solo”, or “None”) concerned in the review and dummy coded.
- **Solicitation:** TripAdvisor launched the Review Express, a free and voluntary marketing tool for hotels to invite customers to submit a review after checkout. “Review collected in partnership with this hotel” underneath the review text indicates these solicited reviews. We dummy code the solicitation (1 for solicited reviews and 0 otherwise).

3.3.2 The controls at the reviewer level

- **Reviewer popularity:** the number of followers (log-transform) and the more a reviewer is followed, the more influential (s)he is in the community.
- **TripAdvisor membership:** the number of years past since the reviewer joined the community.
- **Reviewer expertise:** includes four specific measures. Reviewer *badges*, such as “Top Contributor”, “Senior Contributor”, or “Senior Reviewer”, are dummy coded. The *number of accumulative contributions* (log-transform) summarizes the total number of reviews a reviewer submits. Finally, the *total points* (log-transform) represent a reviewer’s various activities, including submitting reviews, photos, videos, articles, or forum posts.

3.3.3 The controls at the hotel level

- **Hotel class:** the star ranking a hotel indicates.
- **Hotel attractiveness:** including the *grade for walkers*, *number of restaurants* (log-transform) and *attractions* (log-transform) within 0.3 miles. Reviewers grade a hotel on a 0-100 scale to indicate the easiness of finding things to do within walking distance to measure the location’s attractiveness.
- **City:** the city a hotel locates in and dummy coded.

3.3.4 Others

- **Year:** we add the year-fixed effect to control the general time trend and community growth across the years.

3.4 Statistic Summary of The Sample

Table 1 displays the statistical summary of key variables for the whole sample and the subsamples (mobile vs. non-mobile reviews). TripAdvisor has accumulated more non-mobile than mobile reviews (699,840 vs. 324,222). Mobile (vs. non-mobile) reviews have a lower rating (4.10 vs. 4.17, $t = -30.32$, $p = .00$), and are shorter (105.48 vs. 113.01, $t = -35.66$, $p = .00$), less readable (9.70 vs. 11.34, $t = -64.30$, $p = .00$), more emotional (7.67 vs. 7.46, $t = 25.39$, $p = .00$), less cognitive (8.41 vs. 8.49, $t = -9.49$, $p = .00$), and more perceptual (2.12 vs. 2.11, $t = 1.91$, $p = .056$) and more helpful (0.592 vs. 0.584, $t = 3.09$, $p = .002$).

Table 1 Statistical summary of the key variables

	All reviews	Mobile reviews	Non-mobile reviews
Volume	1,024,062	324,222	699,840
Average rating	4.14	4.10	4.17
Review length	110.62	105.48	113.01
Readability	10.82	9.70	11.34
Emotionality	7.53	7.67	7.46
Cognitivity	8.46	8.41	8.49
Perceptuality	2.12	2.12	2.11
Helpfulness votes	0.586	0.592	0.584

4. Model Specifications and Estimation Results

4.1 The Effect of Mobile Reviewing

First, we examine the overall effect of mobile reviewing on review helpfulness, as specified in Model 1 below. Review helpfulness_{ij} is the accumulative helpfulness votes a *Review_k* (submitted by *Reviewer_j* for *Hotel_i*) receives. Mobile_{ijk} is our focal independent variable and b_1 is the coefficient of interest. Review Control_k, Reviewer Control_j, Hotel Control_i and year dummies are the control variables discussed in Section 3.3. For the purpose of brevity, we set the vector of *Control_{ijk}* = [Review Control_k, Reviewer Control_j, Hotel Control_i, year][']. We adopt negative binominal regression with robustness for heteroskedasticity of error in Stata 16.0 to account for the counting nature of Review helpfulness_{ij} (e.g., Fang et al., 2016; Grewal & Stephen, 2019).

$$\text{Review helpfulness}_{ijk} = b_0 + \mathbf{b}_1 \text{Mobile}_{ijk} + b_2 \text{Control}_{ijk} + e_{ijk} \quad (\text{Model 1})$$

The estimation result of Model 1 (Column 2 in Table 2) demonstrates a significant negative effect of mobile reviews (-.119^{***}, SE = .01). On average, mobile reviews receive 0.119 fewer helpfulness votes than non-mobile reviews, which supports some studies (März et al., 2017; Ransbotham et al., 2019) but contradicts with others (Grewal & Stephen, 2019). The inconsistency between our results and Grewal and Stephen's (2019) may be explained by the absence vs. presence of mobile-review labels ("via mobile") in each dataset. When such labels are explicit, consumers assume that the review is crafted with more physical effort and subsequently equate it with the higher credibility (Grewal & Stephen, 2019). Nevertheless, these labels are absent in our dataset.

Table 2 The Effect of Mobile Reviewing on Review Helpfulness

	Mediators: Review content features						DV
	Review Helpfulness	Review length (ln)	Readability (ln)	Emotionality (ln)	Cognitivity (ln)	Perceptuality (ln)	Review Helpfulness
Mobile reviewing	-.119 ^{***}	-.293 ^{***}	-.141 ^{***}	.097 ^{***}	-.03 ^{***}	.021 ^{***}	.001
Review length (ln)	(.01)	(.003)	(.003)	(.002)	(.003)	(.003)	(.001)
Readability (ln)							.168 ^{***}
							(.001)
Emotionality (ln)							.007 ^{***}
							(.001)
Cognitivity (ln)							.019 ^{***}
							(.002)
							-.013 ^{***}
							(.001)

Perceptuality (ln)							.011***
Rating	-.243*** (.002)	-.124*** (.001)	.043*** (.001)	.153*** (0.00)	-.096*** (0.00)	-.031*** (.001)	-.052*** (.001)
Contiguity	-1.112*** (.109)	-2.637*** (.033)	.317*** (.036)	.172*** (.024)	-.215*** (.03)	-.563*** (.036)	-.404*** (.04)
Sequence (ln)	-.059*** (.001)	-.002*** (0.00)	.001 (0.00)	-.001*** (0.00)	-.005*** (0.00)	-.001** (0.00)	-.005*** (0.00)
Dimension	-.019*** (.002)	-.031*** (.001)	-.015*** (.001)	.009*** (.001)	-.001 (.001)	.001 (.001)	.003*** (.001)
Solicitation	-.683*** (.008)	-.418*** (.002)	.165*** (.003)	.05*** (.002)	-.057*** (.002)	-.06*** (.003)	-.033*** (.003)
Membership	.009*** (.001)	.013*** (0.00)	.001*** (0.00)	-.002*** (0.00)	.001*** (0.00)	.002*** (0.00)	.034*** (0.00)
Followers (ln)	.191*** (.015)	-.02*** (.003)	-.031*** (.003)	.026*** (.002)	-.001 (.003)	-.007** (.003)	.596*** (.004)
# of contributions (ln)	.041 (.055)	1.134*** (.012)	-.487*** (.011)	-.279*** (.008)	.085*** (.009)	.373*** (.011)	-1.709*** (.019)
Points (ln)	.566*** (.13)	-1.837*** (.027)	.974*** (.027)	.413*** (.018)	-.283*** (.022)	-.677*** (.026)	7.621*** (.045)
Grade for walkers (ln)	-.169*** (.013)	.036*** (.004)	-.012*** (.004)	.021*** (.003)	-.015*** (.003)	-.087*** (.004)	-.038*** (.004)
# of restaurant nearby (ln)	-.089*** (.004)	-.021*** (.001)	-.007*** (.001)	.004*** (.001)	.007*** (.001)	-.047*** (.001)	-.007*** (.001)
# of attractions nearby (ln)	.106*** (.004)	.019*** (.001)	.009*** (.001)	-.003*** (.001)	.004*** (.001)	.073*** (.001)	.013*** (.001)
_cons	.885*** (.208)	7.615*** (.045)	.692*** (.045)	.705*** (.03)	3.059*** (.037)	2.299*** (.044)	-12.847*** (.071)
Observations	1,024,062	1,024,062	1,024,062	1,024,062	1,024,062	1,024,062	1,024,062
Pseudo R ²	.051	---	---	---	---	---	.06
Reviewer badge dummy	YES	YES	YES	YES	YES	YES	YES
Trip type dummy	YES	YES	YES	YES	YES	YES	YES
Hotel class dummy	YES	YES	YES	YES	YES	YES	YES
Year dummy	YES	YES	YES	YES	YES	YES	YES
City dummy	YES	YES	YES	YES	YES	YES	YES

Note: Robust standard errors are in parentheses; ***: $p < .01$, **: $p < .05$, *: $p < .1$

4.2 The Mediation Effects of Content Features

Next, we formally examine the effect of mobile (vs. non-mobile) reviewing on review helpfulness through the paralleling mediation processes of content features. We specify the effect of mobile reviewing on each content feature in Model 2-m. Model 3 describes the direct effect of mobile reviewing and the mediation effect of content features.

$$m_{ijk} = a_{0m} + \mathbf{a}_{1m} \text{Mobile}_{ijk} + a_{2m} \text{Control}_{ijk} + e_{ijk} \quad (\text{Model 2-m})$$

where $m \in \{\log(\text{Emotionality}_{ijk}), \log(\text{Cognitiveness}_{ijk}), \log(\text{Perceptuality}_{ijk}), \log(\text{review length}_{ijk}), \log(\text{Readability index}_{ijk})\}$.

$$\text{Review helpfulness}_{ijk} = c_0 + \mathbf{c}_1 \text{Mobile}_{ijk} + \sum_m (c_m m_{ijk}) + c_2 \text{Control}_{ijk} + e_{ijk} \quad (\text{Model 3})$$

The estimation results of Model 2-m are reported in Table 2 (Column 3-7). On one hand, the mobile reviews are more emotional (.097***, SE = .002), less cognitive (-.03***, SE = .003), and more perceptual (.021***, SE = .003). When reviewing on a mobile device, consumers' opinions might be more impulsive and less reflective due

to the lack of deliberative consideration (e.g., Kim & Hwang, 2020; Ransbotham et al., 2019). On the other hand, the mobile reviews are significantly shorter ($-.293^{***}$, $SE = .003$) and less readable ($-.141^{***}$, $SE = .003$) than non-mobile reviews, due to the physical constraints of mobile devices (Melumad et al., 2019).

Furthermore, the estimation result of Model 3 (Column 8 in Table 2) reveals that the emotionality ($.019^{***}$, $SE = .002$), perceptuality ($.011^{***}$, $SE = .004$), length ($.168^{***}$, $SE = .001$) and readability ($.007^{***}$, $SE = .001$) of reviews help increase review helpfulness, while more cognitive reviews are regarded as less helpful ($-.013^{***}$, $SE = .001$), supporting H1. Mobile devices seem to put consumers in a more “mobile mindset” in that they judge reviews with more impulsive and hot-headed reasoning (Kim & Hwang, 2020). They deliberate less and make more impulse purchases than rational cognition (e.g., product features) (Batra & Keller, 2016), and accept more the emotional and sensory content generated on mobile devices. More importantly, after considering all mediations, the main effect of mobile reviewing becomes insignificant ($-.001$, $SE = .01$), meaning that the positive mediations of emotionality, perceptuality and cognitivity counteract the negative mediations of length and readability on review helpfulness. Our results disentangle the two-sided effect of mobile reviewing.

Next, we adopt the general path analytic framework (Edwards & Lambert, 2007) to examine the significance of the mediation effects. We substitute Model 2-m into Model 3 (i.e., $\sum_m (c_m m_{ijk})$), which yields the reduced form equation in Model 4. $c_m a_{1m}$ depicts the indirect effect of mobile reviewing through each content feature, whereas c_1 captures the direct effect of mobile reviews after considering the aforementioned mediation effects. We generate the 95% confidence intervals for these coefficients of interest by bootstrapping approach in Stata 16.0. As shown in Table 3, emotionality, cognitivity, and perceptuality positively mediate the effect of mobile reviewing on review helpfulness (Coefficient: $2.475e^{-3}$, $1.137e^{-3}$ and $.441e^{-3}$; 95%CI: $[1.428e^{-3}, 3.523e^{-3}]$, $[.808e^{-3}, 1.467e^{-3}]$ and $[.237e^{-3}, .644e^{-3}]$, respectively). Mobile reviews are more emotional and vivid, but less cognitive, which are perceived to be more helpful, supporting again Hypothesis 1.

$$\begin{aligned} \text{Review helpfulness}_{ijk} = & c_0 + c_1 \text{Mobile}_{ijk} + \sum_m c_m (a_{1m} \text{Mobile}_{ijk} + \\ & a_{2m} \text{Control}_{ijk} + e_{ijk}) + c_2 \text{Control}_{ijk} + e_{ijk} = c_0 + c_1 \text{Mobile}_{ijk} + \\ & \sum_m c_m a_{1m} \text{Mobile}_{ijk} + c_2 \text{Control}_{ijk} + e_{ijk} \end{aligned} \quad (\text{Model 4})$$

Meanwhile, we reveal the negative mediations of review length and readability (Coefficient: $-.112$ and $-1.28e^{-3}$; 95%CI: $[-.115, -.109]$ and $[-2.246e^{-3}, -.032e^{-3}]$, respectively). Mobile reviewing decreases the length and readability of mobile reviews, which hurt their helpfulness. Moreover, the negative mediations caused by the physical constraints outperform the positive mediations attributable to the real-time review generation, leading to an overall negative effect of mobile reviewing on review helpfulness. Therefore, Hypothesis 2 is supported.

Table 3 The summary of mediation effects of content features

Mediation Path	Coefficient	95%CI	P-value
Mobile _{ijk} → Emotionality _{ijk} → Review helpful _{ijk}	$2.475e^{-3}$	$[1.428e^{-3}, 3.523e^{-3}]$	.00
Mobile _{ijk} → Cognitivity _{ijk} → Review helpful _{ijk}	$1.137e^{-3}$	$ [.808e^{-3}, 1.467e^{-3}]$	.00
Mobile _{ijk} → Perceptuality _{ijk} → Review helpful _{ijk}	$.441e^{-3}$	$ [.237e^{-3}, .644e^{-3}]$	.00
Mobile _{ijk} → Review length _{ijk} → Review helpful _{ijk}	$-.112$	$[-.115, -.109]$	.00

Mobile _{ijk} →Readability _{ijk} →Review helpful _{ijk}	-1.28e ⁻³	[-2.246e ⁻³ , -.032e ⁻³]	.003
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4.3 The Moderation of Review Solicitation

Next, we consider the moderation effect of review solicitation on the various content features. We add the interactions between Solicitation_{ijk} and Mobile_{ijk} into Model 2-m and obtain the Model 5-m for each content feature, respectively. We update Model 4 by substituting m_{ijk} in Model 5-m and obtain Model 6. Particularly, $c_m\gamma_m$ delineates the moderation effect of review solicitation on the relationship between mobile reviewing and content features.

$$m_{ijk} = a_{0m} + \gamma_m \text{Mobile}_{ijk} \text{Solicitation}_{ijk} + a_{1m} \text{Mobile}_{ijk} + a_{2m} \text{Control}_{ijk} + e_{ijk} \quad (\text{Model 5-m})$$

$$\begin{aligned} \text{Review helpfulness}_{ijk} = c_0 + c_1 \text{Mobile}_{ijk} + \sum_m c_m (a_{0m} + \\ \gamma_m \text{Mobile}_{ijk} \text{Solicitation}_{ijk} + a) * \text{Mobile}_{ijk} + a_{2m} \text{Control}_{ijk} + e_{ijk} = c'_0 + \\ c'_1 \text{Mobile}_{ijk} + \sum_m c_m \gamma_m \text{Mobile}_{ijk} \text{Solicitation}_{ijk} + c'_2 \text{Control}_{ijk} + e_{ijk} \quad (\text{Model 6}) \end{aligned}$$

The estimation results (in Table 4) support that review solicitation weakens the real-time reviewing process but mitigates the effects of physical constraints. Specifically, solicited (vs. voluntary) mobile reviews are less emotional, more cognitive, less perceptual, longer and more readable (-.011^{***}, SE=.004; .025^{***}, SE=.005; -.009^{*}, SE=.006; .203^{***}, SE=.004; .022^{***}, SE=.005). The review solicitation shifts the locus of choice regarding whether and how to write a review from internal to external (Botti & McGill, 2011). Since externally (vs. internally) motivated decisions make consumers' utilitarian or instrumental (vs. hedonic) goals more salient (Botti & McGill, 2011), our results imply that review solicitation makes review contribution less self-serving (e.g., less motivated to generate impactful reviews) but more utilitarian (e.g., out of reciprocity or social pressure of hotel solicitation). Therefore, Hypothesis 3 is supported.

Table 4 The Moderation of Review Solicitation

	Review length (ln)	Readability (ln)	Emotionality (ln)	Cognitivity (ln)	Perceptuality (ln)
Mobile reviewing	-.247 ^{***} (.003)	-.136 ^{***} (.004)	.095 ^{***} (.002)	-.024 ^{***} (.003)	-.019 ^{***} (.003)
Mobile review x Solicitation	.203^{***} (.004)	.022^{***} (.005)	-.011^{***} (.004)	.025^{***} (.005)	-.009[*] (.006)
Rating	-.125 ^{***} (.001)	.043 ^{***} (.001)	.153 ^{***} (0.00)	-.096 ^{***} (0.00)	-.031 ^{***} (.001)
Contiguity	-2.688 ^{***} (.033)	.311 ^{***} (.036)	.175 ^{***} (.024)	-.221 ^{***} (.03)	-.565 ^{***} (.036)
Sequence (ln)	-.002 ^{***} (0.00)	.001 (0.00)	-.001 ^{***} (0.00)	-.005 ^{***} (0.00)	-.001 ^{**} (0.00)
Dimension	-.012 ^{***} (.001)	-.013 ^{***} (.001)	.008 ^{***} (.001)	.002 ^{**} (.001)	.002 [*] (.001)
Solicitation	-.489 ^{***} (.003)	.157 ^{***} (.003)	.054 ^{***} (.002)	-.066 ^{***} (.003)	-.063 ^{***} (.003)
Membership	.013 ^{***} (0.00)	.001 ^{***} (0.00)	-.002 ^{***} (0.00)	.001 ^{***} (0.00)	.002 ^{***} (0.00)
Followers (ln)	-.02 ^{***} (.003)	-.031 ^{***} (.003)	.026 ^{***} (.002)	-.001 (.003)	-.007 ^{**} (.003)
# of contributions (ln)	1.146 ^{***} (.012)	-.486 ^{***} (.011)	-.279 ^{***} (.008)	.087 ^{***} (.009)	.373 ^{***} (.011)
Points (ln)	-1.857 ^{***} (.027)	.972 ^{***} (.027)	.414 ^{***} (.018)	-.286 ^{***} (.022)	-.678 ^{***} (.026)

Grade for walkers (ln)	.032*** (.004)	-.013*** (.004)	.021*** (.003)	-.016*** (.003)	-.087*** (.004)
# of restaurant nearby (ln)	-.021*** (.001)	-.007*** (.001)	.004*** (.001)	.007*** (.001)	-.047*** (.001)
# of attractions nearby (ln)	.02*** (.001)	.009*** (.001)	-.003*** (.001)	.004*** (.001)	.073*** (.001)
_cons	7.57*** (.045)	.687*** (.045)	.708*** (.03)	3.053*** (.037)	2.297*** (.044)
Observations	1,024,062	1,024,062	1,024,062	1,024,062	1,024,062
R-squared	.231	.03	.162	.048	.019
Reviewer badge dummy	YES	YES	YES	YES	YES
Trip type dummy	YES	YES	YES	YES	YES
Hotel class dummy	YES	YES	YES	YES	YES
Year Dummy	YES	YES	YES	YES	YES
City Dummy	YES	YES	YES	YES	YES

Note: Robust standard errors are in parentheses; ***: $p < .01$, **: $p < .05$, *: $p < .1$

4.4 The Moderation of Reviewer Popularity

Last, we follow the same procedure in 4.3 to examine the moderation of reviewer popularity. The estimation results (in Table 5) confirm our predictions that more popular reviewers are more motivated and skilled in writing more influential reviews. Our results reveal that these popular reviewers who possess a better-learned association between emotion and persuasion naturally increase emotionality (Rocklage & Fazio, 2020) and perceptual vividness, and reduce the cognitivity of review content (.013***, SE=.004; .020***, SE=.006; -.019***, SE=.005). Meanwhile, they are also more skillful in handling the physical constraints of mobile devices by improving the mobile review readability and condensing the review content (i.e., shorter reviews) (.027***, SE=.006; -.087***, SE=.007), supporting Hypothesis 4.

Table 5 The Moderation of Reviewer popularity

	Review length (ln)	Readability (ln)	Emotionality (ln)	Cognitivity (ln)	Perceptuality (ln)
Mobile reviewing	-.284*** (.003)	-.144*** (.003)	.096*** (.002)	-.028*** (.003)	-.021*** (.003)
Mobile review x Followers (ln)	-.087*** (.007)	.027*** (.006)	.013*** (.004)	-.019*** (.005)	.020*** (.006)
Rating	-.124*** (.001)	.043*** (.001)	.153*** (0.00)	-.096*** (0.00)	-.031*** (.001)
Contiguity	-2.644*** (.033)	.319*** (.036)	.173*** (.024)	-.216*** (.03)	-.563*** (.036)
Sequence (ln)	-.002*** (0.00)	.001 (0.00)	-.001*** (0.00)	-.005*** (0.00)	-.001*** (0.00)
Dimension	-.031*** (.001)	-.015*** (.001)	.009*** (.001)	-.001 (.001)	.001 (.001)
Solicitation	-.418*** (.002)	.165*** (.003)	.05*** (.002)	-.057*** (.002)	-.06*** (.003)
Membership	.013*** (0.00)	.001*** (0.00)	-.002*** (0.00)	.001*** (0.00)	.002*** (0.00)
Followers (ln)	.014*** (.004)	-.042*** (.004)	.021*** (.003)	.007*** (.003)	-.008*** (.004)
# of contributions (ln)	1.132*** (.012)	-.487*** (.011)	-.278*** (.008)	.085*** (.009)	.373*** (.011)
Points (ln)	-1.833*** (.027)	.973*** (.027)	.413*** (.018)	-.282*** (.022)	-.677*** (.026)
Grade for walkers (ln)	.036*** (.004)	-.012*** (.004)	.021*** (.003)	-.015*** (.003)	-.087*** (.004)

# of restaurant nearby (ln)	-.021*** (.001)	-.007*** (.001)	.004*** (.001)	.007*** (.001)	-.047*** (.001)
# of attractions nearby (ln)	.019*** (.001)	.009*** (.001)	-.003*** (.001)	.004*** (.001)	.073*** (.001)
_cons	7.605*** (.045)	.696*** (.045)	.707*** (.03)	3.056*** (.037)	2.3*** (.044)
Observations	1,024,062	1,024,062	1,024,062	1,024,062	1,024,062
R-squared	.23	.03	.162	.048	.019
Reviewer badge dummy	YES	YES	YES	YES	YES
Trip type dummy	YES	YES	YES	YES	YES
Hotel class dummy	YES	YES	YES	YES	YES
Year Dummy	YES	YES	YES	YES	YES
City Dummy	YES	YES	YES	YES	YES

Note: Robust standard errors are in parentheses; ***: $p < .01$, **: $p < .05$, *: $p < .1$

4.5 Robustness Check

4.5.1 Causal identification in addressing the endogeneity (RC1)

One potential threat in establishing the causal relationship between mobile reviewing and review helpfulness lies in the endogeneity caused by the omitted variable bias. The hotels with higher quality or popularity are more likely to be ranked and displayed upmost on TripAdvisor. Thus, they are more likely to be booked and reviewed via mobile device and meanwhile their reviews are more likely to be voted by prospective consumers. We adopt the control function approach to address the endogeneity concerns (Petrin & Train, 2010; Villarroel Ordenes et al., 2019). We develop the instruments as follows. First, we obtain the yearly mean household income in the zip-code region of a hotel¹ and the competition intensity (i.e., number of its competitors) as the exogenous instrument for the unobserved hotel quality. The hotels tend to have a higher quality when located in a region with a higher mean household-income or more intensive competition (Kumar et al., 2018). Second, we capture the popularity of a hotel by its advantage in the monthly review volume and valence relative to its competitors', which is consistent with the popularity Index by TripAdvisor². Thus, we specify the control functions below:

$$Mobile_{iym} = \gamma_0 + \gamma_1 Mean\ household\ income_{iy} + \gamma_2 Competition_{iy} + \gamma_3 Relative\ volume_{im} + \gamma_4 Relative\ valence_{im} + \tau_{iy} \quad (\text{Model 7})$$

The endogeneity arises if e_{ijk} is correlated with τ_{iy} . We estimate the control function and obtain the residual (i.e., $\widehat{\tau}_{iy}$), which is further included as another control variable in Model 1~6. Accordingly, the remaining part of e_{ijk} should be independent of mobile reviewing and thus alleviate the endogeneity concern. We summarize the estimation results in Table 6 (RC1), which are consistent with those in the main analyses.

(Insert Table 6 about here)

4.5.2 Robustness check with the Gunning-Fog Index (RC 2)

As Liu and Park (2015) summarize, the Flesch-Kincaid readability index measures the reading ease of each review, whereas the Gunning's Fog Index (FOG) captures the complexity of the text. We conduct the additional robustness check by

¹Source: <https://data.census.gov/table?q=mean+income>.

² <https://www.tripadvisor.com/en-US/hc/traveler/articles/438>, available on July 8, 2023.

using FOG, which is another popular readability index (Fang et al., 2016), to measure the syntax style complexity of the review. We take the minus natural log of FOG ($-\ln(\text{FOG})$) to make the results more comparable with the FKI in the main analyses. The estimation results (summarized in RC2 in Table 6) are consistent with the main analyses.

4.5.3 Robustness checks in subsamples (RC3-5)

We conduct more robustness checks in several important subsamples. (1) Heavily liked reviews are usually more influential (Ransbotham et al., 2019); we remove the top 25% of reviews (i.e., 128,194 reviews deleted) by the number of helpfulness votes they received (i.e., RC3 in Table 6). (2) Also, reviewers that contribute content on TripAdvisor but seldom receive any helpfulness vote could drive the results. We re-estimate the models with the subsample (summarized in RC4 in Table 6) that removes those reviewers that never received any vote (i.e., 242,669 observations deleted). (3) Additionally, we replicate the analyses in the subsample in which the reviewers who have reviewed via both the mobile and non-mobile channels. We obtain 31,071 reviewers with an average of 3.28 reviews on both channels. The results are shown in RC5 in Table 6. All these estimation results in the subsamples (RC3-5) are largely consistent with the main results.

5. Major Findings, Implications, and Future Research

Drawing upon the MOA framework (MacInnis et al., 1991), our research provides insights into how mobile reviewing, review solicitation and reviewer popularity jointly determine consumers' motivation, opportunity, and ability in reviewing, which subsequently shapes review content and ultimately influences review helpfulness. Using a large-scale dataset collected from TripAdvisor, our analyses reveal a two-sided effect of mobile reviewing. The real-time creation enabled by mobile devices (i.e., opportunity in the MOA framework) makes mobile reviews to be more emotional, less cognitive, and more perceptual compared to non-mobile reviews, leading to higher review helpfulness. However, the reviewing ability (i.e., ability in the MOA framework) constrained by mobile devices renders mobile reviews to be shorter and less readable, thus negatively impacting helpfulness. By disclosing the complex mechanisms that explain the effects of mobile reviewing on the five review content features, our study reconciles the contrasting results of previous studies (Mariani et al., 2019) and deepens the current understanding on the role of WOM communication channel in the mobile commerce.

More importantly, in the MOA framework, we consider two important factors that interact with mobile reviewing in the ecosystem of WOM marketing: firm review solicitation and reviewer popularity. Review solicitation, which changes the reviewing motivation, weakens both the negative and positive effects of mobile reviewing. Specifically, solicited reviewing (vs. organic reviewing) elicits more cognitive, more readable, longer but less emotional and less perceptual reviews through mobile devices than through non-mobile devices. Meanwhile, popular (vs. unpopular) reviewers, who may possess higher motivation and ability in reviewing, tend to write more persuasive reviews (i.e., more emotional, experiential, readable, but less cognitive) in a more efficient way (i.e., shorter). In sum, our research develops an integrated framework to evaluate the complex interaction relationships among multiple players (platforms, firms, and reviewers) in the real eWOM environment.

5.1 Theoretical Implications

Our findings provide three-folded contributions to the current eWOM literature. *First*, this study adopts the MOA framework to elucidate how the mobile reviewing shapes reviewers' motivation, opportunity and ability in generating reviews, thereby reconciling the contrasting results in previous literature. Although mobile devices allow for real-time reviewing due to their portability and accessibility, their physical limitations can hurt the review quality. We show that mobile (vs. non-mobile) reviewing increases review emotionality and perceptuality, but decreases their cognitivity, length, and readability. The mobile reviews are overall less helpful than non-mobile reviews. However, this disadvantage disappears after controlling for the mediations of the content features. These results help clarify the contrasting results in previous research (Grewal & Stephen, 2019; Ransbotham et al., 2019) and contribute to a clearer understanding of the mechanism of how the channel influences eWOM behavior (Mariani et al., 2019).

Second, we integrate review solicitation, a firm-side effort, to investigate how such proactive intervention interact with consumers' mobile reviewing. Review solicitation is a commonly used strategy for firms to stimulate post-consumption feedback. Previous research examined the valence of solicited reviews (Litvin & Sobel, 2019) and showed that extremity bias is less observed among solicited reviews (Karaman, 2021). However, the underlying psychological reason has rarely been examined by prior research. This research explores the moderations of review solicitation on the effect of mobile reviewing. It is also the first one to uncover whether and how the review solicitation alters consumers' motivation for contributing reviews (i.e., from hedonic to utilitarian goals), consequently shaping the review content features. Thus, our findings expand the limited literature on the characteristics of organic versus solicited reviews. p

Third, we incorporate reviewer popularity into the framework to examine its moderation on the effect of mobile reviewing. Previous studies on WOM source mainly examine the effect of source (reviewer) expertise and trustworthiness on review helpfulness and brand evaluation (Chatterjee, 2020; Filieri et al., 2023). Our research takes a different perspective to explain how popular reviewers would be more skillful and experienced in seizing the opportunity of mobile reviewing while overcoming its constraints to submit persuasive and high-quality reviews. Moreover, previous literature only examines the concept of source popularity from an "influencer marketing" perspective, focusing on studying how brands can use influencers to advertise products and services (Goes et al., 2014). Our results contribute to the pertinent literature (Goes et al., 2014) by demonstrating that how writing for large audiences affects the language of WOM messages.

5.2 Managerial Implications

For various digital platforms, mobile channel has the natural advantage to help boost the review volume due to its convenience (Kim & Hwang, 2020). However, the benefits of mobile devices are accompanied by paradoxical consequences, which impose limitations on their usage. Despite mobile reviewing often sacrifices the length and readability, our findings still support the managers' strategy of encouraging mobile reviews. They are more convincing because of the high emotional and perceptual intensity, and low cognitivity. Moreover, managers are advised to seek effective approaches to counteract the disadvantage of mobile reviewing. For instance, previous research reveals that explicitly labeling mobile reviews prompts consumers' more favorable responses due to the effortfulness perception (Grewal &

Stephen, 2019). Our results also suggest that it would be harmful to hide the mobile review label as consumers notice the lower quality of mobile reviews instead of appreciating the reviewing efforts.

Furthermore, review solicitation and reviewer popularity can be two valuable measures to boost customer engagement in content contribution. On the one hand, popular reviewers are more motivated to take advantage of mobile devices for real-time content contribution and meanwhile more skillful to overcome inconveniences or difficulties on mobile devices. We advocate online communities to develop effective community-member ranking systems, leaderboards or badges to keep members engaged and motivated to participate, especially for those rooted in mobile applications. On the other hand, review solicitation supported by mobile devices widens the opportunity of more consumers in contributing their post-purchase reviews. Generally, we suggest firms routinely send out review solicitation emails to invite review submissions, leading to a more comprehensive customer base. That is, review solicitation helps counteract the attrition effect (i.e., potential reviewers with moderate experiences are more likely to leave the pool of active reviewers) proposed by Brandes et al. (2022). As our findings indicate, we particularly encourage those firms to employ review solicitation when their product/service is utilitarian but not hedonic in nature.

5.3 Limitations and Future Research

This research has several limitations that leave opportunities for future research. First, we collected the hotel review sample from TripAdvisor, which only allows consumers to submit multiple-dimension ratings via non-mobile devices (but not via mobile devices). We, therefore, did not specify and analyze the cross-attribute review and its helpfulness given the objective of this research. However, requesting consumers to review by product/service attribute is increasingly popular for various platforms, future research could conduct more fine-grained analysis or experiments to assess the cross-attribute difference. Second, because of the nature of our data, we only developed our arguments based on the motivation, opportunity, and ability of reviewers, but did not control for review readers' motives and behavior. Future research could use experimental setting to further address these influences. Third, we focus on reviews for hotels. Future research should include other business to increase current findings' generalizability.

Table 6 The summary of main estimations in robustness checks

			RC1 (Control function)	RC2 (FOG)	RC3 (Remove top 25% reviewers)	RC4 (Remove no-vote reviewers)	RC5 (Across-channel reviewers)
Mobile reviewing →	Review Helpfulness		-.12***	-.12***	-.074***	-.091***	-.118***
	Review length		-.293***	-.293***	-.288***	-.27***	-.273***
	Readability		-.141***	-.085***	-.15***	-.126***	-.129***
Mobile reviewing →	Emotionality		.097***	.097***	.098***	.092***	.078***
	Cognitivity		-.03***	-.03***	-.031***	-.027***	-.024***
	Perceptuality		.021***	.021***	.02***	.02***	.005
[Mobile reviewing, length, readability, emotionality, cognitivity, perceptuality] → Review Helpfulness			[-.013, .383***, .009***, .025***, -.038***, .023***]	[-.013, .382***, .014**, .026***, -.038***, .021***]	[.001, .218***, .013***, .015*, -.02***, .016***]	[.004, .354***, .011*, .032***, -.037***, .017***]	[-.011, .408***, .022**, .026*, -.041***, .026**]
Moderation of Solicitation	Review length		.204***	.204***	.189***	.221***	.186***
	Readability		.022***	.03***	.027***	.03***	.061***
	Emotion		-.011***	-.011***	-.013***	-.009*	-.019*
	Cognition		.025***	.025***	.026***	.02***	.028**
	Perception		-.009*	-.009*	-.006	-.004	-.029*
Moderation of Popularity	Review length		-.087***	-.087***	-.082***	-.075***	-.071***
	Readability		.027***	.014***	.028***	.019***	.007*
	Emotionality		.013***	.013***	.011**	.017***	.019**
	Cognitivity		-.019***	-.019***	-.018***	-.02***	-.021*
	Perceptuality		.012**	.012**	.003	.002*	.001

Note: ***: p<.01, **: p<.05, *: p<.1

References

- Andrews, M., Luo, X., Fang, Z., & Ghose, A. (2016). Mobile ad effectiveness: Hyper-contextual targeting with crowdedness. *Marketing Science*, 35(2), 218-233.
- Batra, R., & Keller, K. L. (2016). Integrating marketing communications: New findings, new lessons, and new ideas. *Journal of Marketing*, 80(6), 122-145.
- Botti, S., & McGill, A. L. (2011). The locus of choice: Personal causality and satisfaction with hedonic and utilitarian decisions. *Journal of Consumer Research*, 37(6), 1065-1078.
- Brandes, L., Godes, D., & Mayzlin, D. (2022). Extremity Bias in Online Reviews: The Role of Attrition. *Journal of Marketing Research*, 59(4), 675-695.
- Casaló, L. V., Flavián, C., & Ibáñez-Sánchez, S. (2020). Influencers on Instagram: Antecedents and consequences of opinion leadership. *Journal of Business Research*, 117, 510-519.
- Chang, H. H., & Tuan Pham, M. (2013). Affect as a decision-making system of the present. *Journal of Consumer Research*, 40(1), 42-63.
- Chatterjee, S. (2020). Drivers of helpfulness of online hotel reviews: A sentiment and emotion mining approach. *International Journal of Hospitality Management*, 85, 102356.
- Edwards, J. R., & Lambert, L. S. (2007). Methods for integrating moderation and mediation: a general analytical framework using moderated path analysis. *Psychological methods*, 12(1), 1.
- Fang, B., Ye, Q., Kucukusta, D., & Law, R. (2016). Analysis of the perceived value of online tourism reviews: Influence of readability and reviewer characteristics. *Tourism Management*, 52, 498-506.
- Filieri, R. (2015). What makes online reviews helpful? A diagnosticity-adoption framework to explain informational and normative influences in e-WOM. *Journal of business research*, 68(6), 1261-1270.
- Filieri, R., Acikgoz, F., Li, C., & Alguezaui, S. (2023). Influencers' "organic" persuasion through electronic word of mouth: A case of sincerity over brains and beauty. *Psychology & Marketing*, 40(2), 347-364.
- Filieri, R., Galati, F., & Raguseo, E. (2021). The impact of service attributes and category on eWOM helpfulness: An investigation of extremely negative and positive ratings using latent semantic analytics and regression analysis. *Computers in Human Behavior*, 114, 106527.
- Filieri, R., McLeay, F., Tsui, B., & Lin, Z. (2018). Consumer perceptions of information helpfulness and determinants of purchase intention in online consumer reviews of services. *Information & Management*, 55(8), 956-970.
- Filieri, R., Raguseo, E., & Vitari, C. (2018). When are extreme ratings more helpful? Empirical evidence on the moderating effects of review characteristics and product type. *Computers in Human Behavior*, 88, 134-142.
- Filieri, R., Raguseo, E., & Vitari, C. (2019). What moderates the influence of extremely negative ratings? The role of review and reviewer characteristics. *International Journal of Hospitality Management*, 77, 333-341.
- Filieri, R., Raguseo, E., & Vitari, C. (2021). Extremely negative ratings and online consumer review helpfulness: the moderating role of product quality signals. *Journal of travel research*, 60(4), 699-717.
- Ghose, A., & Ipeirotis, P. G. (2011). Estimating the helpfulness and economic impact of product reviews: Mining text and reviewer characteristics. *Knowledge and Data Engineering, IEEE Transactions on*, 23(10), 1498-1512.
- Goes, P. B., Lin, M., & Au Yeung, C.-m. (2014). "Popularity effect" in user-generated

- content: Evidence from online product reviews. *Information Systems Research*, 25(2), 222-238.
- Grewal, L., & Stephen, A. T. (2019). In mobile we trust: The effects of mobile versus nonmobile reviews on consumer purchase intentions. *Journal of Marketing Research*, 56(5), 791-808.
- Karaman, H. (2021). Online review solicitations reduce extremity bias in online review distributions and increase their representativeness. *Management science*, 67(7), 4420-4445.
- Kim, J. M., & Hwang, K. (2020). Roles of emotional expressions in review consumption and generation processes. *International Journal of Hospitality Management*, 86, 102454.
- Krishna, A. (2012). An integrative review of sensory marketing: Engaging the senses to affect perception, judgment and behavior. *Journal of Consumer Psychology*, 22(3), 332-351.
- Lei, Z., Yin, D., & Zhang, H. (2021). Focus Within or On Others: The Impact of Reviewers' Attentional Focus on Review Helpfulness. *Information Systems Research*, 32(3), 801-819.
- Leung, D. (2021). Unraveling the interplay of review depth, review breadth, and review language style on review usefulness and review adoption. *International Journal of Hospitality Management*, 97, 102989.
- Liu, X., Law, R., & Xu, Y. (2019). Does identity disclosure affect review extremity? *Annals of Tourism Research*, 77(C), 171-174.
- Liu, Z., & Park, S. (2015). What makes a useful online review? Implication for travel product websites. *Tourism Management*, 47, 140-151.
- MacInnis, D. J., Moorman, C., & Jaworski, B. J. (1991). Enhancing and measuring consumers' motivation, opportunity, and ability to process brand information from ads. *Journal of Marketing*, 55(4), 32-53.
- Mariani, M. M., Borghi, M., & Gretzel, U. (2019). Online reviews: differences by submission device. *Tourism Management*, 70, 295-298.
- März, A., Schubach, S., & Schumann, J. H. (2017). "Why would I read a mobile review?" Device compatibility perceptions and effects on perceived helpfulness. *Psychology & Marketing*, 34(2), 119-137.
- Mathwick, C., & Mosteller, J. (2017). Online reviewer engagement: A typology based on reviewer motivations. *Journal of Service Research*, 20(2), 204-218.
- Melumad, S., Inman, J. J., & Pham, M. T. (2019). Selectively emotional: How smartphone use changes user-generated content. *Journal of Marketing Research*, 56(2), 259-275.
- Mudambi, S. M., & Schuff, D. (2010). Research note: What makes a helpful online review? A study of customer reviews on Amazon. com. *MIS quarterly*, 185-200.
- Mudambi, S. M., & Schuff, D. (2010). What Makes a Helpful Online Review? A Study of Customer Reviews on Amazon.com. *Mis Quarterly*, 34(1), 218-240.
- Petrin, A., & Train, K. (2010). A control function approach to endogeneity in consumer choice models. *Journal of Marketing Research*, 47(1), 3-13.
- Pham, M. T., Cohen, J. B., Pracejus, J. W., & Hughes, G. D. (2001). Affect monitoring and the primacy of feelings in judgment. *Journal of Consumer Research*, 28(2), 167-188.
- Ransbotham, S., Lurie, N. H., & Liu, H. (2019). Creation and consumption of mobile word of mouth: how are mobile reviews different? *Marketing Science*, 38(5), 773-792.
- Rocklage, M. D., & Fazio, R. H. (2020). The enhancing versus backfiring effects of

- positive emotion in consumer reviews. *Journal of Marketing Research*, 57(2), 332-352.
- Rocklage, M. D., Rucker, D. D., & Nordgren, L. F. (2018). Persuasion, emotion, and language: The intent to persuade transforms language via emotionality. *Psychological Science*, 29(5), 749-760.
- Shin, S., Chung, N., Xiang, Z., & Koo, C. (2019). Assessing the impact of textual content concreteness on helpfulness in online travel reviews. *Journal of Travel Research*, 58(4), 579-593.
- Singh, J. P., Irani, S., Rana, N. P., Dwivedi, Y. K., Saumya, S., & Roy, P. K. (2017). Predicting the “helpfulness” of online consumer reviews. *Journal of Business Research*, 70, 346-355.
- Tausczik, Y. R., & Pennebaker, J. W. (2010). The psychological meaning of words: LIWC and computerized text analysis methods. *Journal of Language and Social Psychology*, 29(1), 24-54.
- Villarroel Ordenes, F., Grewal, D., Ludwig, S., Ruyter, K. D., Mahr, D., & Wetzels, M. (2019). Cutting through content clutter: How speech and image acts drive consumer sharing of social media brand messages. *Journal of Consumer Research*, 45(5), 988-1012.
- Woolley, K., & Sharif, M. A. (2021). Incentives increase relative positivity of review content and enjoyment of review writing. *Journal of marketing research*, 58(3), 539-558.
- Yin, D., Bond, S., & Zhang, H. (2014). Anxious or angry? Effects of discrete emotions on the perceived helpfulness of online reviews. *Mis Quarterly*, 38(2), 539-560.
- Zhou, Y., Tian, B., Mo, T., & Fei, Z. (2020). Consumers complain more fiercely through small-screen devices: The role of spatial crowding perception. *Journal of Service Research*, 23(3), 353-367.

Appendix

Appendix Table A1 Literature review on the determinants of review helpfulness

Author (Year)	Determinants				Major findings
	Review Characteristics	Reviewer Characteristics	Review Channel	Firm Review Solicitation	
Forman et al. (2008)	*	Identity disclosure	×	×	Identity disclosure(+)→Helpfulness
Mudambi and Schuff (2010)	Rating extremity and review depth	×	×	×	Extreme reviews for experience product(-)→ Helpfulness; Longer reviews for search product(+)→Helpfulness
Chen & Lurie (2013)	Temporal contiguity	×	×	×	Temporal contiguity(+)→Causal attribution towards product experience(+)→Positive (vs. negative) review helpfulness
Huang et al. (2013)	Attribute- vs. experience-based	×	×	×	Attribute-based reviews for search products/experience-based reviews for experience product(+)→Helpfulness
Yin, Bond & Zhang (2014)	Anxiety and anger	×	×	×	Anxiety- (vs. anger-) embedded reviews(+)→ Perceived review effort(+)→ Helpfulness
Liu & Park (2015)	Perceived enjoyment, readability, rating, length	Identity disclosure, expertise and reputation	×	×	Perceived enjoyment and reviews readability→(+)Helpfulness
Moore (2015)	Explained action vs. reaction	×	×	×	Explained-action reviews of utilitarian products/explained-reaction reviews of hedonic products(+)→Attitude predictability(+)→Helpfulness
Filieri (2015)	Information quality dimensions	Source Credibility	x	x	Information quality and crowd information (rating and ranking scores) (+)→Helpfulness (Diagnosticity)
Fang et al. (2016)	Readability, rating extremity.	Reviewer positivity	×	×	Review readability(+), rating extremity(+), reviewer positivity (+)→Helpfulness
Wu et al. (2017)	Figurative vs. literal language	Expertise	×	×	Figurative (vs. literal) reviews(-)→Helpfulness; weaker for lower expertise
Yin, Bond & Zhang (2017)	Emotional arousal	×	×	×	Emotional arousal (Inverted U-shape)→ Perceived review effort(+)→ Helpfulness; stronger for utilitarian products
Ma et al. (2018)	Photo-embedded reviews	×	×	×	Photo-embedded (vs. text-only) reviews(+)→Helpfulness
Liu, Law & Xu (2019)	Extremity	Identity disclosure	×	×	Identity disclosure(-)→Review extremity(-)→Helpfulness
Shin, et al. (2019)	Concreteness	×	×	×	Review concreteness(-)→Helpfulness
van Laer et al.	Narrativity	×	×	×	Narrativity(+)→Transportation(+)→Helpfulness

(2019)					
Wang, Tang & Kim (2019)	Emotions and linguistic style matching (LSM)	×	×	×	Joy(-), sadness(-), the remaining six emotions(+), LSM(+) → Helpfulness
Chatterjee (2020)	Sentiment, polarity, arousal, length, rating, recency	Expertise	×	×	Review polarity(-), arousal(-), rating(+), recency(+), expertise(+) → Helpfulness
Huang et al. (2020)	Positive and negative emoticons	×	×	×	Positive (negative) emoticons in narrative- (list-) based reviews(+) → Processing fluency(+) → Helpfulness
Li, Liu & Zhang (2020)	Positive vs. negative emotional intensity, anger vs. anxiety	×	×	×	Positive emotional intensity(-), negative emotional intensity(+), anger- (vs. anxiety-) review(+) → Helpfulness
Rocklage & Fazio (2020)	Emotionality	×	×	×	Emotional reviews for utilitarian products(+) → Surprise(-) → Helpfulness; Emotional reviews for hedonic products(+) → Trust(+) → Helpfulness
Lei, Yin & Zhang (2021)	Two-sidedness vs. one-sidedness	Other- vs. self-focus	×	×	Other-focus(+) → Helpfulness; Two-sidedness (one-sidedness) strengthens (weakens) this effect
Leung (2021)	Review depth, breadth, figurative vs. literal language	×	×	×	Review depth(+) → helpfulness; stronger for larger review breadth for literal-language reviews
März, Schubach and Schumann (2017)	×	×	Mobile vs. non-mobile (indicated)	×	Mobile reviews(-) → Helpfulness; Weaker when reviewing device and reading device (i.e., mobiles) is congruent
Mariani, Borghi & Gretzel (2019)	×	×	Mobile vs. non-mobile (indicated)	×	Mobile reviews(-) → Helpfulness
Grewal & Stephen (2019)	×	×	Mobile vs. non-mobile (indicated)	×	Mobile reviews(+) → Perceived review writing effort(+) → Credibility(+) → Purchase intention
Ransbotham, Lurie & Liu (2019)	×	×	Mobile vs. non-mobile (indicated)	×	Mobile reviews → (+)Affective, (+)concrete, (-)extreme → (-) Helpfulness.
Kim & Hwang (2020)	Rating valence and two-sidedness	×	Mobile vs. non-mobile (indicated)	×	Mobile reviews(+) → Emotional; Positive review(+) → Negative emotion(+) → Helpfulness; Negative review(-) → Positive emotion(-) → Helpfulness
This research	Emotionality, cognitivity, perceptual intensity, length and readability	Reviewer popularity	Mobile vs. Non-mobile (non-indicated)	Solicited vs. non-solicited	(1) Mobile reviewing → (+)Emotionality(+), (-)cognitivity(-), (+)perceptuality(+), (-)length(+), (-)readability(+) → Helpfulness. (2) Reviewer popularity strengthens the effects in (1), while review solicitation weakens them.