

## How do employees learn security behavior? Examining the influence of individual cultural values and social learning on ISP compliance behavior.

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### Abstract

*Recent research on information security has recognized that cultural differences need to be considered, when explaining information security policy compliance behavior (ISPCB). There is also evidence that social mechanisms, such as social learning can influence ISPCB. What existing research has neglected is a relationship between such social mechanisms and their relation to employee's individual cultural values to explain ISPCB, whereby current research shows that ISPCB as well as social learning are culture-dependent. This study examines (1) the impact of social learning on ISPCB and (2) the influence of cultural values on social learning mechanisms and their association with ISPCB. Our sample, consisting of employees related to information systems, confirm a connection between the mechanisms of SLT and ISPCB and their cultural dependence. In conclusion, we defined implication points of our theoretical research and practical recommendations. A description of future research suggestions concludes this paper.*

### 1. Introduction

Due to the increasing importance of information technology (IT) in almost all business environments, the importance of ensuring information security to protect the organization and its resources is simultaneously increasing [1]. Current research indicates that human failure has been identified as a primary root cause for security breaches, and thus, employees' actions and behaviors have to be considered when designing information security countermeasures [2]. One measure for ensuring information security is information security policy (ISP). ISPs are defined as "a set of formalized procedures, policies, roles and responsibilities that employees must follow in order to protect and properly use their organizations' information and technology resources" [2].

Research has already used various theoretical lenses to explain ISP compliance behavior (ISPCB). Moody et al. (2018) showed that factors such as sanctions or fear and coping appraisals, among others, can lead to compliant behavior by condensing theoretical constructs from popular theories such as deterrence theory (DT), protection motivation theory (PMT) or planned behavior theory (TPB) in ISPCB [3]. Other studies use such theories to describe ISPCB, such as Trang and Brendel (2019), in a meta-analysis for DT and Somestad et al. (2015) for PMT [4] [5]. However, current research also suggests to additionally focus on the initial acquisition of ISP behavior as the process in which definitions (i.e., norms and attitude) are learned and used as the foundation for behavioral decisions in a specific ISP context [4]. Hence, that could be the root cause for compliant or not compliant behavior.

We can identify approaches in information security research in which this aspect has been taken up together with social mechanisms and the social environment of an individual and considered when analyzing ISPCB. Chul et al. (2020) show that social mechanisms within working groups influence compliance behavior [6]. D'Arcy and Lowry (2019) analyze the effect of co-workers- and peer-compliance behavior on ISPCB [7]. Other research takes theories such as the social learning theory (SLT), which provides, unlike other theories, a theoretical basis for explaining the initial behavioral adoption process and change through social learning and interaction [8]. This is particularly relevant because research emphasizes the difficulties of behavioral change after the routinization of behavior patterns [3]. The theory has already been used to explain ISPCB, e.g., to relate ethical leadership to compliance with ISPs or investigate whether positive ISPCB can be supported by considering social learning mechanisms [8] [9].

Despite research has shown repeatedly in the past that the effectiveness of theories to explain ISPCB also needs to take into account other factors, such as contextual differences by distinguishing different types

of offenses or cultural differences, especially in cases of international organizations [10] [11] [12]. With regard to the inclusion of cultural differences, there is already a variety of approaches to consider ISPCB from different cultural perspectives. Hovav and D'Arcy (2012), for example, analyze cultural differences in the effectiveness of DT regarding ISPCB and use two samples from different countries for their research [13]. Menard et al. (2018) choose the same approach and develop differences based on national cultures for PMT's effectiveness on ISPCB [14]. Looking at the goal in the practice of ensuring a high level of information security through effective measures with employees of international organizations, two open points in related research become apparent.

Firstly, unlike typical ISPCB research, where an individual is given a metric to measure his differences from other subjects, existing research on cultural differences and information security policy compliance behavior mostly focus on national cultural values, often derived from Hofstede's metric [15] [16]. The use of national cultural values for cross-cultural analysis is appropriate when the unit of analysis is a country (or culture is used as a context variable). But when a study examines the effect of an individual's cultural orientation, influences of cultural values should be measured at the individual level, as in the case of the adoption process of ISPCB through social learning, which considers the learning process of individuals. This can prevent national cultural values from being used as a basis for determining cultural effects at the individual level, and the results may be biased by a mismatch between cultural values imposed by national culture and individual cultural characteristics. This is especially important in today's world of heterogeneity and mobility of nations and global communication channels, as cultural boundaries become increasingly fluid [17].

Secondly, existing research shows that cultural differences need to be analyzed more accurately in ISPCB research. Current research on cultural influences on ISPCB does not yet explain the relation between social mechanisms and cultural values of an individual acting in a social environment. Although, we know that social interaction, social learning, and an individual's social environment influence behavior. This becomes particularly relevant when considering research from other disciplines, such as social sciences and psychology, where a strong connection between social learning and culture is assumed [18]. Moreover, this is relevant from a practical point of view, since measures to prevent ISP violations by e.g. using security education, awareness and training aimed to anchor a certain behavioral attitude of employees [19]. With this study, we address this research gap by measuring

cultural factors at the individual level and analyzing their influence on the SLT mechanisms' effectiveness on ISPCB. Thus, we make the following contributions to ISPCB research. Using the SLT and Hofstede's cultural dimensions measured at the individual level [17], we first identify similarities and differences of cultural influences at the individual level on ISPCB. Second, we analyze the influence of cultural dimensions on social learning mechanisms, as represented by SLT, and describe that the process of behavioral education is also culture-dependent and that culture does not only influence decision making in a given situation.

We used the SLT constructs introduced by Akers et al. (1995) and the items constructed by Yoo et al. (2011) to measure Hofstede's cultural dimensions at the individual level [20] [17]; we collected and analyzed data from Germany's professional environment using a SEM-PLS approach. Our analysis covers three aspects. In the first step, we check our data in the measurement model for quality and perform a common method bias test. After that, we analyze the path coefficients in our structural model to identify significant associations between SLT and ISPCB. In the end, we analyze the dependencies of the effects of SLT mechanisms on ISPCB through the Hofstede culture dimensions by analyzing the individual dimensions as moderating factors of SLT constructs on the dependent variable ISPCB.

The rest of the paper is structured as follows. In the second chapter, we look at the mechanisms of SLT and its use in information security research. We then discuss the importance of culture in our research area and describe the relationship to the use of SLT. In the third chapter, we develop the research model and present our hypotheses. In the fourth chapter, we demonstrate the study's results and go into more detail about the structural model, the measurement model and the moderating effect of the cultural dimensions on the mechanisms SLT. The study concludes with a discussion and an outlook on further research potential.

## **2. Theoretical background**

### **2.1. Social learning theory**

The SLT has its origins in social research and criminology [21]. It refers to cognitive, environmental, and behavioral factors that together can determine and influence the behavior of an individual [22]. The theory was first defined by Bandura (1977), arguing that human behavior is formed by a continuous interaction between the cognitive, behavioral, and environmental determinants of a person. Cognitive factors are the knowledge or expectations of an individual in combination with his or her attitudes [21]. Behavior-

influencing factors can be divided into the individual's abilities, practices, and self-efficacy [20]. Environmental factors influence an individual's behavior from an external perspective [22]. In its most commonly used form, SLT consists of four theoretical mechanisms: imitations (IM), differential reinforcement (DR), definitions (DE), and differential association (DA) [23].

IM is defined in terms of learning mechanisms in that an individual acquires social behavior by adopting the behavior of other people and using it to learn various things [8]. DR is influenced by the stimuli that act on an individual. This mechanism describes that behavior can be reinforced by positive incentives such as rewards [20]. Negative effects on behavior, on the other hand, have positive punishments or the loss of rewards. How a person behaves in a particular situation depends on past and present rewards or punishments for a particular behavior. In addition to the influence of punishments and rewards on an individual's behavior, they learn through interaction with groups to classify behavior as positive or negative and form their DE (norms, attitudes, orientations) from this [23]. These DE are characterized by verbal and cognitive behavior that can influence interaction with the social environment. The theory suggests that the more people perceive a behavior as positive, neutral, or negative, the greater the probability of the same attitude. The DA builds on these constructs and defines that especially close groups, such as the family or the work environment, significantly influence behavior because they are the primary source of reinforcement, promoting IM of behavior and forming normative definitions of an individual [21].

The theory has already been applied in some contexts in information security research to explain ISPCB. For example, Lembcke et al. (2018) investigated the explanatory power of SLT mechanisms on ISPCB for compliant communication between companies [8]. Warkentin et al. (2010) analyzed the informal social learning environment's influence on information privacy policy compliance [24]. Research from other disciplines shows that cultural factors can influence behavior and social learning on an individual level [18]. Social research has also found that cultural factors can influence the mechanisms of SLT. For example, culture is an influencing factor in the formation of DE and shapes an individual's social environment and thus his or her behavior [25]. In the field of information security research, we can refer to studies that identified that SLT mechanisms influence ISPCB, but the investigation of cultural influences on the early adoption process of ISPCB through social learning has not been considered in research so far.

## 2.2. Hofstede's cultural dimensions

The existing literature in information security shows us that culture is an essential dimension in influencing employees' behavior. On the one hand, there are approaches in information security research in which national culture was used as a measure for investigating cultural differences in ISPCB (Cram et al. 2019) and in which the cultural dimensions according to Hofstede were mostly used as a basis for differentiating cultures in information security research [13]. On the other hand, other approaches are not only based on the pure analysis of cultural differences in the effectiveness of theoretical constructs on ISPCB. Rather, they use the Hofstede cultural dimensions to explain differences in behavior, such as Hovav and D'Arcy (2012) [13]. They examined the influence of Hofstede's cultural dimensions on ISPCB with sanctions and analyzed differences between those in the USA and South Korea [13].

If we combine results from social research and the influence on culture with results from information security research and social learning mechanisms, we can deduce a connection that has not been considered much so far. Social research shows that cultural factors influence individuals' learning behavior and that differences in this can be influenced by cultural differences [18]. The connection between social learning mechanisms and the influence of culture on these mechanisms' effectiveness has not been considered so far. However, it could have important implications for the DE of e.g., learning models and the design of security education, training, and awareness (SETA) measures in practice [19].

With this study, we address the research gap mentioned above and lay the foundation for further analysis. Existing mechanisms suitable for measuring the expression of cultural dimensions at the individual level should be applied to investigate the influence of cultural dimensions on information security behavior at the individual level. Therefore, we adopt the measurement tools, according to Yoo et al. (2011). We use them because the authors employ the Hofstede dimensions in their operationalization of measuring cultural dimensions at the individual level. These are considered an established tool for representing and analyzing cultural values in our research area and making our results comparable to existing literature [26] [15]. This enables us to integrate our theoretical findings into ISPCB research better. Table 1 shows the Hofstede cultural dimensions and their definition [16].

**Table 1. Hofstede's cultural dimensions.**

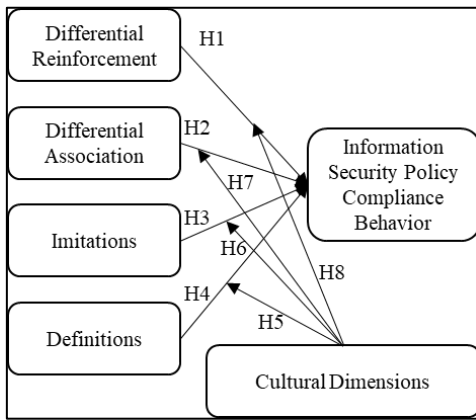
Dimension	Definition
Power Distance	The extent to which less powerful members of a society accept that power is unequally distributed.

Uncertainty Avoidance	The extent to which members of a society try to avoid insecurity.
Individualism / Collectivism	The extent to which the members of a society strengthen collective achievements and interpersonal relationships.
Long Term Orientation	The extent to which society members orientate themselves towards a long or short-term view of life.
MAS Dimension	The extent to which members of a society accept and adopt traditional gender and work roles.

### 3. Research method

#### 3.1. Hypotheses development and research design

From the theoretical mechanisms of SLT and cultural dimensions, according to Hofstede (2011), the hypotheses to fill our research gap can be formulated [16]. Figure 1 shows our structural model, including this underlying hypothesizes.



**Figure 1: Structural model.**

The first four hypotheses refer to the associations between the four previously explained mechanisms of the SLT with ISPCB. As described, DR is considered the ratio of expected or actual rewards and punishments resulting from an individual's behavior. According to the SLT, a predominance of positive feedback leads to positive behavior [24]. This suggests that DR has a positive impact on ISPCB (H1). DA refers to interaction and identity between different social groups. Social groups are defined an individual's environment, in which he or she derives the use or nonuse of a particular action by imitating models and social reinforcements [20]. Therefore, we argue that the mechanisms in DA have a positive impact on ISPCB (H2). Part of the DA process is the IM of other individuals' behavior within the social environment. Depending on the positive or negative behavior observed, IM can positively or negatively influence the behavior itself [22]. Therefore,

we argue that IM also has a positive impact on ISPCB (H3). DE, as a SLT mechanism, can also be applied to the ISPCB context.

Individuals learn through interactions in social groups to perceive the norms, attitudes, and orientations (so-called DE) of certain behaviors as good or bad [21]. Therefore, we assume that not only IM has an impact on the ISPCB, but also on the values and norms, underlying the social environment in which the SLT mechanisms are applied (H4). Table 2 shows the hypothesizes related to the effects of the social learning mechanisms on ISPCB.

**Table 2: Hypothesizes for SLT.**

Hypothesis	
H1	DR has a positive impact on ISPCB.
H2	DA has a positive impact on ISPCB.
H3	IM has a positive impact on ISPCB.
H4	DE has a positive impact on ISPCB.

People who are comfortable with a high degree of power distance (PD) accept a hierarchical order in our context within an international organization, in which everyone has their place in the hierarchy and does not require any further justification. Less PD is a sign of a fair distribution of power and the demand for justification for power inequalities. This characteristic suggests that a high PD can also reinforce learning processes with ISPCB, the higher the PD is since strict hierarchies regulate the influence of the social environment [16]. Therefore, DE is not questioned, and the given structures characterize learning processes based on DA and IM.

Uncertainty avoidance (UA) expresses how a person feels uncomfortable in a social group with uncertainty and ambiguity. A strong UA implies rigid codes of belief and intolerant behavior towards nonconforming behavior and ideas. A weak UA stands for a more relaxed attitude. Concerning the SLT, it can be argued that a high UA value increases the influence of social learning mechanisms on ISPCB. The higher the UA, the more the effect of compliant behavior and compliant ideas is perceived as a given in a person's social environment, which are perceived as correct and then lead to compliant behavior [27].

Collectivism (CL) can be described as a narrow framework in society or, in our context, in an organization. Within this framework, an individual can expect his members of a particular group to take care of him in exchange for unconditional loyalty [13]. Whether an organization or an individual is more collectivist or individualistic is reflected in the self-image in terms such as "I" or "we" [16]. Because of the connection between the social environment in a more collectivistically minded individual, we argue that CL, as opposed to individualism, reinforces the

mechanisms of SLT because of its genuine connection with an individual's social environment to ISPCB.

A low value in long-term orientation (LO) means that individuals prefer to maintain old traditions and norms, while social change is viewed with suspicion. A high LO value promotes thrift and effort in modern education to prepare for the future. A high LO value is seen as an indicator of a person's sustainable career planning in the professional context. This goes hand in hand with the acceptance of new technologies and associated methods and guidelines. In our context, it can be hypothesized that a high LO value positively favors the effects of SLT mechanisms on ISPCB, since the openness of new, long-term issues to them positively influences the attitude of these towards forms and thus learning mechanisms in a person's social environment [28].

A high degree of the MAS dimension (MAS) represents a social preference for achievement, heroism, assertiveness, and material rewards for success. Competition is in the foreground. A low level of MAS represents a propensity for cooperation, modesty, and caring quality [16]. The consensus within a group/organization in this context is in the foreground. In connection with the SLT mechanisms and their explanatory power of ISPCB, the characteristics of this cultural dimension lead to the hypothesis that a higher degree of MAS weakens the influence of SLT mechanisms on ISPCB. This is because of the tendency to compete weakens the social environment's influence and the learning effects underlying it. In contrast, the tendency to build consensus in the professional/social environment leads to the standard formation of normative values that require positive behavior towards ISPCB. Table 3 shows the hypothesizes related to the moderating effect of cultural dimensions on social learning mechanisms on ISPCB.

**Table 3: Hypothesizes about the moderating effect of cultural dimensions.**

Hypothesis	Moderating effect on ISPCB				
	PD	UA	CL	LO	MAS
DR→ISPCB (H5)	PO	PO	PO	PO	NE
DA→ISPCB (H6)	PO	PO	PO	PO	NE
IM→ISPCB (H7)	PO	PO	PO	PO	NE
DE→ISPCB (H8)	PO	PO	PO	PO	NE
<b>Note:</b> PO = positive; NE = negative					

We used the SLT constructs initially introduced by Akers (1995), adapted them to our context of ISPCB

behavior, and the items constructed by Yoo et al. (2011) to measure Hofstede's cultural dimensions at the individual level [20] [17]. The used items are listed in the appendix (see Table 7).

### 3.2. Data collection, sample characteristics, and common-method bias

Before carrying out the actual research, we conducted a pilot study. The questionnaire was sent to five academic experts for review, and a test run with 60 participants was then started, in which at least 36 results were complete and valid. The crowdsourcing platform Clickworker was used for data collection, taking into account the quality criteria defined by Lowry et al. (2016) [29]. Firstly, this means that only participants in Germany participated in our study. Secondly, their acceptance rate must have been higher than 90% when previously participating in other studies on the platform, and a certificate of German language skills must have been registered on the platform [29]. Finally, at the beginning of the study, there was a pre-selection of participants to select according to the participation criteria and meet the sample's desired characteristics. Respondents in this study were employed at the time of the survey, used a computer or laptop daily during their work, and their organization had an ISP. Additional attention tests (e.g., prompts to select a particular response) were used to avoid systematic response patterns. The subjects received €1.99 for successful and conscientious participation in the study.

In total, 767 persons took part in the study carried out in Germany, and after applying the quality criteria and accepting a fully completed survey, the analyzed sample contains 414 (56% validity rate) valid answers. The sample meets the quality criteria that the sample should be ten times larger than the number of maximum paths in our models [30]. The demographic characteristics of the respondents were taken from D'Arcy and Lowry (2019) [7]. The average age is between 30 and 35 years. The proportion of men is over 60%. 70% of participants have at least a bachelor's degree or higher. Only about 23% of the participants have a management position. The majority of the test persons work in a company with more than 1000 employees. A test for a common method bias was employed to check for a common method variance. We used the marker variable technique [31] and chose the respondent's outside activities as a theoretically non-interventional marker variable [7]. The highest variance that the marker shares with another construct is less than .05. The path coefficients showed no significant size changes between the constructs (> .01 and not significant). This result shows that there is no evidence for a common method bias in our study.

## 4. Data analysis and results

We used an SEM approach to test our model. We used the partial least squares method (PLS) because it has low sample size requirements and good prediction [32]. We used the software SmartPLS 3.0 for our analysis. In the first step, we evaluated the validity and reliability of the instruments in our sample. In the second step, we examined the data concerning our hypotheses. In the third step, we analyzed the structural model. Finally, we analyzed the moderating factors of the cultural dimensions on SLT variables' effect on ISPCB. We looked for significant effects in the path coefficients of the analyzed model, and in the moderating effects of Hofstede's cultural dimensions on the SLT constructs effects on ISPCB.

### 4.1. Measurement model

We have used established quality criteria for measurement models in IS research to validate our data's validity and reliability [30]. As quality criteria for our models convergent validity, we used the reliability of the individual items, the extracted average variance (AVE), and the criterion of reliability of composite constructs (CR). Due to low factor loads, we have not considered one item from the SLT models DE scale in our sample. We also have not adapted two items, each for CO, MAS, and for the LO for measuring the cultural dimensions. The factor loadings of the remaining items for the SLT model and the cultural dimensions were all above .70, indicating sufficient item reliability [33]. The AVE was higher than .50 for each variable used in each model, and the CR was higher than .7 [30]. In addition, the Fornell and Larcker criteria were used to confirm the discriminant validity. We showed that the AVE for each construct is higher than the variance shared with other constructs (see square root AVE as bold numbers in Table 4) [34]. Furthermore, the cross-loads show that all items have higher loads construct assigned to them than on the other constructs. The results of our applied quality criteria show that our measurement model is acceptable and reliable.

**Table 4: Measurement model.**

CNS	CR	AVE	DA	DE	DR	IM	ISPCB
<b>DA</b>	.957	.881	<b>.939</b>				
<b>DE</b>	.893	.808	-.386	<b>.898</b>			
<b>DR</b>	.898	.746	-.060	.360	<b>.863</b>		
<b>IM</b>	.970	.915	.642	-.493	.004	<b>.956</b>	
<b>ISPCB</b>	.937	.834	-.427	.649	.221	-.575	<b>.913</b>

Notes (also for following tables): CNS = Constructs. CR = Composite Reliability. AVE = Average Variance Extracted. The bold numbers on the leading diagonal are the square root of the AVE.

### 4.2. Structural model

The first step for the analysis of the influence of cultural dimensions on the constructs of SLT is the identification of significant effects of SLT variables on ISPCB. We have calculated the previously modeled path models using the PLS algorithm to estimate the structural model. Hence, we tested the applicability of the theoretical mechanisms of our selected variables of the SLT. To calculate the significance of the path coefficients, we used the bootstrapping method with 5000 bootstrap samples. Bootstrapping is the preferred method in information systems research, which is the recommended number. Additionally, it is larger than the sample size [30]. An overview of our significance levels of the individual path coefficients is shown in Table 5. Looking at the four analyzed mechanisms of SLT, different effects on ISPCB can be identified. For DA, a negative effect on ISPCB can be recognized (significant at .1), whereas no significant effect of DR on ISPCB can be pointed out. The effects of IM and DE are significant (significant at .01), whereas the effect of IM on ISPCB is negative and of DE positive. Furthermore, positive, significant effects can be identified for the control variables age (significant at .05) and firm size (significant at .01). With regard to the hypotheses on the effects of SLT mechanisms on ISPCB we can say that H4 is supported and H1-H3 is not. However, we could show a significant effect for H2 and H3, although, unlike expected, it is negative and not positive.

**Table 5: Results of the structural model.**

Model path	Path coefficient
<b>DR → ISPCB (H1)</b>	.054
<b>DA → ISPCB (H2)</b>	-.072*
<b>IM → ISPCB (H3)</b>	-.296***
<b>DE → ISPCB (H4)</b>	.298***

Note: \* significant at .1; \*\* significant at .05; \*\*\* significant .01

In order to compare the results with other research approaches on the basis of the explained variance, the research context must be taken into account [35]. In general, the limits of up to .32 are considered low, from

.33 moderate and from .67 significant for the explained variance of the endogenous variable. The R<sup>2</sup> in our model is .619 (.583 adjusted) and, thus, moderately below the .67 limit. Results from other studies show lower values, as in Lembcke et al. (2018), who examined the effectiveness of SLT in the context of ISPCB and inter-organizational information exchange (R<sup>2</sup> of .374) [8]. Warkentin et al. (2011) show similar results in the context of the influence of the informal social learning environment on information privacy policy compliance [24]. With regard to R<sup>2</sup>, our results can be classified similarly to the existing literature in this research area.

### 4.3. The moderating effect of cultural dimensions on SLT

The second step for the analysis is to identify the influences of the cultural dimensions on the constructs of the SLT. We used the previously modeled path model and used the previously mentioned cultural dimensions as moderating factors for the effect of the SLT constructs on ISPCB. We calculated the structural estimation model with the partial least square (PLS) algorithm and the significance of the moderating effects. We used the bootstrapping method with 5000 bootstrap samples. An overview of our significance levels of the individual moderating factors is shown in table 6. DA (significant at .05) and DR (significant at .01) are moderated by the cultural dimension LO. The theoretical construct IM is moderated by the cultural dimension PO (significant at .05). DE is negatively moderated by UA (significant at .1) and LO (significant at .05) and positively moderated by MAS (significant at .1). The effects of the cultural dimensions on the respective effects of the SLT constructs on ISPCB are shown in Table 6.

**Table 6: The moderating effects of cultural dimensions on SLT's associations on ISPCB.**

CNS	PD	UA	CL	LO	MAS
DA (H5)	-.018	-.027	.015	.124**	.045
DR (H6)	.034	.012	-.009	.075*	-.005
IM (H7)	.121**	.044	.022	-.023	.027
DE (H8)	-.058	-.104*	.015	-.112**	.083*
Note: * significant at .1; ** significant at .05; *** significant .01					

## 5. Discussion

When looking at the results based on our hypotheses, different effects of SLT on ISPCB and cultural dimensions' influence on them can be identified. We have measured the influence of SLT constructs on ISPCB with generalized items that do not relate to a specific behavior but measure general ISPCB. Compared to existing research on SLT mechanisms and their impact on ISPCB, similarities and differences can be pointed out. In other contexts, such as stated by Lembcke et al. (2018), which investigated the effectiveness of SLT in the context of information exchange between organizations, the IM and [8] DA constructs have a negative, significant effect on ISPCB. This also fits with the findings of Warkentin et al. (2011), which show that social conditions within the organizational setting influence a learning process with respect to policy compliance [24].

The impact of the cultural dimensions on the effects of SLT effects on ISPCB vary. In general, the cultural dimensions influence the SLT effects on ISPCB both positively and negatively. Our hypotheses can only be partially confirmed. PD only moderates the IM's effect positively and shows that a high acceptance of hierarchical order and its rules leads to a more substantial effect of IM, whereas IM is negatively associated with ISPCB. Another positive effect can be seen in the moderating effect of MAS on DE, contrary to the hypothesis above. Thus, a high degree of MAS increases the effect of DE on ISPCB instead of weakening it. Based on our results, we can also argue that UA, in contrast to the hypothesis above, moderates DE in its association with ISPCB negatively instead of positively as previously assumed. This suggests that a robust, rigid code of belief behavior towards nonconforming behavior and ideas weakens the effect of values and norms on ISPCB. The moderating effect of LO on SLT mechanisms is mixed. While a strong longterm orientation and planning strengthen the effect of DA on ISPCB, it harms the positive effect of the underlying values and norms (DE) on ISPCB.

Our results underline several crucial aspects of current information security research. Firstly, it is evident that cultural differentiation for measures against information security violations is also relevant for the process of behavioral development, e.g., illustrated here by mechanisms of social learning. Secondly, we could gain new insights into the influence of culture on ISPCB. In our model, we could show that those cultural aspects, the cultural dimensions in our case, not only influence ISPCB measured on a national level but also an individual level [13]. This implies, that research in this context

needs to do further analysis of cultural influences on ISPCB of individuals. This avoids that individual cultural orientations are measured and not equated with national culture. In this way, researchers can avoid the fallacy that country-specific relationships are interpreted as if they also exist among individuals [17]. Furthermore, we were able to show that not only theoretical mechanisms for explaining decision-making processes about an ISP Violation are culture dependent, but also that the process of behavioral formation and learning can be dependent on cultural factors, as shown in our case for social learning mechanisms.

Our results also provide implications for practice. If organizations try to develop measures, such as learning programs to ensure information security or implement measures to ensure ISPCB in their organization, they should be designed considering cultural differences.

In order to ensure an appropriate interpretation of our results, the following limitations of the study must be taken into account. Primarily, we measured the general ISPCB and did not specifically refer to one or more contexts. Consequently, our results cannot be generally valid, and it has not been shown that cultural differences can be context specific. Future research can take up this aspect and investigate differences in specific ISPCB contexts and the influence of culture on social learning mechanisms. More detailed differences and the inclusion or deepening of other factors, such as a sector-specific study or an analysis based on different educational backgrounds, and job positions are potential future research opportunities.

Additionally, we have used an exemplary culture for our study, where we measured the cultural dimensions at the individual level [16]. To learn more about cultural influences on the effect of social learning mechanisms on ISPCB, further, more diversified approaches to data collection should be pursued. Similarly, future research could deal with the analysis of similarities and differences of cultural influences at individual and national level on ISPCB.

Finally, our model is based on the basic SLT. Established extensions of the model or other theories to explain learning mechanisms or the adoption process of ISPCB could be part of future research. Despite these limitations, we see this study as a contribution to a closer empirical examination of cultural influences on ISPCB.

## 6. Conclusion

Current research on the analysis of ISPCB often shows the need to look at their results from different cultural perspectives. Existing studies in this field follow an approach of conducting cultural differences based on national cultural values and comparing different cultural samples. This study is the first to

empirically test cultural dimensions frequently used in information security research on an individual level, according to Hofstede (2011), and investigate their influence on social learning mechanisms to ensure ISPCB. The results of this analysis show that the measured SLT mechanisms impact ISPCB, and the cultural dimensions often used for cultural comparisons of ISPCB, according to Hofstede, show that compliant behavior is culture-dependent.

Moreover, we were able to show that this influence can vary depending on the cultural dimension at the individual level. Notably, both similarities and differences between the cultural dimensions' effects on SLT mechanisms can be observed. Thus, it can be seen that the cultural dimensions have different effects on the individual SLT mechanisms and that this effect occurs only sporadically and is not universally applicable along all constructs of the theory. Furthermore, negative moderating factors can be identified, e.g., for UA on DE or LO on DE, whereby the hypothesis was previously put forward since the effects tend to moderate the influence of DE on ISPCB positively.

In sum, future ISPCB research on the analysis of cultural differences should also consider the individual level, and more accurate analyses should be carried out. The specific components of cultural influences should be examined for their influence on mechanisms to ensure ISPCB.

The limitations of this work should be emphasized along with its theoretical contribution. In particular, an in-depth analysis of the influences of individual cultural dimensions on ISPCB in other contexts or subject to a different theoretical perspective offers a new deepening of our research approach.

Since this single study is the first step in measuring cultural influences at the individual level, we hope that future studies will follow our path and take a closer look at the influences of culture on ISPCB.

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## 8. Appendix

**Table 7: Items used in this study.**

	Item
Power Distance	People in higher positions should make most decisions without consulting people in lower positions.
	People in higher positions should not ask the opinions of people in lower positions too frequently.
	People in higher positions should avoid social interaction with people in lower positions.
	People in lower positions should not disagree with decisions by people in higher positions.
	People in higher positions should not delegate important tasks to people in lower positions.
Uncertainty Avoidance	It is important to have instructions spelled out in detail so that I always know what I’m expected to do.
	It is important to closely follow instructions and procedures.
	Rules and regulations are important because they inform me of what is expected of me.
	Standardized work procedures are helpful.
	Instructions for operations are important.

Collectivism	Individuals should sacrifice self-interest for the group.
	Individuals should stick with the group even through difficulties.
	Group welfare is more important than individual rewards.
	Group success is more important than individual success.
	Individuals should only pursue their goals after considering the welfare of the group.
	Group loyalty should be encouraged even if individual goals suffer.
Long-Term Orientation	How important is "Careful management of money (Thrift)" to you?
	How important is "Going on resolutely in spite of opposition (Persistence)" to you?
	How important is "Personal steadiness and stability" to you?
	How important is "Long-term planning" to you?
	How important is "Giving up today’s fun for success in the future" to you?
	How important is "Working hard for success in the future" to you?
MAS Dimension	It is more important for men to have a professional career than it is for women.
	Men usually solve problems with logical analysis
	Solving difficult problems usually requires an active, forcible approach, which is typical of men.
	There are some jobs that a man can always do better than a woman.
Diff. Re-enforcement	It’s likely that I’ll be caught doing it if I do not stick to the information security policy (ISP) procedures.
	I will be punished fast, if I do not stick to the ISP procedures.
	The expected punishment will be high, if I do not stick to ISP procedures.
Imitation	Because many colleagues in my team do not stick to information security policy (ISP) procedures, I do the same.
	Because many colleagues who are important to me do not stick to ISP procedures, I do the same.
	Because colleagues with whom I have a lot to do, do not stick to ISP procedures, I do the same.
Diff. Association	Many colleagues in my team do not stick to information security policy (ISP) procedures
	Many colleagues who are important to me do not stick to ISP procedures.
	Colleagues with whom I have a lot to do, do not stick to ISP procedures.
Definition	Because it contradicts my employer's rules, I would never break the information security policy (ISP) procedures.
	Generally, I follow the ISP procedures of my organization.
ISP Compliance Behavior	Since it is contrary to my personal values, I would never break the information security policy (ISP) procedures.
	I will comply with the requirements of the ISP procedures of my organization in the future.
	I will protect information and technology resources according to the requirements of the ISP procedures of my organization in the future.
	I will carry out my responsibilities prescribed in the ISP procedures of my organization when I use information and technology in the future.