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User compensation as a data breach recovery action: A methodological replication and investigation of generalizability based on the Home Depot breach

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Abstract

Purpose - In the aftermath of data breaches, many firms offer compensation to affected customers to recover from damaged customer sentiments. To understand the effectiveness of such compensation offerings, Goode *et al.* (2017) examined the effects of compensation offered by Sony following the PlayStation Network breach in 2011. Although Goode *et al.* (2017) present key insights on data breach compensation, it is unclear whether their findings generalize beyond the context of subscription-based gaming platforms whose customers are young and experience substantial switching costs. To address this issue, we conducted a methodological replication in a retail context with low switching costs.

Design/methodology/approach - In our replication, we examine the effects of compensation offered by Home Depot in the aftermath of its data breach in 2014. Home Depot is the largest home improvement retailer in the US and presents a substantially different context. Data were collected from 901 participants using surveys.

Findings - Our results were consistent with the original study. We found that in retail breaches, effective compensation needs to meet customers' expectations because overcompensation or undercompensation leads to negative outcomes, such as decreased repurchase intention.

Originality/value - Our study provides insights into the effectiveness of compensation in the retail context and confirms the findings of Goode *et al.* (2017).

Keywords Data breach, compensation, Home Depot, methodological replication, generalizability

Paper type Research paper

1. Introduction

In 2018, the US government received reports of over 1,200 data breaches (ITRC, 2018), an equivalent of 3 data breaches per day. These data breaches cumulatively exposed over 440 million records of sensitive customer information (ITRC, 2018). Examples of high-profile data breaches include Sony, Target, Adobe, Home Depot, Facebook, and Marriott, to name but a few. The costs of data breaches can be enormous in terms of financial penalties and customer sentiment (Sherman, 2015). To recover from data breaches, firms frequently offer compensation to affected customers (e.g., Smith *et al.*, 2011; Bélanger and Crossler, 2011). Through compensation, firms seek and hope to restore customers' trust that determines customer satisfaction, reduce negative sentiments, and generate positive word-of-mouth that helps the firm to retain or even gain competitive advantage (Kau and Loh, 2006; Fang *et al.*, 2011; Jalilvand and Samiei, 2012; Al-Debei *et al.*, 2015). For example, when the Sony PlayStation Network (PSN) was breached on April 20, 2011, more than 77 million records of customers' personal and financial information was stolen (Richmond and Williams, 2011). In the aftermath of the breach, Sony offered free games, temporary access to premium network features, and 12 months free identity protection services as compensation to customers to avoid losing customers to competitors and possibly even gaining customers.

To understand the effectiveness of compensation to restore customer sentiment, Goode *et al.* (2017) examined the effects of Sony's compensation strategies on customers' perceptions of service quality, continuance intention, and repurchase intention. Based on their findings, Goode *et al.* (2017) proposed that compensation that can meet customers' expectations will positively affect customers' service quality, continuance intention, and repurchase intention (see Table 1, H1). Further, they suggested that, if the compensation exceeds or falls below customer

expectations, the positive effects of compensation that exceed customer expectations will be less than the negative effects of compensation that fall below customer expectations on service quality and continuance intention (see Table 1, H2). They also proposed a negative relationship between expectation disconfirmation and repurchase intention when the magnitude of expectation disconfirmation is large (see Table 1, H3). They found support for all three of their hypotheses.

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To add to the contributions of Goode *et al.* (2017), a next step is to examine the generalizability of their findings. That is because the Sony PSN is a rather unique case in that PSN is an online multiplayer gaming platform. On the PSN, customers accumulate social and cultural capital, form a sense of community and develop relationships with other players, as well as generate a sense of fantasy, satisfaction, adventure, excitement, mastery, and accomplishment by playing specific games (Hastings, 2015; Bourdieu, 1982; Lin *et al.*, 2015). These experiences are specific to the PSN and may not only foster a sense of identity with the network among customers, but also make it difficult and costly for customers to switch from the PSN to other gaming platforms. Given these idiosyncrasies of the PSN, customers might be willing to easily forgive Sony because high switching costs can increase customer loyalty (Yen, 2010), thereby distorting the effectiveness of Sony's compensation offerings that were reported in Goode *et al.* (2017). Thus, it will be important and interesting to examine if the findings of Goode *et al.* (2017) generalizes to other contexts in which customers are less involved with the target organization and have little to no switching costs. The generalizability of a model that is

confirmed in a published paper to new settings is regarded as the most important form of generalizability (Lee and Baskerville, 2003). This is because researchers are interested in the utility of theories in the real world where the actual settings may not be identical to the setting used in the original paper (Lee and Baskerville, 2003). This type of generalizability can only be supported by testing and confirming the model in the new setting (Lee and Baskerville, 2003). This point is further fortified by the contrasting viewpoint described by Alvesson and Kärreman (2007) who note that when a theory fails to generalize to a new context, the break down presents an opportunity for new knowledge creation.

Against this backdrop, we conducted a methodological replication of the Goode *et al.* (2017) study by examining the effects of compensation in the context of the Home Depot data breach. A replication study is an effective tool to examine the reliability, validity, and generalizability of the original study because it can control for sampling error, strengthen internal validity, generalize results, and verify the hypotheses of the original study (Schmidt, 2009; Fidler and Wilcox, 2018). Home Depot is a suitable case for replication as it, similar to Sony, compensated customers with 12 months free identity protection services after the data breach on September 18, 2014 that exposed 56 million credit and debit card information. However, the key contextual difference between Sony and Home Depot being that the latter cannot boast the same level of existing brand loyalty that helps examine whether the findings generalize to more general retail settings with low switching costs, thus allowing us to examine if a break down of the findings of Goode *et al.* (2017) occurs in this new context. To this end, our methodological replication, which used a method identical to the method in the original paper (Goode *et al.*, 2017), aimed to test the hypotheses of Goode *et al.* (2017) in this new context (Berthon *et al.*, 2002).

We found support for all three hypotheses. This leads to key contributions. First, our work contributes to the generalizability of the work of Goode *et al.* (2017) by demonstrating similar findings in a new setting. By doing so, our work offers insights that the differences in brand loyalty and value across the two settings do *not* present a boundary condition. Instead, our work supports their conclusions and thus contributes to their theory (Whetten, 2009). This in turn presents a critical step in the direction of broadening the potential impacts of their findings related to customer compensation to a more general, generic retail setting. Second, our findings offer practical implications for managers on how to effectively offer compensation in retail contexts. In retail, it is crucial for managers to evaluate the amount of compensation and expectations of customers. We found that, as long as the breached retail company provides customers with compensation that meets their expectations, compensation can restore customers' perceived service quality, continuance intention, and repurchase intention. Specifically, for customers' perceived service quality and continuance intention, the positive effects of compensation that exceeds expectation is smaller than the negative effects of compensation that falls below customers' expectations. Further, large differences in the positive (exceeding) or negative (falling below) expectations can decrease repurchase intention of customers.

2. Methodological replication

As one of three types of replications, a methodological replication applies the same theories, methods (such as survey design), measures, and analyses, with a key distinction being that the replication study context is possibly different from the original study context (Berthon *et al.*, 2002; Dennis and Valacich, 2014). The importance of context is emphasized by extant literature, as context can help us understand person-situation interactions and explain the applications of findings (Johns, 2006; Choi *et al.*, 2015). Further, context can change the way the

behavior and relationships occur or break down that in turn facilitates new theory development and knowledge creation (Johns, 2006; Choi *et al.*, 2015). Specifically, as it relates to data breaches, the broader conversation that organizational behavior can have different meanings depending on the situation is relevant (Johns, 2006). Thus, situations may exist in which the direction and sign of a relationship can be reversed, the relationship can change from linear to curvilinear, and/or the relationship can become stronger, weaker, or invalid (Johns, 2006). Consequently, relationships need to be examined in multiple contexts so as to understand the strength and generalizability of a theory or to understand its boundary conditions (Johns, 2006; Choi *et al.*, 2015; Hong *et al.*, 2014).

To this end, methodological replications have been widely applied in information systems research. For example, by using the methodological replication approach, Diegmann *et al.* (2018) examined the antecedents of online repurchase intention in Germany. They found contradictory findings of prior work of Fang *et al.* (2014) and provided alternative explanations. Similarly, Samtani *et al.* (2019) investigated the impacts of fear appeals on users' behavioral intention using a sample from an Amazon Mechanical Turk sample and their findings were different from that of Johnston and Warkentin (2010), which is the study they were replicating. Likewise, Ebrahimi and Martinez (2019) methodologically replicated Choi *et al.* (2015) and reported additional evidence that confirmed Choi *et al.*'s hypotheses related to users' responses to embarrassing exposures on online social networks.

In sum, methodological replications are useful for examining the generalizability and/or boundary conditions of theories and concomitant findings (Berthon *et al.*, 2002; Fidler and Wilcox, 2018). Methodological replications help in refining and strengthening theories, thus making important contributions to existing theory (Olbrich *et al.*, 2017; Whetten, 2009). The

successful replication of a study in a new context allows for generalizations, whereas failure suggests opportunities to modify or extend a theory so as to account for contextual factors (Dennis and Valacich, 2014).

3. Method

We performed a methodological replication of the Goode *et al.* (2017) study. In this methodological replication, we used the same survey design, measurement, polynomial modeling, and response surface analysis as the study of Goode *et al.* (2017).

3.1. Context

Goode *et al.* (2017) collected data from the Sony PSN, which is an online gaming service. We studied Home Depot, the largest home improvement retailer in the US. As Table 2 shows, in 2014, Home Depot recorded 1.44 billion customer transactions worldwide and \$78.81 billion in revenue (O'Connell, 2019; Macrotrends, 2019). Compared to the Sony PSN, customers of Home Depot face very low switching cost.

On September 2, 2014, the first announcement was made that Home Depot was breached (Clerix, 2014). On September 7, 2014, several financial institutions reported that they received Visa and MasterCard alerts that specific credit and debit cards were compromised in a data breach (Clerix, 2014). One day later, Home Depot officially confirmed that their payment systems had been hacked. More than 2,200 of its stores across the US and Canada were hacked through custom-built malware (Bose, 2014; Clerix, 2014). Home Depot emailed customers on September 19, 2014 to inform them that their credit card information had been stolen and offered them free identity protection services for 12 months as compensation (Franceschi-Bicchierai, 2014). Importantly, Home Depot offered less compensation compared to what Sony offered in the aftermath of the PSN breach. In total, between April and September 2014, information about

approximately 56 million credit and debit cards were stolen, rendering it the second-largest breach of a retailer to date (D'Innocenzio, 2014; Clerix, 2014). Table 2 further provides information on the breach examined in this paper and the Sony data breach studied in Goode *et al.* (2017).

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=== Table 2 about here ===
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3.2. Participants

Using Mechanical Turk, Goode *et al.* (2017) collected data from 557 participants in round 1 and 144 of those participants in round 2. Using a market research company, we collected data from 1,084 participants in round 1 and 901 of those participants in round 2 (Table 3). Similar to the original study, in both rounds, most participants were men. However, in contrast to the original study, our participants were older and had higher salaries. This pattern of differences was to be expected, as the customers of PSN are, on average, likely to be younger given that it is related to gaming compared to the average shopper at Home Depot. Thus, although half the participants in the original study were between 20 and 30 years old, the participants in our study were, on average, 33 years old. Analogously, although half the participants in the original study had an annual income lower than \$37,499 a year, our participants had an average salary of \$47,000.

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3.3. Design and measurement

Goode *et al.* (2017) used Mechanical Turk to collect data. We collected data using a market research company. Although our source of data collection was different, we used an identical survey instrument. Goode *et al.* (2017) employed a two-stage longitudinal online survey across two months, with expected compensation (round 1) being measured one week after Sony announced customer compensation and experienced compensation (round 2) being measured one month after Sony provided the compensation. We also used a two-stage longitudinal survey design, with time lags identical to the study of Goode *et al.* (2017). Like in the original study, for compensation, we used a three-item scale including general items and context-specific items (Table 4). For service quality, continuance intention, and repurchase intention, we adopted four-item scales. We controlled for age, gender, extrinsic motivation, intrinsic motivation, and habit of purchasing items at Home Depot.

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4. Data analysis and replication results

4.1. Preliminary analysis

Following Goode *et al.* (2017), we removed outliers, standardized residuals from regression equations, and used scale centering. The results of the factor analysis with direct oblimin rotation supported the validity of the scales measuring extrinsic motivation, intrinsic motivation, habit, experienced compensation, and expected compensation, with factor loadings from .71 to .84 and cross-loadings from .08 to .33 (Table 5). The descriptive statistics and correlations in Table 6 indicate that the mean of expected compensation was higher than the mean of experienced compensation. Similar to the original study, all three outcome variables,

service quality, continuance intention, and repurchase intention, were positively and significantly correlated with both experienced compensation and expected compensation.

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4.2. Hypotheses testing

Following Goode *et al.* (2017), we employed polynomial regression analysis to test our hypotheses. Specifically, as shown in Table 7, we used a modified assimilation-contrast model to test the effects on service quality and continuance intention, and a generalized negativity model to test the effects on repurchase intention.

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We used cubic equations to test the modified assimilation-contrast model for the outcomes of service quality and continuance intention because *F*-tests ($p < .01$) showed that the cubic equation explained more variance ($R^2 = .50$, $R^2 = .49$, respectively) than the quadratic equation ($R^2 = .31$, $R^2 = .37$, respectively) and the linear equation ($R^2 = .15$, $R^2 = .23$, respectively) did. For the outcome of repurchase intention, we used the quadratic equation because the *F*-test ($p < .01$) showed that the quadratic equation ($R^2 = .37$) better explained the

variance than the linear equation ($R^2 = .25$) did. Although the cubic equation explained more variance ($R^2 = .43$) than the quadratic equation, the cubic terms were not statistically significant.

H1 suggests that low expectation disconfirmation within the perceived zone of tolerance will be positively related to service quality, continuance intention, and repurchase intention. As shown in Tables 8 and 9, H1 was supported with all required tests being supported, which is consistent with Goode *et al.* (2017). H2 suggests that, for service quality and continuance intention, the negative effect of negative expectation disconfirmation that is large and outside the perceived zone of tolerance is larger than the positive effect of the same level of positive expectation disconfirmation. The results shown in Tables 8 and 9 demonstrate support for H2, which is consistent with Goode *et al.* (2017). H3 suggests that the direction of disconfirmation does not matter for the outcome of repurchase intention and the expectation disconfirmation that is outside the perceived zone of tolerance will have negative effects on repurchase intention. The results in Tables 8 and 9 showed that H3 was supported, with all required tests being supported, which is consistent with Goode *et al.* (2017).

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=== Table 9 about here ===
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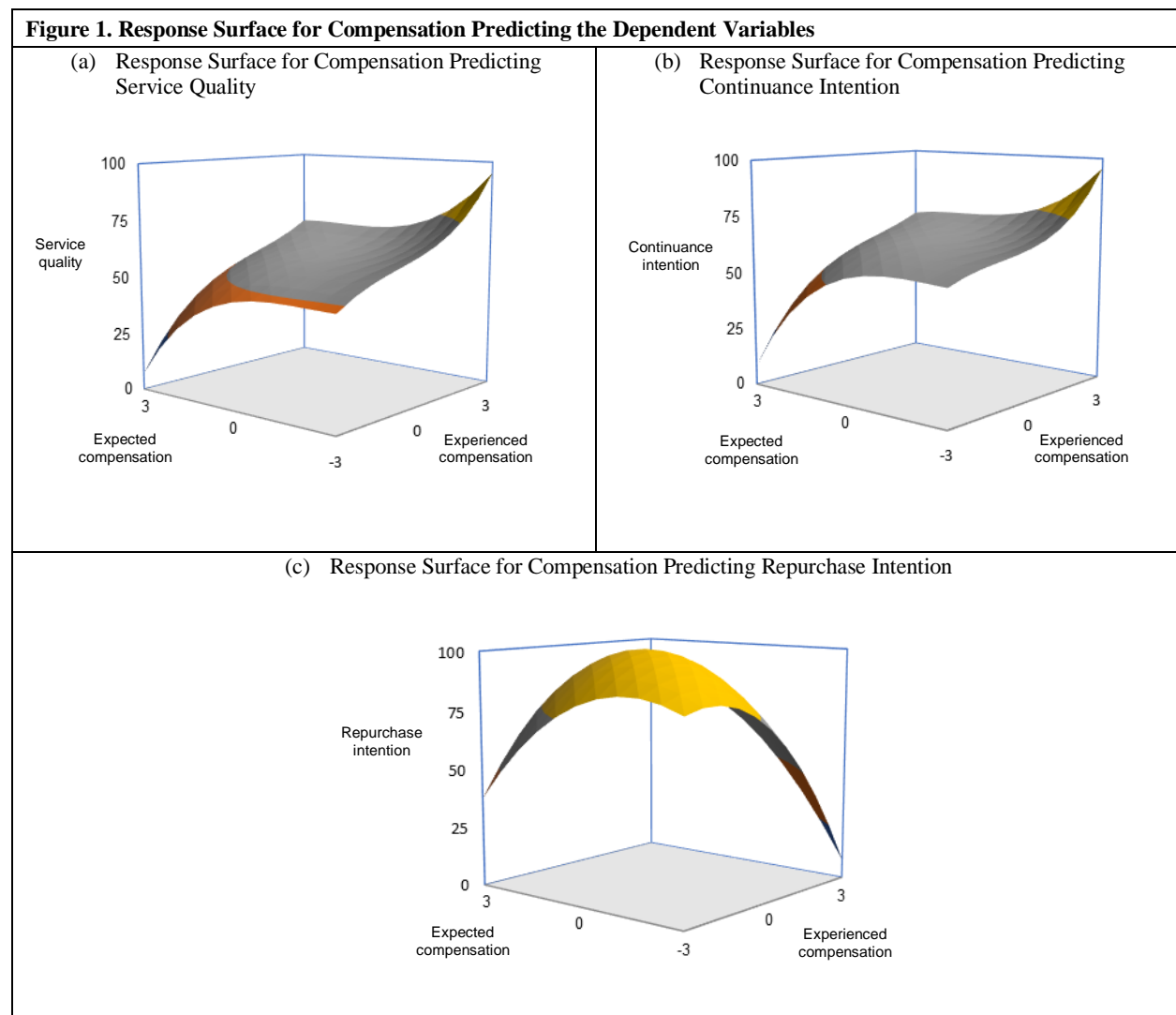
4.3. Response Surface Analysis

Modified assimilation-contrast model. We employed the modified assimilation-contrast model to examine the effects of compensation on service quality and continuance intention.

According to the results shown in Table 9, the cubic slope along the disconfirmation axis for service quality ($a_y^3 = 1.95, p < .01$) and continuance intention ($a_y^3 = 2.14, p < .01$) was significant and positive. The linear slope along the confirmation axis for service quality ($a_x = .64, p < .01$) and continuance intention ($a_x = .46, p < .01$) was also significant and positive. The test of the curvilinear slope along the confirmation axis for service quality (quadratic slope $a_x^2 = -.15, p < .05$; cubic slope $a_x^3 = .35, p < .01$) and continuance intention (quadratic slope $a_x^2 = -.24, p < .05$; cubic slope $a_x^3 = .24, p < .01$) was weakly supported, with the values for their quadratic slopes and cubic slopes being close to zero. Therefore, the modified assimilation-contrast model for service quality and continuance intention was supported. As Figure 1 shows, if the disconfirmation was large, the level and direction of disconfirmation determine service quality and continuance intention. When the disconfirmation was low, service quality and continuance intention were mainly influenced by expectations. When the disconfirmation was positive, service quality and continuance intention reached their highest levels and reached their lowest levels when the disconfirmation was negative. The absolute value of the decrease in service quality and continuance intention when there was negative disconfirmation was larger than the value of the increase when there was positive disconfirmation.

Generalized Negativity Model. We examined the relationship between compensation and repurchase intention using the generalized negativity model. The results in Table 9 show that the quadratic slope along the disconfirmation axis for repurchase intention ($a_y^2 = -2.14, p < .01$) was significant and negative, indicating that H3 was supported. The linear slope along the confirmation axis for repurchase intention ($a_x = 1.25, p < .01$) was significant and positive. The quadratic slope along the confirmation axis for repurchase intention ($a_x^2 = -.52, p < .01$) was negative and significant. Therefore, the generalized negativity model was supported. Figure 1

shows that when expectations met experiences repurchase intention was highest. The disconfirmation decreased the level of repurchase intention.



5. Discussion

This replication provides insights into the effectiveness of compensation in retail breaches. We found that effective compensation needs to meet customers' expectations because overcompensation or undercompensation led to negative outcomes. Specifically, overcompensation decreased repurchase intention of customers. This study also found that the

findings of Goode *et al.* (2017) generalized to a more generic, general retail context with low switching costs (Table 10).

Our replication of Goode *et al.* (2017) offers evidence in support of the generalizability of their model. That is, because the context of our replication study was substantially different from the context in the original study. First, as noted earlier, the switching costs for Home Depot customers are low compared to Sony PSN customers. Second, unlike Sony PSN that operates in more than 70 countries, Home Depot operates only in the US, Canada, and Mexico, thus adding a cultural nuance to this study. Third, Home Depot offered less compensation to customers than Sony PSN did. Specifically, other than 12 months free identity protection services offered by both Sony PSN and Home Depot, Sony PSN also offered free games and temporary access to premium network features. Fourth, we surveyed about twice as many participants than in the original study. Therefore, compared to the original study, our results have greater statistical power. Yet, we found compelling evidence that, despite the differences in brand loyalty and value, business models, compensation offerings, and participant demographics, the findings of Goode *et al.* (2017) held in the retail context that we studied.

Our findings thus strengthen the work of Goode *et al.* (2017) in two ways. First, our results showed that providing retail customers with appropriate compensation after data breaches is a suitable way to restore customer sentiment. Our findings show that the model and findings of Goode *et al.* (2017) generalize to a more general, generic retail context. Related to this, our findings disconfirmed the conjecture that results of Goode *et al.* (2017) are potentially constrained to a context with the type of customer lock-in and loyalty that characterizes Sony PSN. One possible explanation is that, although switching costs are lower in the retail context that we studied, retailers might have stronger levers by offering price discounts or promotions to

more price-sensitive customers (Chen *et al.*, 1998). Therefore, the possible effects of switching costs are offset, leading to our findings being in line with the findings of Goode *et al.* (2017).

Second, our results showed that the effects of compensation were not driven by the compensation itself, but rather customers' expectations. That is, despite Home Depot offering different and lower compensation than Sony PSN did, our findings were similar, thus suggesting that the underlying reason could be related to customers' expectations. Indeed, previous research has argued that customers in different industries have different expectations of compensation (Morse *et al.*, 2011). As Home Depot offered less compensation compared to Sony PSN, our results underpin the importance of matching expectations with experiences, rather than just offering more—i.e., we call for avoiding the trap of throwing more money at the problem.

Third, our findings also point out that geographic distribution and demographic characteristics do not impact the way customers respond to compensation. This may be because customers in any country and at any age have the same attitudes to expectation confirmation and disconfirmation. Consequently, our study suggests that the model and findings of Goode *et al.* (2017) provide a strong basis for understanding the effectiveness of user compensation in the aftermath of data breaches.

Finally, and most broadly, our general objective was to conduct a methodological replication (see Dennis and Valacich, 2014). However, as we noted earlier, replications have the potential to deliver substantial theoretical contribution because they have different possible outcomes that relate to generalizability (Lee and Baskerville, 2003), a contextual knowledge and related boundary conditions (Johns, 2006), and/or a more extreme situation of a possible break down of existing theory (Alvesson and Kärreman, 2007). In our case, we found that our findings closely mirrored that of (Goode *et al.*, 2017), thus supporting the robustness and generalizability

of their work. We hope that our work will spur continued investigations of various prior studies, with the different potential pathways to a theoretical contribution, as outlined above. One particularly important future direction in this area, especially to further generalizability and/or examine contextual conditions, are longitudinal investigations of the impact of a breach and compensation. The underlying role of time should be tackled not only methodologically, but also conceptually (see Venkatesh *et al.*, 2006).

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6. Conclusion

We conducted a methodological replication of Goode *et al.* (2017) to examine the effect of customer compensation on customer sentiment. We used the same method to test their hypotheses in a new context. This replication study showed that the findings from the original study were confirmed in a more general, generic retail context that had different characteristics (e.g., little brand loyalty and value and associated low switching costs) compared to the original study context. Our study provides evidence of the generalizability of the model advanced by Goode *et al.* (2017) and explains that the effects of customer compensation in the aftermath of the Home Depot data breach in 2014 were highly to what was found in the context of the Sony PSN data breach in 2011.

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Tables

Table 1. Hypotheses from Goode et al. (2017)	
H1	When the magnitude of expectation disconfirmation regarding compensation is small and within the perceived zone of tolerance, there will be a positive effect on the outcome variables of service quality, continuance intention, and repurchase intention.
H2	When the magnitude of expectation disconfirmation regarding compensation is large and outside the perceived zone of tolerance, the positive effect of positive disconfirmation on service quality and continuance intention will be significantly smaller than the negative effect associated with the same level of negative disconfirmation.
H3	When the magnitude of expectation disconfirmation regarding compensation is outside the perceived zone of tolerance, repurchase intention will decrease, regardless of the direction of disconfirmation.

Table 2. Comparison of Sony PlayStation Network and Home Depot Breaches		
Setting	Sony PlayStation Network	Home Depot
Service	Online multiplayer gaming service	Retailer
Switching cost	High	Low
Revenue	\$11.57 billion in 2014 (Statista, 2019)	\$78.81 billion in 2014 (Macrotrends, 2019)
Customers	More than 110 million registered customers (Moss, 2013)	1.44 billion customer transactions (O'Connell, 2019)
Year of data breach	2011	2014
Impact	More than 77 million customers' personal and financial information was hacked (Richmond and Williams, 2011)	Fifty-six million credit and debit cards information between April and September 2014 were stolen (Clerix, 2014)
Compensation	"Welcome Back" package including free games, temporary access to premium network features, and 12 months free identity protection services	12 months free identity protection services

Table 3. Demographic Information					
Demographic	Category	Round 1		Round 2	
		n	%	n	%
Gender	Men	618	57	514	57
	Women	466	43	387	43
Age (years)	Mean	32.80		34.71	
	SD	11.23		10.66	
Annual Salary	Mean	46,299		47,142	
	SD	11,280		10,903	

Table 4. Constructs and Survey Items for the Home Depot	
Items Used in Round 1	
Expected Compensation	A reasonable compensation for Home Depot being hacked would be 12 months of free credit monitoring.
	I expect to receive 12 months of credit monitoring as compensation for Home Depot being hacked.
	I expect to get a 12 months free identity protection service, if Home Depot gets hacked.
Items Used in Round 2	
Experienced Compensation	The 12 months of free credit monitoring offered by Home Depot following its data breach was a reasonable compensation.

	Once Home Depot was breached, I felt it was fair that Home Depot offered 12 months of free credit monitoring.
	A 12 months free identity protection service for all customers was obvious when Home Depot was breached.
<i>Items for Outcome and Control Variables (Identical in both data collection rounds)</i>	
Service Quality	Home Depot's customer services are of high quality.
	Home Depot's customer services are always functional.
	The performance of Home Depot's customer services is very reliable.
	The customer service of Home Depot is not good quality.*
Continuance Intention	I intend to continue considering Home Depot for my shopping needs.
	I want to continue, rather than discontinue, considering Home Depot as a possible option for my purchases.
	I predict I will continue to consider Home Depot for my shopping needs.
	I plan to continue considering Home Depot as a shopping option for my purchases.
Repurchase Intention	I intend to continue purchasing products from Home Depot.
	All things considered, I will purchase products from Home Depot over the next 12 months.
	Chances are high that I will continue purchasing products from Home Depot.
	I don't intend to repurchase products from Home Depot in future.*
Intrinsic Motivation	I find shopping at Home Depot enjoyable.
	The actual process of shopping at Home Depot is pleasant. [item dropped]
	I have fun shopping at Home Depot.
	I find it unenjoyable shopping at Home Depot.*
Extrinsic Motivation	Shopping at Home Depot helps me accomplish relevant tasks (e.g., building projects).
	Shopping at Home Depot improves my productivity on relevant tasks.
	Shopping at Home Depot enhances my effectiveness on relevant tasks. [item dropped]
	Overall, I find shopping at Home Depot to be useful and helpful.
Habit	Shopping at Home Depot has become automatic to me.
	Shopping at Home Depot is natural to me. [item dropped]
	I shop at Home Depot as a matter of habit.
	I do not shop at Home Depot habitually.*

Note. A seven-point Likert scale was used to measure all items (1 = strongly disagree...7 = strongly agree). * denotes reverse-coded items.

Table 5. Loadings and Cross-Loadings						
Construct	Item	(1)	(2)	(3)	(4)	(5)
Extrinsic motivation (1)	1	.80	.10	.33	.20	.30
	2	.79	.09	.32	.33	.18
	3	.77	.12	.20	.14	.19
Intrinsic motivation (2)	1	.24	.76	.13	.09	.09
	2	.22	.75	.08	.29	.08
	3	.16	.79	.20	.09	.12
Habit (3)	1	.21	.11	.84	.13	.33
	2	.21	.30	.80	.19	.20
	3	.19	.14	.77	.15	.20
Experienced compensation (4)	1	.19	.10	.11	.74	.13
	2	.17	.14	.33	.75	.25
	3	.29	.28	.12	.71	.23
Expected compensation (5)	1	.15	.20	.32	.33	.80
	2	.27	.20	.13	.18	.82

	3	.11	.30	.09	.10	.79
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Table 6. Descriptive Statistics and Correlations												
#	Variable	Mean	SD	1	2	3	4	5	6	7	8	9
1	Gender (1: women)	(see Note)										
2	Age	(see Note)		.13*								
3	Extrinsic motivation	4.87	1.28	-.38***	-.33***							
4	Intrinsic motivation	5.11	.73	-.47***	-.29***	.24***						
5	Habit	5.17	.51	-.53***	-.37***	.43***	.50***					
6	Experienced compensation	4.17	1.33	.21***	.23***	.17**	.19**	.24***				
7	Expected compensation	5.09	1.31	-.13*	-.19**	.19**	.28***	.27***	.15*			
8	Service quality	4.12	1.3	.17**	.24***	.15*	.13*	.34***	.40***	.34***		
9	Continuance intention	5.08	1.5	.21***	.22***	.25***	.28***	.40***	.43***	.40***	.29***	
10	Repurchase intention	4.18	1.62	.19**	.26***	.21***	.37***	.33***	.44***	.47***	.31***	.35***

Note. The distribution of gender (1 represents women) and age are as shown in Table 3. *p < .05; **p < .01; ***p < .001.

Table 7. Proposed models from Goode et al. (2017)	
Assimilation-Contrast Model	$Z = b_0 + b_1C_1 + b_2C_2 + b_3C_1^2 + b_4C_1C_2 + b_5C_2^2 + b_6C_1^3 + b_7C_1^2C_2 + b_8C_1C_2^2 + b_9C_2^3 + e$ Tests: Test 1: $a_y^3 > 0$ Test 2: $ b_6 , b_7 , b_8 , \text{ or } b_9 > 0$ Test 3: $a_x > 0$ Test 4: $a_x^2 = 0$ Test 5: $a_x^3 = 0$ Test 6: $a_y \text{ (negative disconfirmation)} = a_y \text{ (positive disconfirmation)}$
Generalized Negativity Model	$Z = b_0 + b_1C_1 + b_2C_2 + b_3C_1^2 + b_4C_1C_2 + b_5C_2^2 + e$ Tests: Test 1: $ b_3 , b_4 , \text{ or } b_5 > 0$ Test 2: $a_y = 0$ Test 3: $b_1 = b_2$ Test 4: $a_y^2 < 0$ Test 5: $a_x > 0$ Test 6: $a_x^2 = 0$ Test 7: $b_3 < 0; b_4 > 0; b_5 < 0$

Note. Z = Outcome variable (service quality, continuance intention); C_1 = Experienced compensation; and C_2 = Expected compensation; a_x = linear slope along confirmation axis; a_y = linear slope along disconfirmation axis; a_x^2 = quadratic slope along confirmation axis; a_y^2 = quadratic slope along disconfirmation axis; a_x^3 = cubic slope along confirmation axis; and a_y^3 = cubic slope along disconfirmation axis.

Table 8. Predicting Outcomes Using Compensation										
		First-Order Linear Equation			Second-Order Quadratic Equation			Third-Order Cubic Equation		
Dependent Variable	Predictors	R ²	B	SE	R ²	B	SE	R ²	B	SE
Service quality	Age	.15	-.14	.05	.31	-.12	.07	.5	-.08	.08
	Gender		.24***	.01		.17**	.02		.12*	.03
	EM		.17**	.01		.13*	.02		.1	.05

	IM		.19**	.01		.16**	.03		.12*	.04
	Habit		.26***	.02		.14*	.03		.13*	.04
	C ₁		.35***	.03		.51***	.03		.33***	.05
	C ₂		.44***	.04		.37***	.05		.31***	.07
	C ₁ ²					-.33***	.05		-.25***	.07
	C ₁ C ₂					.59***	.04		.41***	.05
	C ₂ ²					-.87***	.04		-.31***	.03
	C ₁ ³						.44***		.03	
	C ₁ ² C ₂				-.43***		.04			
	C ₁ C ₂ ²				.71***		.06			
	C ₂ ³				-.37***		.03			
Continuance intention	Age				.23	-.14	.08		.37	-.09
	Gender	.21**	.03	.14*		.04	.09	.06		
	EM	.12*	.02	.09		.03	.05	.05		
	IM	.19**	.02	.14*		.03	.11	.07		
	Habit	.27***	.03	.21***		.04	.15*	.05		
	C ₁	.55***	.06	.40***		.07	-.31*	.08		
	C ₂		.37***	.04		.44***	.05		.77***	.08
	C ₁ ²		-.33***	.03		-.22*	.06			
	C ₁ C ₂		.77***	.04		.71***	.03			
	C ₂ ²		-1.03	.07		-.73***	.04			
	C ₁ ³					.44***	.03			
	C ₁ ² C ₂					-.57***	.03			
	C ₁ C ₂ ²					.75***	.04			
	C ₂ ³					-.38***	.05			
Repurchase intention	Age	.25	-.23***	.02	.37	-.15*	.04	.43	-.09	.04
	Gender		.16**	.02		.11*	.03		.07	.04
	EM		.05	.05		.03	.04		.02	.03
	IM		.04	.05		.03	.04		.04	.04
	Habit		.13*	.02		.1	.05		.07	.06
	C ₁		.88***	.04		.64***	.05		.55***	.05
	C ₂		.56***	.06		.61***	.07		.57***	.06
	C ₁ ²		-.73***	.04		-.75***	.05			
	C ₁ C ₂		.81***	.05		.84***	.06			
	C ₂ ²		-.60***	.04		-.29***	.03			
	C ₁ ³					.08	.05			
	C ₁ ² C ₂					.15*	.03			
	C ₁ C ₂ ²					.13*	.02			
	C ₂ ³					.08	.07			

Note. C₁ = Experienced compensation; C₂ = Expected compensation. Control variables: Age, gender (1 represents women), EM (extrinsic motivation), IM (intrinsic motivation), and habit.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Table 9. Values of Slopes along Lines of Interest

Dependent Variable	Model	Confirmation Axis $C_1 = C_2$			Disconfirmation Axis $C_1 = -C_2$			Replication Summary	Original Summary
		a_x	a_x^2	a_x^3	a_y	a_y^2	a_y^3		
Service quality	Modified assimilation-contrast	.64	-.15	.35			1.95	Test 1: $a_y^3 > 0$ Test 2: $ b_6 , b_7 , b_8 $, or $ b_9 > 0$ Test 3: $a_x > 0$ Test 4: $a_x^2 = 0$ Test 5: $a_x^3 = 0$	Test 1: $a_y^3 > 0$ Test 2: $ b_6 , b_7 , b_8 $, or $ b_9 > 0$ Test 3: $a_x > 0$ Test 4: $a_x^2 = 0$ Test 5: $a_x^3 = 0$
Continuance intention	Modified assimilation-contrast	.46	-.24	.24			2.14	Test 6: a_y (negative disconfirmation) = a_y (positive disconfirmation)	Test 6: a_y (negative disconfirmation) = a_y (positive disconfirmation)
Repurchase intention	Generalized negativity	1.25	-.52		.03	-2.14		Test 1: $ b_3 , b_4 $, or $ b_5 > 0$ Test 2: $a_y = 0$ Test 3: $b_1 = b_2$ Test 4: $a_y^2 < 0$ Test 5: $a_x > 0$ Test 6: $a_x^2 = 0$ Test 7: $b_3 < 0$; $b_4 > 0$; $b_5 < 0$	Test 1: $ b_3 , b_4 $, or $ b_5 > 0$ Test 2: $a_y = 0$ Test 3: $b_1 = b_2$ Test 4: $a_y^2 < 0$ Test 5: $a_x > 0$ Test 6: $a_x^2 = 0$ Test 7: $b_3 < 0$; $b_4 > 0$; $b_5 < 0$

Note. C_1 = Experienced compensation; C_2 = Expected compensation; a_x = linear slope along confirmation axis; a_y = linear slope along disconfirmation axis; a_x^2 = quadratic slope along confirmation axis; a_y^2 = quadratic slope along disconfirmation axis; a_x^3 = cubic slope along confirmation axis; and a_y^3 = cubic slope along disconfirmation axis.

Table 10. Comparison of the Original and the Replication Study		
Differences	Goode <i>et al.</i> (2017)	Replication study
Setting	Sony PlayStation Network	Home Depot
Source of data	Mechanical Turk	Market research company
Sample size	557	1,084
Demographics of participants	About half of the participants are between 20 and 30 years old and with a salary of less than \$37,499	About half of the participants are between 24 and 45 years old and with a salary between \$36,000 and \$58,000
Modified assimilation-contrast	Supported	Supported
Generalized negativity	Supported	Supported
H1	Supported	Supported
H2	Supported	Supported
H3	Supported	Supported