The More, the Better?
Compensation and Remorse as Data Breach Recovery Actions – An Experimental Scenario-based Investigation

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Abstract. With the increasing number of companies actively collecting data, the number of data breaches has exploded. It can be observed that affected often discontinue their relationship with the company. In order to avoid this kind of response, companies should develop and deploy their own recovery strategies. In our paper, we examined the effectiveness of different recovery strategies geared towards retaining customer satisfaction immediately after a data breach. We examine a data breach of a fitness tracker that varies in severity and tests the recovery actions compensation and remorse. The results found that customer satisfaction depends on the severity of the data breach, while combining compensation and remorse together demonstrates itself as the best strategy for increasing customer satisfaction in almost all cases. However, it was also discovered that in case of a severe data breach, customer satisfaction is difficult to restore and in the end remorse has virtually no effect.

Keywords: data breach, recovery action, severity, customer satisfaction, fitness tracker

1   Introduction

In the age of smart watches and smartphones, customers have more or less accepted or are willing to share their data in exchange for the benefits of automated analysis, for example the self-monitoring of one's heart rate and tracking the amount of calories burned. The fact that personal data such as e-mail, age, gender and name are requested when interacting with such technologies or applications when being used for the first time is easily taken for granted by the customer. This extensive list of data entries makes up the basis for companies to understand the individual customer, personalize the applicable products or services for said customer and ultimately create a competitive advantage [1]. As the storage and analysis of customer data brings significant benefits to both companies and customers, the number of companies collecting such data is likewise increasing. As a consequence, the number of data breach incidents has increased and continues to increase [2]. For instance, in February 2018, the company Under Amour experienced a data breach for their fitness app MyFitnessPal, where personal data of 150 million user was affected [3]. Quite often devastating consequences can occur for the company after a data breach incident, such as damage to the firm's reputation and an overall impact on the firm's financial performance [4]. Affected customers frequently put an end to the customer-organization relationship when they learn about a data breach, or otherwise stop purchasing products and/or services from the company [5]. In order to counter a damaging backlash in the wake of a data breach, companies have to develop effective recovery strategies.

In our paper, we examine how a breached company should react and what kind of recovery actions should be considered when striving to maximize customer satisfaction in the aftermath of a data breach, with compensation and remorse being investigated as possible actions to take. An example for an effective reaction came after the data breach that occurred in July 2019 at the US bank Capital One. Immediately after the breach, the bank's CEO, Richard D. Fairbank, expressed his remorse to the press with the statement: "I am deeply sorry for what happened" [6]. Alongside the recovery action, the severity of the data breach is also taken into account in order to derive strategy indications regarding the behavior for companies in the event of a data breach. Therefore, our research aims to explore the following research question:

RQ: How can Recovery Actions positively shape costumer opinion after data breach occurrence?

To answer this question, we draw on the service failure literature and employ justice theory as the theoretical lens. We identify data breach severity as a contextual factor and investigate the effectiveness of remorse and compensation as two central recovery strategies. To test our research model, we created an experiment with a 2x2x2 between-subject design based on a data breach of a fitness tracker. We conducted this experiment with 406 users of fitness trackers at a sports event. Our study provides three main contributions: First, we empirically investigate how the use of recovery measures in the context of data breaches effects customer satisfaction.

Second, we compare two specific recovery actions, compensation and remorse, in terms of customer satisfaction. Third, we set the use of recovery actions in terms of the severity of a data breach.

2 Theoretical Background and Related Work

A data breach is a security incident where data is intentionally or unintentionally exposed to an unauthorized third party [7]. Recent research on data breaches and their disclosure has mainly focused on the after-effects of economic impacts on equity markets, share prices and the market value of an individual company. For example, Campbell et al identified a negative impact on a company's market value when the infringed data remained confidential [8]. Moreover, the severity of the various infringements results in different effects on the market loss [9] and the market valuation of the company concerned [10]. In contrast, a limited amount of evidence is provided by empirical analysis used to capture the impact of data breaches and thus provide limited insights into customer behavior [5]. Overall, most of the research focuses on developing and managing security policies to prevent data breaches, while at the same time little research is devoted to the recovery strategies taking place after data breaches occur.

2.1 Recovery Action Research

Due to the novelty of the topic, few studies specifically address data breaches [11], which is quite in contrast to the topic of service failures. As data breaches can be seen as electronically transmitted service failures that customers perceive as a disruption of the core service offered and a failure of the service process, the principles of service failures can hence be transferred to that of data breaches [5, 12]. As soon as customer information is violated, it endangers the privacy of customers, which can lead to a breach of trust [13]. Given this breach of trust, any data breach of customer information privacy can be considered a service failure, which can then lead to a loss for customer perception of service quality [14]. In order to deal with the situation after service failure, service recovery measures are derived via the efforts a company undertakes to process a customer complaint about a perceived service failure [15]. Therefore, it becomes crucial to examine customer satisfaction, as it is determined for the most part by service recovery actions [16].

Kelley and Davis (1994) show that service failures can vary in their severity [17] and have a direct impact on customer outcomes [18]. This causal relationship implies that the greater the severity of a service failure, the greater the impact on customer satisfaction [19]. Furthermore, Bitner, Booms and Tetreault (1990) demonstrate in their study that a company's response to a successful recovery should include four criteria: recognition, explanation, apology and compensation [20]. Recognition and explanation are usually covered by customer notification, as is the case with the data breach at myFitnessPal described above, where customers were informed by email and notification in the app [3]. In addition to the provided information, a company can

decide whether to apologize and/or offer compensation to the customer as a means of a recovery strategy.

Apologies are messages that include the admission of mistakes and remorse [21]. On a business level, the service provider apologizes and shows remorse for attempting to mitigate the negative impact of the service failure or restore its usefulness [22]. On the other hand, compensation can also be perceived as a form of admission in the context of service recovery [23]. It potentially implies an admission of guilt by the service provider, and thus increases the perception that the service provider had control over the failure of the service [24]. Since service failures or data breaches are often unavoidable and lead to customer dissatisfaction [25], research should provide the groundwork for how companies use and dispense compensation and remorse as strategies to address service failures/data breach incidents.

2.2   Justice Theory

Justice theory acts as the basic theoretical framework in recent service recovery research [1, 25–28]. Customers, for instance, who evaluate a company's response as fair, tend to be more satisfied in the actions of that company than those customers who evaluate the response as unfair [19], with fairness being perceived in relation to other parties or perspectives. This means the individual ratio between inputs and outputs is balanced with the other side's ratio [29]. Fairness or justice theory in general comprises three dimensions: distributive justice, procedural justice, and interactional justice [30]. Whereas distributive justice refers to the perceived fairness of distribution of resources or/and decision outcomes [29], procedural justice is conceptualized as the perceived fairness of the processes by which decision outcomes are made and how conflicts are handled [31]. As for interactional justice, it includes the treatment by which information and/or decisions are communicated [32]. Recovery actions may be affected by one, two or even all three of these dimensions [19].

Service failures and recoveries can be evaluated under the justice framework and affect the customer outcome. For instance, Gelbrich and Roschk assign compensation mostly to distributive justice, while at the same time it also influences procedural and interactional justice [33]. As service recovery actions appear, distributive justice can begin to mediate the relationship between procedural and interactional justice, while also leading towards ultimate recovery satisfaction [34]. Additionally, any compensation offered to affected customers mediates the distributive justice and affects the customer behavior of negative and positive emotions [35]. Prior work shows that compensation mediates distributive justice was positively related to satisfaction and procedural justice in the case of purchase intentions [36]. Remorse (resp. apology) assigns the same way, because it can be understood as a subset of compensation [33]. Furthermore, apologies can increase the interactional justice, which positively influences the customer satisfaction [37].

3   Hypotheses

To investigate the effects of recovery actions and the influence of the severity of a data breach, we formulate three hypotheses (Figure 1): First, based on the justice theory, we propose to investigate the impact of compensation on customer satisfaction, due to most dissatisfied consumers requesting a refund, replacement or repair when they issue a complain [26]. Walster et al. have shown how compensation such as these remain a vital strategy [38]. In addition, in relation to the distributive justice that deals with the elimination and compensation of failures and includes recovery action and compensation, as part [31], various studies have shown that distributive justice has a positive effect on customer satisfaction [36, 39, 40]. In the context of our study, it should therefore be examined whether compensation, as part of distributive justice, can also have a positive effect on satisfaction given these circumstances. Hence, we formulate our first hypothesis as follows:

H1: In the event of a data breach, an informative notification and compensation offered by the company leads to significantly higher customer satisfaction, rather than just an informative notification.

Secondly, we suggest that an apology given alongside information about the data breach has a positive effect on the satisfaction people feel when processing the event. Interpersonal relationships based on fairness have a positive effect on satisfaction after an incident [19, 41]. Therefore, it is argued that explaining and sharing emotions about the incident has a positive effect on customer satisfaction:

H2: In the event of a data breach, an informative notification including a remorseful statement and an apology yields significantly higher customer satisfaction, rather than just a statement by the company.

Finally, based on the idea that, in the context of data breaches, the severity of loss can be distinguished from basic personal data to sensitive information, we additionally aim to investigate the impact of severity of data breaches on customer satisfaction [11, 42]. The Breach Level Index shows that breaches which result in illegal access to a large amount of data have a substantially large impact on companies and their customers, whereas a breach with little data lost or compromised has a smaller impact by comparison [43]. In line with this discussion, we assume that the more sensitive the compromised data is from the customer's point of view, the more negative the impact on satisfaction will be:

H3: In the event of a data breach, misuse of less sensitive data (e-mail, etc.) yields significantly higher customer satisfaction than the misuse of more sensitive data such as live tracked personal data (GPS).
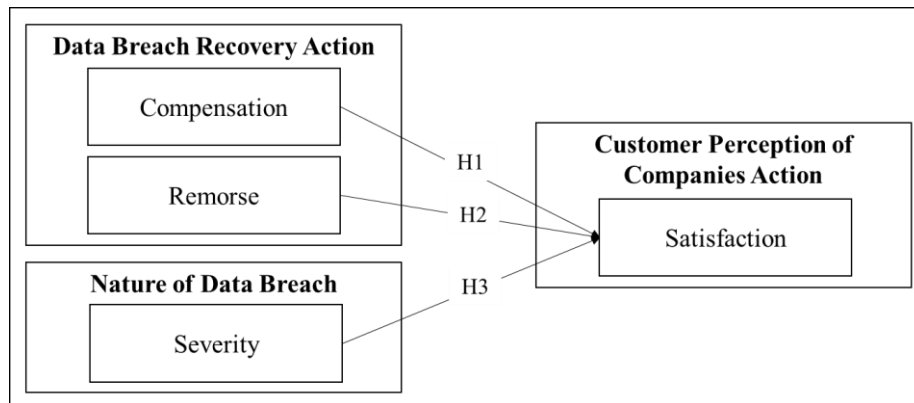
Figure 1. Research Model

4 Research Design

The hypotheses listed above were tested in an online experiment. In order to collect the independent variables by experimental manipulation, a vignette design with three independent variables was created, each varied at two levels (2x2x2 Design). As for the type of vignette design, a between-subject design was chosen where the participants were randomly assigned to one of the eight scenarios [44]. In order to investigate the effectiveness of the two countermeasures (compensation and remorse) and the severity of a data breach, a fictive data breach of a fitness tracker was described. In order to increase external validity and to ensure that the participants could relate to the fictive situation, only fitness tracker users were surveyed at a live sports event. In the following, we describe the data collection and the sample, in addition to the experimental design and the dependent measures.

4.1 Data Collection Procedure and Sample

The survey participants were asked to imagine they own a fitness tracker that they regularly use for running; this could be an app on their mobile phone or a wearable device like a smart watch. The user (participant) is informed that he/she has once provided the fitness tracker with personal data such as e-mail address, date of birth, height, weight, etc. In addition, the tracker collects GPS live data at each run to evaluate the running performance. Furthermore, participants had to imagine that they want to go for a run, but just before they begin, a message from the fitness tracker provider appears stating that some of your personal information has been breached by an unauthorized third party. All participants received exactly the same introductory information:

"Please imagine that you have a fitness tracker that you use regularly for jogging. This could be an activity tracker app (Runtastic, Nike Run Club, Strava, ...) or a fitness watch (Fitbit, Apple Watch, Samsung Galaxy Fit, ...). The Fitness Tracker

needs personal data from you once, such as e-mail address, date of birth, height, weight, running behavior, etc. In addition, every time you use the Fitness Tracker for jogging, the running route is tracked using GPS data, so that you receive an evaluation after the run. You now want to go running and receive the following message: "Dear user, we discovered a security incident in your Fitness Tracker account on June 25, 2019. Some of your personal data has been stolen by an unauthorized third party."

In the following, participants randomly received the second part of the providers' message concerning the experimental condition about the reaction of the provider with regard to the data breach. Each participant then receives the same questionnaire, including a manipulation check.

As for the experiment itself, each session and resulting questionnaire lasted about ten minutes per person. To ensure that the participants could put themselves into the described situation, fitness tracker owners/users were surveyed at a local sport event in Germany. After removing invalid answers, a sample size of n = 406 participants aged on average 29.42 years (SD = 9.80 years) and 42.4% women was collected. The participants exercise or do other athletic-related activities on average 3.3 times a week and go running on average 1.5 times a week. 65.5% of respondents say that they "occasionally" or more often (34.2% always) use a fitness tracker when doing sports.

4.2   Experimental Scenarios

We chose a 2x2x2 between-subject experimental design comprising two dimensions regarding the data breach recovery action of the provider: compensation (receive compensation/receive no compensation) and remorse (receive apology/ receive no apology), as well as one dimension regarding the data breach severity (general personal data/ live-tracked GPS data) as visualized in Table 1. Therefore, the experiment contained eight different scenarios, with each participant being assigned to one of those eight. Next, we introduced a data breach via a fitness tracker (text see above) and adapted the message of the provider to the customer who was therein informed about the resulting breach. We created eight different messages to our experimental conditions. In the first paragraph the severity of the breach was mentioned:

Low Severity: *"The data viewed by a third party includes your name, e-mail address, date of birth and number of runs. Unlike other affected users, your GPS data has not been collected. "*

High Severity: *"The information viewed by a third party includes your name, email address, date of birth and number of runs. In addition, all GPS data of your runs with date and time was stolen (i.e. your movement profile with the information when and where you ran with the app)."*

The second paragraph was only added in the case of remorse being a data breach recovery action.

Remorse: *"We deeply regret the incident and are endeavoring to address it to ensure that such inconvenience does not recur. We apologize for the inconvenience."*

The third paragraph contained the compensation offer and was only added in the case of a compensation scenario.

Compensation: *"As a compensation, we offer you to use our premium version free of charge for 3 months. (There are no further obligations. Your account will then automatically be switched back to the standard version.)"*

		Compensation			
		Neutral		*Compensation*	
Remorse	*Neutral*	**Control Case (low Severity)** *n=50*	**Control Case (high Severity)** *n=57*	**Compensation (low Severity)** *n=56*	**Compensation (high Severity)** *n=42*
	Apology	**Apology (low Severity)** *n=51*	**Apology (high Severity)** *n=44*	**Compensation and Apology (low Severity)** *n=52*	**Compensation and Apology (high Severity)** *n=54*

Table 1. Scenarios

4.3 Measures

After the experimental condition, all participants received the same survey. Specifically, we measured the construct satisfaction with the response of the fitness tracker provider after the data breach. The construct was measured with five items each, all with a 7-Point Likert scale. Besides demographic information (gender, age) and information with regard to personal fitness habits, the use of fitness tracker was also asked. Table 2 shows the construct with its items. We conducted an explanatory factor analysis to gain insight into the factor loadings, as well as Cronbach's alpha, composite reliability (CR) and average variance extracted (AVE) [45]. We dropped one item from the construct due to its factor loadings below .70 [46]. The construct exhibited a sufficient values for Cronbach's alpha (larger than .80), CR (larger than .80), and AVE (larger than .50) [47].
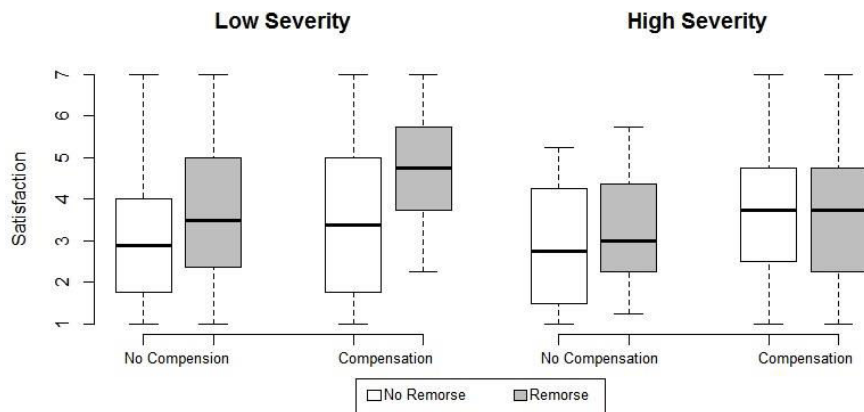
Constructs and items	Loadings
Satisfaction (α = .902, CR = .906, AVE = .662) *Source:* (Kantsperger & Kunz, 2010 [45])	
Overall, I am satisfied with the response of the fitness tracker provider to the incident.	.918
The reaction of the Fitness Tracker provider fully meets my expectations.	.888
Looking back, I perceive the response of the fitness tracker provider as a good experience.	.797
~~Looking back, the decision to use this fitness tracker was right.~~	~~.567~~
The reaction of the Fitness Tracker provider corresponds to my ideas.	.857

Table 2. Measurement of dependent variable

5   Results

The data from the survey were analyzed using descriptive statistics and a three-factor ANOVA to make simultaneous comparisons of several means [46] in order to investigate a better understanding of the relationship between the data breach recovery actions compensation (H1) and remorse (H2), as well as the data breach severity (H3). The analysis was performed with the statistics software R. All statistical tests were tested on a 10%-level of alpha.

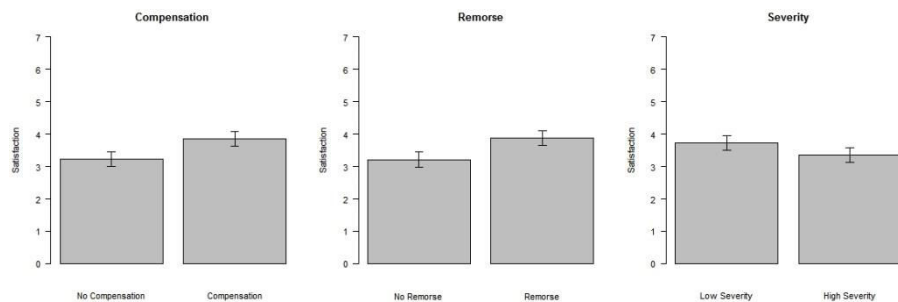**Figure 2.** Box plot of satisfaction for the eight conditions

First, a box plot diagram (Figure 2) was conducted to visualize the data distribution of the single groups. A Levene's test was conducted to check for homogeneity of variance (F = 1.68, p = .111). We find no evidence for heteroscedasticity in our data. Thus we conducted a three-factor ANOVA (see Table 3), to test the factorial design for significant differences between the groups for the construct satisfaction. The results of the variance analysis show that compensation and remorse, as well as severity have a main effect on the mean of the customer satisfaction. Besides that, there is a statistically significant interaction between remorse and severity $F(1, 398) = 3.82$, $p = .051$, alongside a significant three-way interaction between compensation, remorse and severity $F(1, 398) = 3.88$, $p = .049$. To further elaborate on the results, each affect will be presented separately.

	df	SS	F	p
COMP	1	40.50	17.09	**0.000***
REMO	1	41.20	17.38	**0.000***
SEV	1	12.90	5.43	**0.020***
COMP*REMO	1	0.20	0.10	0.751
COMP*SEV	1	0.20	0.08	0.783

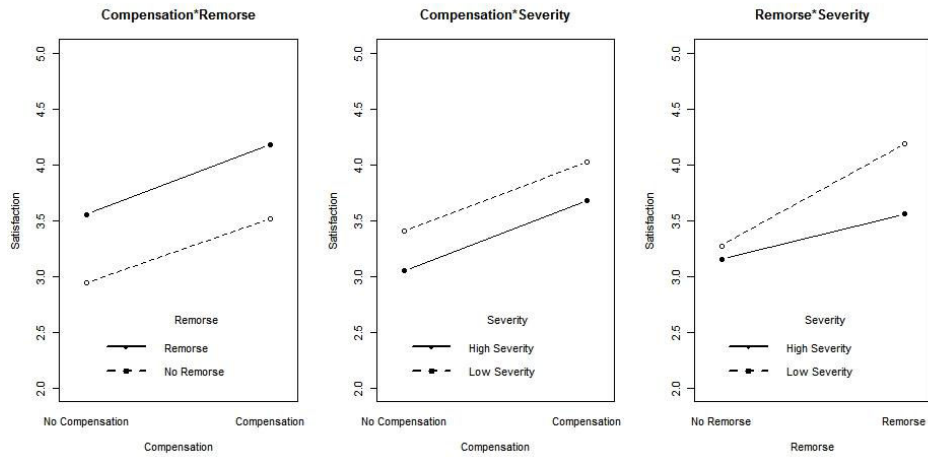|				
REMO*SEV	1	9.10	3.82	**0.051[+]**
COMP*REMO*SEV	1	9.20	3.88	**0.049***
Residuals	398	942.4		
Signif. Codes: *** < .001; ** < .01; * < .05; **+** <.1				
Compensation = COMP; Remorse = REMO; Severity = SEV df = degrees of freedom, SS = Sum of Squares, F = F-statistic, p = p-value				

Table 3. Three-factorial ANOVA

Main effects: There are three main effects, one for each independent variable. All three show a significant difference for the mean values of satisfaction among the two characteristics. The effect can be visualized (Figure 3) by depicting both condition of each factor with error bars indicating the 95% confidence interval.
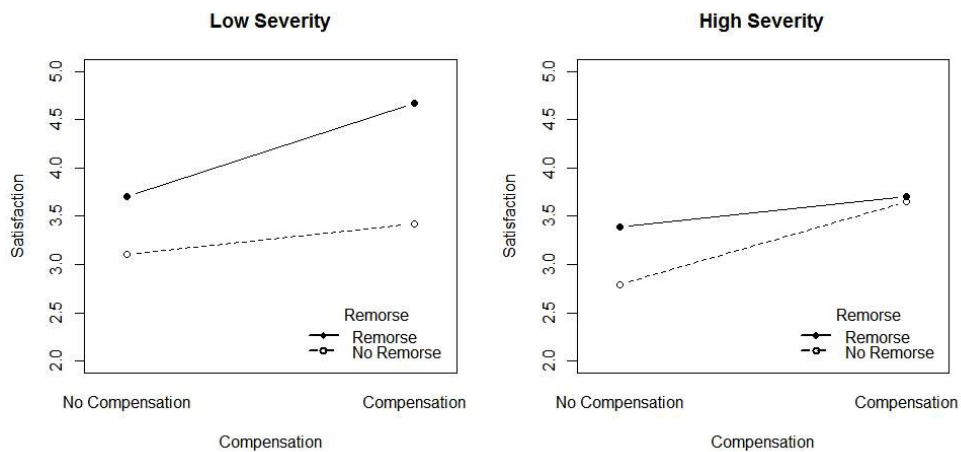

Figure 3. Error bars to depict main effects

Two-way effects: Besides the main effects, there are three two-way interactions which need to be considered. A statistically significant two-way interaction depicts a difference in the simple main effects of one of the factors as you change the levels of the other factors. The results show the two-way interaction between remorse and severity to be statistically significant. This means that there is a difference in mean values on remorse if the severity changes or vice versa. There is likewise a difference in the mean value of satisfaction on severity if remorse changes. This is visualized by an interaction plot (Figure 4).

Figure 4. Interaction plot for two-way interaction

Three-way effect: Finally, all three factors share one interaction term. The three-way interaction can be understood as the difference between the two-way interaction for a third variable (Figure 5). For visualization, it does not matter which of the three variables is selected, as the one whose different levels are represented by different diagrams, the difference is visible in each case. In our case this means that the interactions plot will not show parallel lines anymore if visualized for the characteristics of the third variable independently.

Figure 5. Interaction plot for three-way interaction

Based on the analysis, it can be concluded that customer compensation has a statistically significant effect on satisfaction. Therefore, H1 can be confirmed. In addition, an apology as a recovery action of the company in the event of a data breach

also leads to statistically significantly higher customer satisfaction. This validates H2. Finally, H3 can be confirmed since the misuse of less sensitive data leads to statistically significantly higher customer satisfaction than the misuse of heavier data in the case of a data breach. Therefore, all three hypotheses can be confirmed.

6 Discussion

This paper aims to contribute to the question of how recovery actions can positively shape costumer opinion after a data breach. Despite the huge practical relevance, so far, only little is still known on the impact of different recovery strategies for varying recovery contexts. In the following, we describe the implications, as well as the limitations of the work and future research approaches.

6.1 Implications for Data Breach Recovery Actions

Our experimental data show that recovery actions have a positive influence on satisfaction (Figure 3. left and middle). In addition, the severity of the data breach is reflected in customer satisfaction (Figure 3 right). Moreover, differences can be observed in the combinations of recovery actions and the severity of the data breach. Compensation and remorse generally have a positive influence on satisfaction, while it can be stated that there is an additive effect in the interaction of the two variables (interaction not significant, Figure 4 left). Hence, it can be concluded that in the case of a data breach, the highest satisfaction can be achieved with a combination of compensation and remorse. Considering the severity of the data breach, differences can be observed between the effects of the recovery strategy approach. Remorse has a greater effect with a low severity data breach. In contrast, the effect of compensation with regard to the severity is bivalent. If all three factors are considered together, it can be assumed that in the case of a low severity data breach, compensation alone has hardly any effect at all, whereas remorse has a positive effect, and together with compensation and remorse the highest customer satisfaction can be achieved. In the case of a high severity data breach, compensation and remorse have an individual effect. The interaction leads to almost the same customer satisfaction as compensation on its own. Thus, it can be concluded that in the case of a low severity data breach, a compensation and remorse recovery strategy should be chosen, while in the case of a high severity data breach, only compensation or remorse can be used as a means of recovery strategy. However, in the end the satisfaction cannot be increased as much when compared with the customer satisfaction after a low severity data breach.

6.2 Limitations and Opportunities for Future Research

The present work is not free of restrictions and offers possibilities for future studies. First, our experiment is based on a hypothetical data breach incident that the participants are supposed to empathize with. In the future, real data breaches should be investigated with participants truly affected upon result. Besides, it was not

considered, whether the participants of the study have experienced an actual data breach before. Future research should include this aspect and investigate if this effects the satisfaction with the recovery action. Second, there were two concrete recovery actions under consideration. A uniformly formulated apology and a defined compensation were given. In the case of minimal deviations of the predefined recovery actions, it cannot be excluded that a different effect on satisfaction would have occurred. In the future, different forms of compensation, as well as different formulations of apology should be tested with regard to satisfaction. Third, a similar problem occurs with severity. The authors have freely chosen the definition of lower and higher severity, which needs to be further investigated as to whether these categories exist in relation to the severity of a data breach. Fourth, satisfaction alone was examined as a dependent variable. Further constructs such as trust and loyalty could be considered in order to gain a comprehensive overview of the effects of recovery strategies.

7 Conclusion

In this study, we examined the impact of data breach recovery actions on customer satisfaction, taking into account the severity of data breaches in order to identify which recovery strategies work best for a data breach of either low or high severity. For this purpose, we conducted a 2x2x2 between-subject design with 406 participants. Our work provides important insights into the impact of recovery actions as a result of a data breach with varying severity on customer satisfaction. It was found that different strategies should be applied to different severities when attempting to achieve the highest possible level of customer satisfaction. In this way, we can complement the growing knowledge base about data breach recovery actions and identify and derive initial strategies for their future applications. Future research on recovery actions and practitioners can build and extend our results, eventually establishing a concrete approach to the most effective recovery actions possible.

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References

1.   Wan, L., Zhang, C.: Responses to trust repair after privacy breach incidents. J. Serv. Sci. Res. 6, 193–224 (2014).
2.   Kindervag, J., Holland, R., Shey, H.: Planning For Failure. Forrester Research, Cambridge (2015).
3.   Dickey, M.R.: Under Armour says MyFitnessPal data breach affected 150 million users | TechCrunch, https://techcrunch.com/2018/03/29/under-armour-says-

myfitnesspal-data-breach-affected-150-million-users/. (Accessed 10.07.2019)

4. Goel, S., Shawky, H.A.: Estimating the market impact of security breach announcements on firm values. Inf. Manag. 46, 404–410 (2009).

5. Goode, S., Hoehle, H., Venkatesh, V., Brown, S.A.: User Compensation as a Data Breach Recovery Action: An Investigation of the Sony PlayStation Network Breach. MIS Q. 41, 703–727 (2017).

6. Spiegel Online: Capital One: Hacker erbeutet Daten von rund 100 Millionen Bankkunden - SPIEGEL ONLINE, https://www.spiegel.de/wirtschaft/unternehmen/capital-one-hacker-erbeutet-daten-von-rund-100-millionen-bankkunden-a-1279583.html. (Accessed 0.8.07.2019)

7. Cheng, L., Liu, F., Yao, D.D.: Enterprise data breach: causes, challenges, prevention, and future directions. Wiley Interdiscip. Rev. Data Min. Knowl. Discov. 7, 1–14 (2017).

8. Campbell, K., Gordon, L.A., Loeb, M.P., Zhou, L.: The economic cost of publicly announced information security breaches: Empirical evidence from the stock market. J. Comput. Secur. 11, 431–448 (2003).

9. Morse, E.A., Raval, V., Wingender, J.R.: Market Price Effects of Data Security Breaches. Inf. Secur. J. 20, 263–273 (2011).

10. Gordon, L.A., Loeb, M.P., Zhou, L.: The impact of information security breaches: Has there been a downward shift in costs? J. Comput. Secur. 19, 33–56 (2011).

11. Aivazpour, Z., Valecha, R., Chakraborty, R.: The Impact of Data Breach Severity on Post-Breach Online Shopping Intention. ICIS 2018 Proc. (2018).

12. Bolton, Ruth, N.: A Dynamic Model of the Duration of the Customer's Relationship with a Continuous Service Provider. Mark. Sci. 17, 45 (1998).

13. Parasuraman, A., Zinkhan, G.M.: Marketing to and serving customers through the Internet: Conceptual frameworks, practical insights, and research directions - From the editor. J. Acad. Mark. Sci. 30, 286–295 (2002).

14. Parasuraman, A., Zeithaml, V.A., Malhotra, A.: E-S-QUAL a multiple-item scale for assessing electronic service quality. J. Serv. Res. 7, 213–233 (2005).

15. Grönroos, C.: New Competition in the Service Economy: The Five Rules of Service. Int. J. Oper. Prod. Manag. 8, 9–19 (1988).

16. Hart, C.W.L., Heskett, J.L., Sasser Jr, W.E.: The profitable art of service recovery. Harv. Bus. Rev. 68, 148–156 (1990).

17. Kelley, S.W., Davis, M.A.: Antecedents to customer expectations for service recovery. J. Acad. Mark. Sci. 22, 52–61 (1994).

18. Oliver, R.L., Swan, J.E.: Equity and Disconfirmation Perceptions as Influences on Merchant and Product Satisfaction. J. Consum. Res. 16, 372 (1989).

19. Smith, A.K., Bolton, R.N., Wagner, J.: A Model of Customer Satisfaction with Service Encounters Involving Failure and Recovery. J. Mark. Res. 36, 356 (1999).

20. Bitner, M.J., Booms, B.H., Tetreault, M.S.: The Service Encounter: Diagnosing Favorable and Unfavorable Incidents. J. Mark. 54, 71 (2006).

21. Fehr, R., Gelfand, M.J.: When apologies work: How matching apology components to victims' self-construals facilitates forgiveness. Organ. Behav. Hum. Decis. Process. 113, 37–50 (2010).

22. Bolkan, S., Daly, J.A.: Organizational responses to consumer complaints: An

examination of effective remediation tactics. J. Appl. Commun. Res. 37, 21–39 (2009).

23. Weiner, B.: Attributional Thoughts about Consumer Behavior. J. Consum. Res. 27, 382–387 (2001).

24. Bitner, M.J.: Evaluating Service Encounters: The Effects of Physical Surroundings and Employee Responses. J. Mark. 54, 69 (1990).

25. Kau, A.K., Loh, E.W.Y.: The effects of service recovery on consumer satisfaction: A comparison between complainants and non-complainants. J. Serv. Mark. 20, 101–111 (2006).

26. Morrisson, O., Huppertz, J.W.: External equity, loyalty program membership, and service recovery. J. Serv. Mark. 24, 244–254 (2010).

27. Hong, J., Lee, A.Y.: Feeling Mixed but Not Torn: The Moderating Role of Construal Level in Mixed Emotions Appeals. J. Consum. Res. 37, 456–472 (2010).

28. Yun, H., Lee, C.C., Kettinger, W.J.: Personal Information Breach as a Service Failure: Examining Relationships amng Recovery Efforts, Justice, and Customer Responses. In: International Conference on Information Systems (2012).

29. Adams, J.S.: Toward an understanding of inequity. Journal of Abnormal and Social Psychology. J. Abnorm. Soc. Psychol. 67, 422–436 (1963).

30. Tax, S.S., Brown, S.W., Chandrashekaran, M.: Customer Evaluations of Service Complaint Experiences: Implications for Relationship Marketing. J. Mark. 62, 60 (2006).

31. Leventhal, G.: What should be done with equity theory? New approaches to the study of fairness in social relationships. Soc. Exch. theory Adv. theory Res. London, Springer.

32. Bies, R.., Shapiro, D..: Interactional justice: The influence of causal accounts. Soc. Justice Res. 1, 199–218 (1987).

33. Gelbrich, K., Roschk, H.: A meta-analysis of organizational complaint handling and customer responses. J. Serv. Res. 14, 24–43 (2011).

34. Prasongsukarn, K., Patterson, P.G.: An extended service recovery model: The moderating impact of temporal sequence of events. J. Serv. Mark. 26, 510–520 (2012).

35. Chebat, J.C., Slusarczyk, W.: How emotions mediate the effects of perceived justice on loyalty in service recovery situations: An empirical study. J. Bus. Res. 58, 664–673 (2005).

36. Maxham, J.G., Netemeyer, R.G.: Modeling customer perceptions of complaint handlich over time: the effects of perceived justice on satisfaction and intent. J. Retail. 78, 239–252 (2002).

37. Wirtz, J., Mattila, A.S.: Consumer responses to compensation, speed of recovery and apology after a service failure. Int. J. Serv. Ind. Manag. 15, 150–166 (2004).

38. Walster, E., Berscheid, E., Walster, G.W.: New directions in equity research. J. Pers. Soc. Psychol. 25, 151–176 (1973).

39. Maxham, J.G., Netemeyer, R.G.: Firms Reap what they Sow: The Effects of Shared Values and Perceived Organizational Justice on Customers' Evaluations of Complaint Handling. J. Mark. 67, 46–62 (2003).

40. del Río-Lanza, A.B., Vázquez-Casielles, R., Díaz-Martín, A.M.: Satisfaction with service recovery: Perceived justice and emotional responses. J. Bus. Res. 62, 775–781

(2009).

41. Karatepe, O.M.: Customer complaints and organizational responses: the effects of complainants' perceptions of justice on satisfaction and loyalty. Int. J. Hosp. Manag. 25, 69–90 (2006).

42. Chakraborty, R., Lee, J., Bagchi-Sen, S., Upadhyaya, S., Raghav Rao, H.: Online shopping intention in the context of data breach in online retail stores: An examination of older and younger adults. Decis. Support Syst. 83, 47–56 (2016).

43. Stiennon, R.: Categorizing Data Breach Severity with a Breach Level Index. 1–3 (2013).

44. Atzmüller, C., Steiner, P.M.: Experimental vignette studies n survey research. Methodology. 6, 128–138 (2010).

45. Kantsperger, R., Kunz, W.H.: Consumer trust in service companies: a multiple mediating analysis. Manag. Serv. Qual. An Int. J. 20, 4–25 (2010).

46. Cohen, B.H.: Three-Way ANOVA. In: Explaining Psychological Statistics. pp. 688–746. John Wiley & Sons (2008).