

Why so skeptical? Investigating the emergence and consequences of consumer skepticism toward web seals

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ABSTRACT

Web seals have recently been subject to increasing skepticism from consumers. This study develops and tests a theoretical model of web seal skepticism by integrating multiple theoretical perspectives. We explore how web seal skepticism emerges and harms consumers' perceptions. The results of an online experiment with 757 participants demonstrate that consumer skepticism increases consumers' mistrust in information system providers and makes them feel less protected. Our findings also indicate that situational factors (web seal unreliability and seal authority incredibility) are significant antecedents of web seal skepticism and that consumers' inferences of providers' manipulative intent mediate the relationships.

1. Introduction

Web seals are visual signals that information system (IS) providers (e.g., those operating online platforms or offering digital services) embed in their websites to address consumers' concerns regarding data protection, security, or service fulfillment [43,52]. Internationally recognized web seals (e.g., TRUSTe's "Certified Privacy" seal and related IS certifications (e.g., ISO/IEC 27001 for information security management systems) have spurred the interest of IS providers and researchers in understanding the relevance and impact of web seals in digitally enabled environments. IS providers obtain the right to use a web seal by completing a third-party attestation process in which a neutral intermediary (i.e., a seal authority) examines providers' adherence to prescribed requirements, regulations, or standards [65]. Web seals are the longest and most pervasively used strategy for reducing consumers' uncertainty [1,66,96]. The adoption rates of web seals are steadily increasing, reflecting their continued relevance for online businesses [46].

Practitioners and researchers have long acknowledged the positive influence of web seals, such as signaling quality to consumers and increasing their trust and perceived assurance (e.g., [76,83,96]). However, recent years have witnessed numerous counterintuitive phenomena related to web seals that call into question the overly optimistic view that is predominant in practice and academia. First, because web seals

have become an increasingly popular marketing tool, a growing amount of consumer advice on the internet suggests that web seals can deceive consumers and therefore recommends that consumers should *not* trust seals blindly or at least that consumers approach them with a skeptical mindset and reasonable doubt (e.g., [38,97,106]). Second, a survey surprisingly finds that some consumers trust a website even *less* when it displays a web seal [113]. Recent research surveying consumers' perceptions supports these findings by revealing that consumers can become skeptical and doubt the qualities of an IS provider when seeing web seals on a website [76]. Finally, such negative consumer perceptions are fueled by fraudulent IS providers who use web seals as a "green-washing" mechanism (Heras-Saizarbitoria et al. [37]) and even fake them on their websites [6]. The growing skepticism among consumers may adversely influence the effectiveness of web seals so that consumers may no longer rely on the assurances they provide [76]—a trend that has been witnessed in related domains (cf. consumer skepticism about corporate social responsibility claims; [108]).

Web seal effectiveness has attracted significant research attention (for overviews, see [1,76]). Consumer-centered IS researchers have predominantly studied how web seals impact consumer beliefs and behavior and have offered theoretical explanations for why these effects occur (Appendix A). While providing valuable contributions, existing research has merely focused on the positive effects of web seals by analyzing whether the presence of a web seal leads to beneficial effects

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(increasing consumers' trust, perceived assurance, and purchase intention) but has neglected to examine unintended effects such as consumers' skepticism. This pervading optimistic bias about web seal outcomes is unfortunate for three reasons. First, consumer skepticism constitutes an intriguing but adverse phenomenon that manifests in various situations [45,108]. Second, consumer skepticism toward web seals is rising, as observed by media reports and prior research findings, demanding theoretical explanations to understand witnessed counterintuitive phenomena (cf. [6,37,76]). If web seals fail to achieve vital beneficial effects by evoking skepticism, IS providers' significant and recurring investments in web seals (usually between \$2500 and \$75,000 per year; [84]) might be wasted or ineffective in providing assurances to consumers. Third, we contend that understanding both the beneficial and unintended effects of web seals is critical for more complete theorizing in situations characterized by consumer uncertainty. We are calling on researchers to move from a singular view of web seals having only beneficial outcomes to a more integrated perspective on web seal outcomes that also considers the threat of unintended effects. Researchers can then add valuable explanatory and predictive power when theorizing about web seal outcomes.

Following recent calls for theoretical approaches that uncover web seals' unintended consequences (e.g., [6,76]), we examine the impact of consumer skepticism toward web seals by developing and testing alternative explanations of web seal effectiveness. We extend IS research by examining conditions that can bolster consumer skepticism toward web seals rather than leading to positive outcomes, such as increasing perceived assurances and trust. We ask two interrelated research questions: (1) *What are the antecedents of consumer skepticism toward web seals?* and (2) *How does consumer skepticism influence consumers' perception of IS providers?*

To answer these questions, we draw on the literature on marketing, which has focused on consumer skepticism toward ads, and on signaling theory as a theoretical lens. We develop a theoretical model that explains how consumer skepticism toward web seals emerges and how it impacts consumers' perception of IS providers. We test our model empirically using an online experiment with 757 participants.

The results of our study confirm that consumer skepticism toward web seals arises from situational factors associated with the web seal (i.e., perceived web seal unreliability and seal authority incredibility). In addition, our results show that skeptical consumers feel manipulated by IS providers, mistrust them, and feel less assured about using their systems. Our study, therefore, offers the first theoretical explanation for how consumer skepticism toward web seals emerges, shedding light on skepticism as a mechanism that helps explain current counterintuitive market observations. For practice, we raise IS providers' and seal authorities' awareness of consumer skepticism and support them in developing appropriate countermeasures.

2. Theoretical background

2.1. Summarizing the rise of consumer skepticism toward web seals

Web seals involve three key actors: IS providers, consumers, and seal authorities [71]. IS providers acquire web seals for the systems and services they offer to (potential) consumers. Consumers are individuals or organizations that rely on web seals to reduce their uncertainty concerning the qualities and features of a system and its provider. An essential characteristic of web seals is that seal authorities act as independent intermediaries offering the web seal and performing corresponding attestations. Seal authorities are not directly involved in the relationship between IS providers and consumers. They facilitate the provisioning of systems and services by validating the qualities of an IS provider and its IS that consumers cannot observe directly. Typically, seal authorities evaluate compliance with regulatory or industry requirements. This compliance attestation process involves, among other things, evaluating security measures, interviewing employees, or

conducting on-site assessments of the computing infrastructure and organizational processes [65]. Seal authorities can also deter or punish IS providers' inappropriate behavior by enforcing monetary penalties or revoking a web seal.

IS providers most commonly adopt web seals (refer to Fig. 1 for prominent examples) to achieve three key outcomes: (1) increasing consumers' *perceived assurance* (i.e., consumers' perception of the likelihood that the IS provider protects their confidential information and that it applies proper security measures to achieve such protection effects; [50]); (2) fostering consumers' *trust perceptions* (i.e., consumers' perceptions of the IS provider's competence, benevolence, and integrity; [87]), and (3) strengthening consumers' *system usage intention* [1,76].

Web seals are a prominent mechanism for reducing consumers' uncertainty and achieving these beneficial outcomes. However, the recent past has revealed increasing skepticism toward seals among consumers. Consumer reports and blog posts (e.g., [38,97,106]) and institutional and governmental reports urge consumers to be cautious about web seals. For example, the European Consumer Centres Network [23] revealed issues with web seals, including the malicious use of seals, limited information on seals, and a lack of means to assess their authenticity. Recent web seal scandals have further strengthened consumers' skeptical views toward web seals. For example, in the case of TRUSTe, a well-known seal authority that provides web seals focused on privacy assurances, the U.S. Federal Trade Commission fined the seal authority \$200,000 for allowing more than 1000 websites to display the web seal without adequately assessing whether these websites indeed met the required privacy standards [85]. These observations in practice are backed by recent research suggesting that consumer skepticism can dampen the effectiveness of web seals [76] or discussing similar controversies and challenges in the context of novel data protection seals [6].

Despite practical evidence on the rise of skepticism, the emergence and consequences of consumer skepticism toward web seals remain insufficiently understood in IS research that has overly examined the beneficial outcomes of web seals (Appendix A). We posit that two methodological design decisions have encouraged prior studies to draw positive associations between web seals and outcomes. First, prior studies deliberately selected web seals as beneficial institutional means to increase consumers' perceived assurance, trust perceptions, or usage intention but neglected to control for potential drawbacks or unintended effects of seals. Second, studies often relied on specific web seal manifestations and manipulations that might have more strongly prompted positive responses among study participants, that is, using well-known and reputable web seals (e.g., TRUSTe, BBBOnline) and introducing them in surveys and experiments in a positive manner but neglecting to consider less credible, unknown, or novel web seals. To our knowledge, web seal research has not explicitly tested the assertion that skeptical consumers disbelieve in web seals, leading to harmful outcomes.

To address the shortcomings in the existing IS research on web seals, we draw on related research that has already examined how consumers interpret similar persuasion messages (e.g., advertising claims) and why consumers become skeptical about such messages, providing us with the means to conceptualize consumer skepticism toward web seals.

2.2. Conceptualizing consumer skepticism toward web seals

Skepticism generally refers to a person's tendency to "doubt, disbelieve, and question" a persuasive message, such as advertising, promotions, or public relations ([108], p. 1832). Skepticism has its roots in the persuasion knowledge model (PKM) [30]. The PKM proposes that when consumers encounter a persuasive message from an agent, they rely on three (interacting) knowledge structures to elaborate on the message and determine how they react to it: consumers' (1) topic knowledge (e.g., beliefs about the product or service that consumers are persuaded to buy), (2) agent knowledge (e.g., beliefs about the traits, competencies, and motives of the agent), and (3) persuasion knowledge



Fig. 1. Example web seals on websites.

(e.g., knowledge about the tactics used by agents to persuade; [30]). For example, many consumers know “that advertisers often use babies, puppies, or beautiful models to appeal to emotions” ([29], p. 3). Persuasion knowledge structures enable consumers to (subconsciously) recognize and analyze the persuasion message and then select and execute effective coping mechanisms [30]. Skepticism is a prominent cognitive coping mechanism and outcome of activating these knowledge structures [44].

Researchers distinguish two types of skepticism, *dispositional* and *situational skepticism*. Dispositional skepticism relates to skepticism as a more stable and enduring personality trait, consistent across different situations, and reflects that individuals have different predispositions to skepticism [27,92]. Conceptualizing skepticism as an individual trait explains why some consumers are, per se, more skeptical about persuasive messages than others. In contrast, situational skepticism is a temporary state of skepticism that arises from situational factors [108], such as specific advertising statements [5,27]. To this end, situational skepticism is tied to the characteristics of a context that individuals can perceive and varies depending on the situation [89]. For example, while a consumer might be less skeptical in person (i.e., low dispositional skepticism), the consumer might be highly skeptical about a particular IS provider due to doubtful service descriptions (e.g., claiming to achieve 100 % system availability).

In this study, we align with the notion of situational skepticism because we consider web seals to be context-specific signals that IS providers can send to consumers to inform them about a successful third-party attestation of IS providers’ systems and services. A consumer may observe a web seal on an IS provider’s website when searching for systems and services online and then draw inferences from that seal. Understanding the causes and consequences of situational skepticism toward web seals enables IS providers and seal authorities to mitigate skepticism more effectively. In contrast, influencing consumers’ dispositional skepticism would be much more difficult because of its stable and trait-like nature [89].

Notably, situational skepticism differs from related conceptions of consumer traits and beliefs, including cynicism, suspicion, trust, mistrust, distrust, and credibility (Table 1; [104,108]). In particular, skepticism comprises the notion of mistrust but also resembles doubt and uncertainty toward the persuasive message [11,26,45]. “Mistrust is a distinctive member of the trust family” ([47], p. 1178). Consumers’ mistrust reflects doubt and ambivalence about the trustworthiness of the seal authority [18,47,68]. Mistrust resembles an absence of trust but is not based on a settled or confirmed belief that the seal authority is trustworthy or not. Consumers who mistrust a seal authority are more cautious, watchful, and questioning concerning the actions and claims of a seal authority, leading to a continuous assessment of its trustworthiness [47,68].

Skeptical consumers tend to question all aspects of the situation they are facing, including the motives of a persuasion agent and the authenticity of claims they make [89]. Extant research has therefore studied two facets of situational skepticism: individuals’ (1) *disbelief in the persuasive message* and (2) *mistrust in the persuasion agent* (i.e., the

Table 1
Overview of related constructs.

Construct	Definition	Differences from situational skepticism
Cynicism	Consumers’ stable disbelief in other people’s “motives, faithfulness, and goodwill” ([48], p. 6).	Cynicism constitutes an enduring personality trait that occurs when other people are seen as acting based on selfish motives, whereas situational skepticism depends on a context [89,108].
Suspicion	Consumers’ belief that an agent’s behavior reflects ulterior motives and that the agent attempts to hide something from the consumers, which would adversely impact consumers’ perceptions of the agent [25].	Skepticism resembles doubt and uncertainty, but suspicion relates to a consumer’s act of willingly suspecting an agent of doing something wrong, given specific evidence. For example, consumers may become suspicious when their expectations have been violated or recognize cues that suggest agents’ ulterior motives (e.g., being warned about the agent’s incredibility; [25,63]).
Trust (mistrust)	Consumers’ positive beliefs in an agent’s competence, benevolence, and integrity [87].	Skepticism comprises the notion of mistrust that resembles an absence of trust but is not based on a settled or confirmed belief that an agent is trustworthy or not [18,47,68]. Whereas trust in agents mostly leads to positive outcomes (i.e., trusting intention and behavior; [87]), mistrust leads consumers to be more cautious, and they instead assess the agent before drawing a conclusion about its trustworthiness [47,68].
Distrust	Consumers’ settled negative expectations about an agent’s undesirable attributes or actions [69].	If consumers distrust an agent, they fear an agent’s actions and have the desire to protect themselves [69]. Consumers’ distrust reflects a settled belief, whereas mistrust reflects ambivalence about whether to trust or not trust an agent [18].
Credibility	The extent to which an agent as a whole is seen as believable [24].	“Skepticism and credibility are two poles on a continuum, with disbelief/mistrust on one side and belief/trust on the other” ([44], p. 896–897). This study focuses on skepticism to examine web seals’ harmful outcomes on consumers’ perceptions of IS providers.

Note: (cf. [104,108]).

message source; [11,26,45]). Contextualizing skepticism, we propose that consumers’ situational skepticism toward web seals comprises both facets, because consumers harness their topic and agent knowledge. First, skeptical consumers may disbelieve the content of the web seal,

that is, the assurance claims made by the seal authority [44,93]. When accessing topic knowledge (e.g., their knowledge about web seals, IS providers, and offered IS; [30]), skeptical consumers may question the truth of assurance claims underlying a web seal [11,89]. Second, consumers may be skeptical about the persuasive intent and motives of the seal authority that issues the seal and performs the provider attestations [11,27] because of consumers' agent knowledge [30].

In addition to relying on their topic and agent knowledge, skeptical consumers access their persuasion knowledge when faced with a persuasion attempt [14,60]. Accessing persuasion knowledge supports consumers in evaluating a web seal's appropriateness and the extent to which an IS provider's ulterior motives involve the intent to manipulate with the seal [14,30]. If consumers feel that the IS provider has tricked them into observing and processing a doubtful web seal, they may feel cheated and infer that the IS provider is trying to manipulate them [13, 21]. Contextualized to this study, *manipulative intent* refers to consumers' inference that an IS provider is attempting to persuade them inappropriately by embedding a doubtful web seal (adapted from [13]). We examine the role of IS providers' manipulative intent as an outcome of consumer skepticism because skeptical consumers may be more likely to infer the manipulative intent of persuasion agents [92].

Due to situational skepticism's dependence on a context [27], a closer look at the web seal context and its particularities is needed to identify situational factors that cause skepticism toward web seals [39]. To guide the identification of situational factors, we use the theoretical framing offered by signaling theory, a common theoretical perspective for understanding the effectiveness of web seals and consumers' interpretation of them [65,76,83].

2.3. Using signaling theory to identify situational factors influencing skepticism

We build on signaling theory [109,110] to identify situational factors because it explains essential elements of the signaling process and their interplay, offering a rich theoretical framework that defines the boundaries for identifying situational factors. We mainly focus on three vital theoretical elements: (1) signalers, (2) signals, and (3) receivers. From a signaling theory perspective [109], an IS provider acts as a signaler and acquires web seals (i.e., the signal) to provide consumers with information (e.g., the quality of security protections). Consumers are the signal receivers. A fundamental premise in signaling theory is that the costs associated with the web seal need to be sufficiently high to prevent low-quality IS providers from using it (Appendix A). In addition, signaling theory proposes two crucial situational factors for studying skepticism toward web seals: *signal reliability* and *signaler credibility*.

Signal reliability is a (multidimensional) concept in signaling theory that emerges when the signaler honestly sends a signal that also fits unobservable qualities [19]. In this study, we contextualize web seal reliability to capture (1) the intentions of malicious IS providers and (2) a doubtful fit that may impact web seal effectiveness (adapted from [19]). First, malicious IS providers can be incentivized to be dishonest and cheat, for example, by hiding their dubious qualities when being certified by a seal authority, thereby threatening web seal reliability ([37,73]). Second, web seal reliability depends on the fit between the communicated qualities and the actual qualities of IS providers (adapted from [19]). A web seal failing to communicate the authentic status quo of IS providers' qualities is characterized as having a low fit. Web seals can become unreliable if consumers perceive discrepancies between the web seals' claims and the actual quality due to dishonest IS providers or a low fit [58]. We therefore examine whether a lack of web seal reliability (i.e., web seal unreliability) influences consumer skepticism because unreliable seals will likely increase consumers' disbelief in the seal's content.

Signaling theory further suggests that signals must originate from a highly credible source to be effective [19,24]. *Signaler credibility* refers to the extent to which a signaler is willing, knowledgeable, and capable to

deliver on its promises and is unbiased [24,40,122]. Prior research has already examined IS providers' credibility impacting signal strength (e.g., their reputation; [35]). Extending prior research, we turn toward investigating the role of the seal authority and its credibility because the seal authority remains an understudied yet central actor in the signaling process. A seal authority acts as an intermediary responsible for the attestation process and issuance of the web seal to convey third-party generated information. Consumers can inform themselves about the seal authority, for example, by clicking on a hyperlink embedded in the web seal, allowing them to visit a seal authority's website that provides detailed information on the attestation process and its results, among others. Examining the impact of seal authority credibility is promising because the signaling literature lacks explanations about how the characteristics of such intermediaries influence the signaling process [6, 76] and calls for future research to examine in more detail the role of intermediaries in signaling (e.g., [79,120]).

Contextualizing seal authority credibility, we argue that a credible seal authority must have high expertise and be honest and objective when acting as an intermediary (adapted from [24,40,122]). First, a credible seal authority is capable of making correct assertions, typically building on its knowledge, experience, or training in assessing the sociotechnical requirements of IS (adapted from [40]). Second, a credible seal authority must be honest and intend to communicate truthfully (adapted from [40]). Finally, a seal authority must be objective, requiring the absence of bias when communicating information (adapted from [121,122]). An absence of bias increases credibility because consumers perceive seal authorities' information as fair, reliable, and less prejudiced [122]. If seal authorities lack the expertise to perform rigorous attestations of IS providers' qualities or are dishonest in their quality claims, consumers may question their credibility. Similarly, a biased seal authority is (intrinsically or extrinsically) motivated to hold a particular opinion and, therefore, has a skewed perspective (e.g., in favor of the IS provider; [122]).¹ We will examine whether a lack of credibility (i.e., seal authority incredibility) will influence consumer skepticism, because incredible seal authorities will likely increase consumers' mistrust in them.

3. Research model and hypothesis development

This study employs the theoretical framing of situational skepticism and signaling theory to develop a model explaining the emergence of consumer skepticism toward web seals (refer to Fig. 2 and Table 2). We argue that consumers rely on their topic and agent knowledge structures to elaborate on a web seal's unreliability (Section 3.1.1) and the seal authority's motives and credibility (Section 3.1.2), resulting in disbelief in the web seal and mistrust in the seal authority.

We then examine the consequences of skepticism for consumers' perceptions, namely, reducing consumers' perceived assurance (Section 3.2.1) and leading to mistrust in IS providers (Section 3.2.2). In addition, we propose that skepticism's impact is mediated by consumers' inferences of IS providers' manipulative intent when embedding web seals (Section 3.3). Examining the mediating role of manipulative intent is promising for three reasons. First, considering consumers' inferences of manipulative intent aligns well with this study's objectives to examine unintended and adverse outcomes of (doubtful) web seals. Second, according to the PKM, consumers also access their persuasion knowledge to evaluate the appropriateness and IS providers' ulterior motives, in addition to their topic and agent knowledge [14,30]. We strive to achieve complete theorizing by considering all three knowledge structures and their respective outcomes on consumers' beliefs. Finally, skeptical consumers may be more likely to infer the manipulative intent of IS

¹ Note that being biased is distinct from being dishonest because bias inherently involves a direction, whereas dishonesty does not: a seal authority may range from positively biased to objective to negatively biased [121].

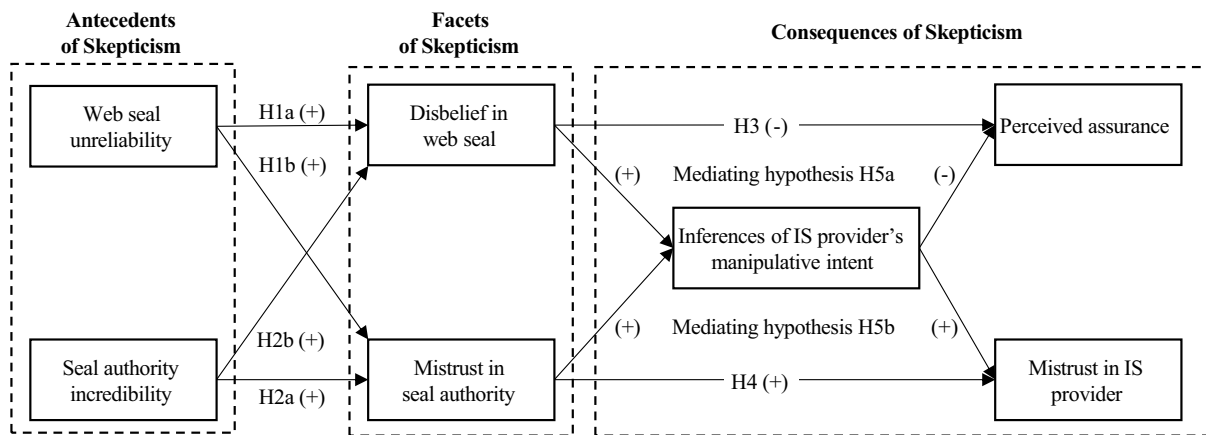


Fig. 2. Theoretical model.

Table 2
Key construct definitions.

Category	Construct	Definition
Situational factors	Web seal unreliability	The extent to which a consumer disbelieves that an IS provider honestly sends a web seal that also fits their unobservable qualities (adapted from [19]).
	Seal authority incredibility	The extent to which a consumer doubts that a seal authority is honest, knowledgeable, and unbiased (adapted from [24,122]).
Skepticism beliefs	Disbelief in a web seal	The extent to which a consumer doubts and questions the truth of a web seal's assurance claims (adapted from [89]).
	Mistrust in a seal authority	The extent to which a consumer disbelieves in and questions the trustworthiness of a seal authority (adapted from [47,68]) based on the seal authority's persuasive intent and motives [11,27].
Web seal outcomes	Perceived assurance	A consumer's perception of the likelihood that an IS provider protects the consumer's confidential information and has applied security measures [50].
	Mistrust in an IS provider	The extent to which a consumer disbelieves and questions the trustworthiness of an IS provider (adapted from [47,68]).
	IS providers' manipulative intent	A consumer's inference that an IS provider attempts to persuade the consumer inappropriately through embedding a doubtful web seal (adapted from [13]).

providers [21,92]. Controlling the mediating impact of manipulative intent can therefore provide deeper insight into the role of web seal skepticism and its adverse effects.

3.1. The influence of situational factors on skepticism toward a web seal

3.1.1. Web seal unreliability as a cause for consumer skepticism

Skepticism toward persuasive messages generally develops when consumers disbelieve the truthfulness of message claims [27,116]. Consumers may question the truthfulness of a web seal's assurance claims if they perceive discrepancies in signaled versus actual qualities of the IS provider, a situation in which a consumer perceives a web seal as unreliable [58]. According to signaling theory, perceptions of unreliability emerge if consumers believe that IS providers are dishonest when embedding a web seal or if consumers perceive that the web seal does not accurately represent the status quo of IS providers' qualities [19]. Consumers may (subconsciously) activate their topic knowledge

related to an IS provider's honesty and a web seal's fit with IS provider's qualities to interpret and evaluate the truthfulness of web seals [30].

We propose that consumers' disbelief in web seals stems from, first, their doubt about the honesty with which IS providers use a web seal on their websites. Consumers may have learned from news reports that inferior IS providers may embed false seals (called *fake seals*; [6,97,106]). For example, dubious IS providers have embedded images of fictitious web seals on their websites without permission, thereby exploiting web seals' deceptive potential given their graphical representation and limited verification mechanisms [71]. Such dishonest IS providers are incentivized to cheat, intentionally creating false web seals to mislead consumers [19,90]. When encountering a web seal, consumers can activate their topic knowledge gained from news articles about fake seals and elaborate on IS providers' truthfulness. If consumers lack the means to validate whether IS providers are truthful about the web seal and its claims (e.g., by clicking on the seal), they become more skeptical because skepticism develops when claims are difficult to verify [26,27].

Second, we propose that consumers' disbelief in a seal may be evoked if they believe that the seal is unreliable because its claims do not fit IS providers' qualities [19]. Web seals are based on standardized requirements that a seal authority uses to assess IS providers' qualities before issuing the seal [65]. For example, the cloud service web seal STAR issued by the Cloud Security Alliance verifies diverse security requirements, including establishing internal security policies, performing backups regularly, and implementing access control mechanisms. When encountering a web seal, consumers may activate their topic knowledge about the web seal and its underlying requirements to evaluate whether the assessed requirements fit with IS providers' qualities. However, consumers are often incorrect or uncertain about the meaning and prerequisites for web seals [76,88]. Additionally, consumers may have expectation gaps between the claims and assurances the web seal intends to provide and the IS providers' qualities that they actually perceive [64,94]. For example, a study revealed that more than half of consumers incorrectly assumed that the assuring seal authority approved of the IS provider's business practices [100]. If consumers perceive such discrepancies between the requirements underlying the web seal and the actual status quo of the IS provider, consumers may doubt the content of the web seal and disbelief its authenticity [31,115].

We conclude that if consumers perceive a web seal as unreliable, they will start to question the truthfulness of its claims and become skeptical. We propose the following hypothesis:

H1a: Consumers' perceived web seal unreliability will increase their disbelief in the web seal.

Unreliable web seals may also fire back at the seal authority because the seal authority is responsible for the accuracy of the web seal's contents. We propose that unreliable web seals thereby foster consumers'

mistrust in the seal authority.

Despite embedding fake web seals, dishonest IS providers may provide false information to the seal authority about their qualities, implement web seal criteria superficially to barely pass the attestation [37], or even cheat during the attestation or afterward [73]. For example, the superficial adoption of environmental certifications (i.e., ISO 14001) is often criticized as “greenwashing tendencies of organizations” ([37], p. 9). Suppose consumers perceive such threats to web seal reliability by relying on their knowledge structures. In that case, they may question seal authorities’ actions and integrity because trustworthy seal authorities should be able and motivated to uncover and punish dishonest IS providers [58,111]. Consumers’ lack of confidence in seal authorities’ capabilities and motives will likely increase their skepticism [14,45].

Similarly, news reports, such as security breaches at certified IS providers, may inform consumers about a web seal’s low fit to IS providers’ qualities. Consumers may have experienced a low fit themselves while using an IS provider’s system that has been awarded a web seal. Consumers who perceive such discrepancies likely start questioning seal authorities’ trustworthiness because consumers wonder why an authority has awarded a seal to IS providers with lower qualities. Consumers then become more skeptical [27]. IS research lends support to this assumption, showing that consumers’ negative experiences with IS providers’ systems that did not meet their quality expectations decrease the effect of web seals because consumers are disillusioned by the unmet expectations, and their negative experiences overshadow the assurance claims from the seal authority [107].

In sum, if consumers perceive web seals as unreliable, they may doubt the trustworthiness of the seal authority and become skeptical about it. We posit the following hypothesis:

H1b: *Consumers’ perceived web seal unreliability will increase their mistrust in the seal authority.*

3.1.2. Seal authority credibility as a cause for consumer skepticism

Consumers may also be skeptical about the persuasive intent and motives of a seal authority [11,27]. If consumers mistrust the seal authority’s motives or lack confidence in its credibility, consumers will become skeptical toward it [14,45]. Signaling theory similarly demands that signals must originate from a highly credible source to be effective [19,24]; that is, seal authorities must have high expertise and communicate honestly and objectively [40,122].

When observing a web seal, consumers may access their agent knowledge (e.g., “beliefs about the traits, competencies, and goals of the [seal authority]”; [30], p. 3) to elaborate on the seal authority’s credibility. First, consumers may expect that seal authorities are knowledgeable on the technological and organizational facets of IS and have related experience to perform thorough assessments of IS providers’ qualities. If consumers perceive that a seal authority lacks expertise, they may doubt its trustworthiness because it might be unable to detect weaknesses in IS providers’ systems and processes, posing risks to consumers’ system usage. For example, unqualified authorities would be less able to detect security vulnerabilities in online shops during their assessments [71]. Under such circumstances, consumers are more likely to mistrust the seal authority [47,68].

Second, consumers can form an opinion about whether a seal authority is honest or whether it (intentionally) communicates false information about its actions [121]. A consumer might remember previous scandals, such as the case of the seal authority TRUSTe, which failed to conduct annual reassessments to validate that IS providers fulfill their privacy requirements, despite TRUSTe having promised to do so [85]. Scandals such as these may lead consumers to be more cautious and watchful about the believability of seal authorities’ actions and to more strongly mistrust a seal authority [47,68].

Finally, consumers can assess a seal authority’s objectivity while relying on their agent knowledge. Consumers often question a seal authority’s objectivity if they mistrust its motives [11]. Related research

has shown that skepticism often originates from the conflict between the agent’s motive to increase profits and the motive to perform benevolent actions [104,108]. A consumer may question whether the seal authority strives solely to earn money by issuing web seals or whether the seal authority is eager to increase security and data protection in IS and reduce market information asymmetry. Being financially dependent on IS providers, seal authorities may be reluctant to take sanctions against IS providers [105]. For example, a less objective seal authority may refrain from issuing monetary penalties and withdrawing a web seal in the case of fraudulent IS providers because the seal authority risks losing profits [6]. Consumers are likely to raise doubts about seal authorities’ actions when they ascribe them to profit-seeking reasons, fostering their mistrust in the seal authority [108].

In summary, if consumers perceive that a seal authority lacks credibility due to questionable expertise, honesty, or objectivity, we propose that consumers will mistrust the seal authority, making them more cautious and doubtful about the actions and claims of a seal authority. We hypothesize the following:

H2a: *Consumers’ perceived seal authority incredibility will increase their mistrust in the seal authority.*

Consumers will also draw inferences about the truthfulness of a web seal’s content, depending on how credible they perceive a seal authority to be. Web seal accuracy may differ based on seal authorities’ expertise because seal authorities have distinct competencies and methodologies to assess IS providers’ qualities. For example, a highly competent seal authority performing penetration testing would be more likely to reveal low-quality systems than a seal authority that only reviewed IS providers’ security documentation. Some seal authorities even rely only self-assessments of the IS providers, without performing any assessment themselves [65]. Seal authorities that fail to identify prevailing discrepancies in actual versus signaled qualities will increase consumers’ disbelief in the seal because these discrepancies remain hidden and unaddressed, posing risks for the consumer.

Dishonest seal authorities may attempt to influence consumers’ opinions about the truthfulness of their claims [121]. For example, seal authorities can restrict consumers’ access to view or download (proprietary) requirement catalogs [102] or provide consumers with too much information, to overwhelm them [10]. Likewise, less objective seal authorities may try to persuade consumers with a biased message because they are financially dependent on IS providers [11,126]. If a consumer experiences difficulty verifying a web seal’s truthfulness due to seal authorities’ deceptive or biased actions, they will become more skeptical [26,27].

We conclude that a seal authority lacking expertise and being dishonest and less objective will make consumers doubt the truthfulness of the web seal’s content. We posit the following hypothesis:

H2b: *Consumers’ perceived seal authority incredibility will increase their disbelief in the web seal.*

3.2. The adverse effects of skepticism on consumers’ perceptions and beliefs

Next, we elaborate on the adverse consequences of consumer skepticism toward web seals. Research has primarily studied web seals’ positive influence on consumers’ perceptions of IS providers [1]. However, skeptical consumers are in a state of disbelief, and therefore, the outcomes may differ. We propose that skeptical consumers feel less protected by the provider’s safeguards (Section 3.2.1) and are more likely to mistrust IS providers (Section 3.2.2).

3.2.1. Reduced feelings of protection as a consequence of consumer skepticism

Extant research has argued that web seals provide strong trust-assuring arguments for IS providers because they associate providers’ claims of system features with an independent and trusted authority [53]. However, if consumers are skeptical and disbelieve web seals’

assurance claims, they cannot resolve their uncertainties about IS providers' unobservable qualities. Consumers will be less likely to believe the IS provider's intention to protect their information when they doubt the truthfulness of the seal information on the provider's protective mechanisms (e.g., encryption, authentication, SSL technology). Without reliable seal information, consumers cannot infer the system's quality and have less confidence in evaluating the system's security and privacy and the integrity of related management operations [55]. Consequently, skeptical consumers will still be confronted with an information asymmetry problem, leading them to question whether they can or cannot feel assured by the IS provider.

Skepticism research has similarly argued that situational skepticism tends to erode the credibility of advertising claims, diminish the positive impact of these claims, and lower consumers' acceptance of claims [54, 89]. For example, Tan and Tan [117] show that consumers with higher skepticism toward health claims are less likely to rely on them. We posit the following hypothesis:

H3: Consumers' disbelief in web seals will reduce their perceived assurance by IS providers.

3.2.2. Mistrust in IS providers as a consequence of consumer skepticism

Web seal research has shown that consumers often trust IS providers because they trust the seal authority [43,53]. A web seal can establish a cognitive association between a certified IS provider and a seal authority so that the consumer's trust in a seal authority is transferred to an IS provider [43,53]. This process is called trust transference [114]. Likewise, we propose that a consumer's mistrust toward a seal authority can influence a consumer's perception of an IS provider. If consumers associate an IS provider with a seal authority, skeptical consumers will transfer their doubts about the seal authority's trustworthiness to a certified IS provider. For instance, consumers may start to question why the IS provider cooperates with a doubtful seal authority. Instead of feeling assured by a trustworthy seal authority, skeptical consumers may become more uncertain and cautious about the IS provider. Thus, consumers' mistrust in the seal authority will lead to a state of doubt and ambivalence about IS providers' trustworthiness, resembling consumers' mistrust in the IS provider.

These assertions are backed by skepticism research indicating that consumer skepticism creates a negative attitude toward the motives of marketers (i.e., the IS providers embedding the web seal; [27]) and related research showing that individuals also transfer their disbelief toward one entity to another (e.g., [77,98]). We conclude that

H4: Consumers' mistrust in the seal authority will increase their mistrust in the IS provider.

3.3. The mediating role of IS providers' manipulative intent

Finally, we examine whether skepticism increases consumers' inferences that an IS provider is attempting to persuade inappropriately by embedding a web seal, adversely impacting consumers' perceptions.

In general, skeptical consumers are more likely to infer the manipulative intent of agents [92]. If consumers disbelieve a web seal or mistrust the seal authority, they may question why the IS provider has embedded the doubtful web seal. Skeptical consumers naturally access their persuasion knowledge [14,60]. Consumers can then elaborate on the web seal's appropriateness and whether the IS provider intends to persuade and manipulate with a (doubtful) web seal [14,30]. Skeptical consumers may conclude that the IS provider is trying to manipulate them, given their doubt about the truthfulness of the seal's contents and the seal authority's trustworthiness [13,21]. Research has similarly argued, for example, that consumers might perceive advertisers using sexually suggestive ads to sell clothing as inappropriate [57]. We posit that consumers' skepticism increases inferences of IS providers' manipulative intent.

Related research has found strong evidence that the inference of manipulative intent will negatively influence consumers' subsequent

evaluations of products, services, and companies. They will more likely resist persuasive attempts and discount the persuasive message and the agent itself [13,20,60]. For example, Campbell and Kirmani [14] show that when manipulative intent was salient, consumers discounted the comments of a salesperson and evaluated the salesperson less favorably.

Building on prior research findings, we propose that consumers' inference of IS providers' manipulative intent will reduce their perceptions of assurance and increase their mistrust in IS providers. A web seal, therefore, might be merely a gimmick ([119], p. 275) that IS providers use to manipulate them. Inferences that IS providers are manipulative may lead to impressions of providers' desperation rather than confidence in their qualities [13,59]. Consumers appear to think that *if they are trying so hard to influence me, something must be wrong* [56], leading them to feel less assured by the IS provider and to conclude that the provider's systems must be of low quality [13,59].

Similarly, consumers inferring that IS providers use dubious web seals perceive them as less sincere [14]. The more consumers perceive that the intentions of IS providers are manipulative, the less they attribute integrity to these IS providers [80]. However, consumers' trust depends on the extent to which they believe IS providers' behaviors are honest and well-intended [87]. Hence, the inference of manipulative intent may lead to mistrust in IS providers. To this end, related research has noted that "perceptions of manipulative intent may create cognitions of mistrust of the company, which can lead to a consumer backlash against the advertiser" ([20], p. 364).

We conclude that skeptical consumers will be more likely to activate persuasion knowledge that enables them to recognize a web seal as a potential persuasion attempt and assess its appropriateness. A dubious web seal may reveal the ulterior motives of IS providers, increasing consumers' inference of manipulative intent that negatively affects consumers' perceptions of the provider. We thus argue for a mediating role of consumers' inferences of manipulative intent:

H5: Inferences of manipulative intent mediate the relationship between consumer skepticism toward web seals and (a) consumers' perceived assurance and (b) their mistrust in IS providers.

4. Research method

We conducted an online experiment using a 2 × 2 between-subject design with four groups of participants and one control group to test the hypotheses. We introduced participants to a scenario in which they should evaluate their usage of a cloud storage service named "MyCloudDrive," which had been awarded the web seal "Trusted Cloud" by the seal authority "Cloud Protection Alliance." We aimed to manipulate participants' perceptions of Trusted Cloud's reliability (low/high) and Cloud Protection Alliance's credibility (low/high).

The following sections present detailed information about the panel characteristics, the experimental context and design, the measurement, and the data collection and analyses.

4.1. Descriptive statistics

We used the online panel provider Cint to acquire participants for our experiment. We sampled participants based on two criteria. First, participants must reside in the United States to reduce cultural biases [52]. In addition, we asked for a census-based sample representative of the US population concerning age, gender, and regions in the United States. Second, participants must at least sometimes buy products online (e.g., electronics, clothing, groceries, entertainment-related products, or medicine), ensuring that participants were familiar with electronic markets.

Cint administered the experiment to 1252 participants, ensuring that we obtained at least 125 participants for each of the five groups. We recorded the time spent on each page, ensuring that participants paid sufficient attention. The panel provider screened 322 participants who rushed through the experiment or failed attention checks. Of the

remaining 930 participants, 757 finished the experiment, resulting in 757 valid responses. Of the final participants, 63 % were women, 36 % were men, and 1 % preferred to self-describe their gender. They were, on the average, 43 years old (minimum 17, maximum 73). They held a high school diploma (41 %), a bachelor’s degree (28 %), a master’s degree (12 %), or a Ph.D. (1 %), or had another level of education (18 %). Most participants were employed (47 %), while some were self-employed (9 %), currently unemployed (21 %), students (3 %), or retired (13 %), or had another employment situation (7 %).

4.2. Experiment context

Empirical studies typically examine web seals in electronic markets that manifest great consumer uncertainty (Appendix A; [76]). This study focuses on cloud service markets and related web seals. We chose cloud services because they are now widely used, permeating almost every aspect of the everyday use of IT, including e-commerce, storage services, social media, video streaming, and gaming [8]. Nevertheless, cloud services are characterized by high consumer uncertainty concerning system use and safeguards [118]. Consumers cannot examine cloud services and their features in advance because they lack control and transparency regarding cloud service security safeguards and data protection. Web seals (e.g., Cloud Security Alliance’s STAR) can alleviate such uncertainty and support consumers when they select a cloud service [66].

4.3. Experimental design

The experiment consisted of four steps. After welcoming our participants, we provided a short description and examples of current cloud storage services (e.g., Dropbox, Microsoft OneDrive, Apple iCloud, and Google Drive) and web seals (e.g., TRUSTe, McAfee Secure, CSA STAR, Norton Secured, PCI DSS, ISO 27001). We introduced a scenario in which participants had to select a cloud storage service for their personal use and in which they would evaluate the MyCloudDrive service. Please note that MyCloudDrive was introduced as a realistic cloud service that would be released soon, to increase the perceived scenario realism.

Second, we showed participants the website of MyCloudDrive (Appendix B) and asked them to look at it briefly. To elicit natural responses from participants, the website’s layout, pictures, and text accurately simulated the actual cloud storage providers’ websites (i.e., Dropbox, Jumpshare, and Infnit) and were adapted to fit the study objectives. We deactivated clickable content. MyCloudDrive’s website informed participants about the cloud storage service’s main features and characteristics. We aligned storage capacities and prices based on the storage offers at the time of the study. More importantly, the website embeds a web seal called “Trusted Cloud—Certified Security” issued by the seal authority Cloud Protection Alliance (Appendix B). We developed the seal based on the layout of actual seals to ensure a high level of realism for the experiment and that the seal would fit the study objectives. We decided to develop a novel web seal because participants should have no firsthand experience or prior knowledge of the seal, to ensure that these did not confound our manipulations. All participants had to scroll through the entire website before continuing the experiment. Afterward, we added an attention check in which we asked participants to name elements they recognized on the website. If a participant failed to recognize the Trusted Cloud web seal, we provided an excerpt of MyCloudDrive’s website containing the web seal and asked participants to look again at this website excerpt (Appendix B).

Except for the control group, we continued our cloud service selection scenario. To learn more about the Trusted Cloud web seal, we showed them a recent news article about the web seal from a credible and truthful online magazine. We asked them to read the magazine article carefully. We created four versions of the article in which we manipulated the web seal’s reliability (low/high) and the seal authority’s credibility (low/high). We randomly assigned participants to one of

these treatments (Table 3). Each treatment started with an image showing the magazine’s graphical header, followed by three text blocks (Appendix B). The first text block was consistent across all treatments and introduced the web seal’s aim and scope. The second text block contained information about the Trusted Cloud web seal, either emphasizing its reliability or unreliability. The third text block contained information about the seal authority Cloud Protection Alliance that induced either high or low seal authority incredibility. We developed each text carefully in alignment with the theoretical underpinnings (i.e., the dimensions of signal reliability and signaler credibility; Section 2.3). We also ensured that the information resembles actual web seals (i.e., cloud service web seals) and web seal scandals (i.e., about TRUSTe). Appendix C summarizes the text manipulations.

After participants read the web seal information, we measured their perceived assurance, their mistrust in MyCloudDrive, and their inferences of its manipulative intent. Then we measured consumers’ disbelief in the web seal and mistrust in the seal authority, followed by measures for perceived web seal reliability and seal authority credibility. Next, we added a debriefing section, telling participants that the cloud service and the web seal were fictional examples. We measured scenario realism perceptions and then told them to let go of the scenario. In the end, we asked several questions to control for related constructs having a confounding impact on the predicted effects and gathered demographic participant information.

4.4. Experimental measures and pilot test

Following methodological recommendations, we used validated scales from the literature to measure all constructs. Items were measured using seven-point Likert scales. Appendix D presents an overview of the measures used.

To measure consumer skepticism, we adapted scales related to disbelief in web seals from Mohr et al. [89]. To measure consumers’ mistrust in the seal authority and IS provider, we adapted McKnight et al.’s [88] trust items by adding notions of consumer doubt and uncertainty about whether the seal authority was trustworthy or not [18, 47,68]. We adapted the scales for consumer inferences of manipulative intent from Campbell [13] and perceived assurance from Kim et al. [51]. Web seal unreliability was measured using items for signal fit from Appelman and Sundar [3] and signaler honesty from Ohanian [95]. Finally, we adapted measures from Ohanian [95] and Applbaum and Anatol [4] to measure seal authority incredibility.

We controlled for several confounding factors. We controlled for personality traits (i.e., relatively enduring cognitive, emotional, and behavioral patterns) and individual factors (i.e., temporary factors that change based on consumers’ knowledge and experiences) that might foster the emergence of consumer skepticism [92]. Notably, we measured consumers’ dispositional skepticism [92], cynicism [112], persuasion knowledge [7], web seal involvement [67], and privacy concerns [12].

We also controlled for whether consumers perceived the web seal as costly [123], which is a fundamental prerequisite of signaling theory [19,109]. Finally, we controlled for consumers’ social desirability [34] and consumers’ disposition to trust [33], which is a crucial antecedent of

Table 3
Overview of experimental manipulations.

Manipulated constructs		Manipulating seal authority incredibility to foster mistrust in seal authority	
Manipulating web seal unreliability to foster disbelief in web seal	Unreliable	Incredible Treatment	Credible Treatment
		1	2
	Reliable	Treatment	Treatment
		3	4

trusting beliefs [86].

We pretested the measurement instrument and the treatments with ten faculty members and incorporated their feedback. We also conducted a pilot test with 99 participants using a panel provided by Amazon Mechanical Turk. Based on the feedback from the pilot test, we made changes to improve the comprehensibility and readability of the items and the treatment texts.

4.5. Data analysis

To analyze the data, we used IBM SPSS Statistics (version 27) and IBM SPSS Amos (version 27), covariance-based structural equation modeling (SEM) software, which is especially appropriate for theory testing, as in our case.

4.5.1. Measurement model

We assessed the measurement model. First, we assessed the normality of the measurement items in our experiment. One perceived assurance item had the highest absolute kurtosis value of 12.088 (i.e., item PA3), followed by a seal authority mistrust item with a value of 10.247 (i.e., StA1), both exceeding the acceptable threshold of 10.0 for kurtosis [61] and they were thus removed. The remaining items were below the thresholds (highest kurtosis value: 8.649 for PC2; highest skewness value: 1.438 for AC9). We conclude that the distributions of our measurement items do not deviate substantially from normality.

Second, we performed a confirmatory factor analysis (CFA). We examined the reliability, convergent validity, and discriminant validity of the latent reflective constructs. The composite reliability (CR) was above the recommended 0.70 threshold [91]. The average variance extracted (AVE) for all constructs exceeded the suggested 0.50 threshold [28], thereby demonstrating good reliability and internal consistency (Table 4), except for our control variable, social desirability (AVE = 0.475). Because social desirability slightly falls below the 0.50 threshold but has a CR of 0.729, we kept social desirability in our model (cf. [28]). All indicators loaded significantly on their latent constructs, and standardized loadings exceeded the required minimum of 0.700, indicating good convergent validity, except for social desirability (Appendix D). In addition, we tested the discriminant validity of the constructs. Since the square root of the AVE of each construct exceeded the squared inter-construct correlations, each construct explained more variance in its indicators than it shared with other constructs (Table 4). In addition, all heterotrait–monotrait (HTMT) ratios of correlations (Table 5) were below the 0.85 threshold [36], suggesting no discriminant validity problems. We also examined variance inflation factor (VIF) values to test for multicollinearity in our data. The highest VIF value was between inferences of manipulative intent and mistrust in seal authority (i.e., 3.146), falling below a threshold of 5.0, suggesting that our data are not subject to a severe multicollinearity issue [62]. To assess model fit, we used four metrics [70]: the χ^2 /degrees of freedom (df) ratio, the root mean squared error of approximation (RMSEA), the comparative fit index (CFI), and the Tucker–Lewis index (TLI). Common thresholds for acceptable model fit are $\chi^2/df < 3$, RMSEA < 0.80, CFI and TLI > 0.90 [32,42]. The CFA model yielded an acceptable model fit ($\chi^2/df = 2.329$; RMSEA = 0.042; CFI = 0.943; TLI = 0.939).

4.5.2. Common method bias

We employed procedural and statistical remedies to address the potential bias from common method variance that could affect our results because we collected self-reported data for dependent and independent variables simultaneously with one measurement instrument [99]. As procedural remedies, we instructed participants that the data would be anonymized and used for scientific purposes only and that they should take their time to answer the questions honestly and to the best of their ability and knowledge. We used validated scales from the literature, randomized items, and placed independent and dependent variables on different pages (i.e., proximal separation).

Table 4
Validity analyses results.

Construct	CR	AVE	Inter-construct correlations																	
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)			
(1) Mistrust provider	0.968	0.750	0.866																	
(2) Manipulative intent	0.949	0.861	0.844	0.928																
(3) Seal costs	0.902	0.754	-0.184	-0.135	0.868															
(4) Seal unreliability	0.967	0.806	0.504	0.488	-0.530	0.898														
(5) Auth. incredibility	0.972	0.797	0.394	0.369	-0.450	0.843	0.893													
(6) Perc. assurance	0.973	0.877	-0.464	-0.375	0.563	-0.803	-0.658	0.937												
(7) Disbelief in seal	0.951	0.765	0.764	0.754	-0.214	0.612	0.531	-0.475	0.875											
(8) Mistrust authority	0.978	0.830	0.736	0.676	-0.223	0.563	0.641	-0.474	0.847	0.911										
(9) Disposition to trust	0.875	0.639	0.021	0.079	0.269	-0.316	-0.269	0.329	-0.010	-0.035	0.799									
(10) Privacy concerns	0.956	0.815	0.322	0.270	-0.010	0.224	0.194	-0.186	0.341	0.349	-0.029	0.903								
(11) Pers. knowledge	0.889	0.667	0.101	0.194	0.309	-0.179	-0.117	0.279	0.119	0.111	0.173	0.130	0.817							
(12) Cynicism	0.909	0.668	0.227	0.261	0.139	-0.031	-0.033	0.100	0.256	0.265	-0.119	0.424	0.391	0.817						
(13) Seal involvement	0.940	0.840	-0.127	-0.039	0.429	-0.416	-0.373	0.494	-0.151	-0.191	0.466	-0.085	0.411	0.164	0.917					
(14) Social desirability	0.729	0.475	-0.108	-0.072	0.310	-0.304	-0.299	0.356	-0.122	-0.137	0.357	0.055	0.361	0.164	0.407	0.689				
(15) Dis. skepticism	0.955	0.780	0.252	0.194	-0.514	0.603	0.553	-0.619	0.302	0.339	-0.547	0.137	-0.099	-0.280	-0.779	-0.405	0.863			

Note: Diagonal bold numbers show the square root of the average value extracted.

Table 5
HTMT results.

Construct	HTMT value														
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) Mistrust provider															
(2) Manipulative intent	0.847														
(3) Seal costs	0.174	0.131													
(4) Seal unreliability	0.492	0.487	0.527												
(5) Auth. incredibility	0.385	0.367	0.444	0.841											
(6) Perc. assurance	0.450	0.375	0.565	0.803	0.651										
(7) Disbelief in seal	0.765	0.756	0.207	0.604	0.516	0.464									
(8) Mistrust authority	0.737	0.676	0.222	0.565	0.641	0.475	0.842								
(9) Disposition to trust	0.035	0.087	0.284	0.314	0.262	0.335	0.007	0.020							
(10) Privacy concerns	0.318	0.268	0.006	0.224	0.195	0.186	0.335	0.350	0.016						
(11) Pers. knowledge	0.103	0.186	0.315	0.188	0.120	0.286	0.117	0.107	0.188	0.132					
(12) Cynicism	0.227	0.257	0.146	0.035	0.032	0.102	0.257	0.262	0.107	0.423	0.393				
(13) Seal involvement	0.117	0.036	0.434	0.417	0.372	0.498	0.146	0.191	0.480	0.088	0.423	0.165			
(14) Social desirability	0.099	0.071	0.305	0.304	0.295	0.354	0.113	0.134	0.369	0.060	0.364	0.155	0.407		
(15) Dis. skepticism	0.239	0.196	0.515	0.601	0.553	0.619	0.292	0.341	0.549	0.130	0.287	0.102	0.778	0.410	

As a statistical remedy, we followed a single common method factor approach [99]. We allowed all items in the CFA model to load onto an unmeasured common latent method factor and their intended latent constructs. The results indicated that common method variance explained 3.35 % of the variance. This value is well below 25 %, which is the median amount of method variance found in a meta-analysis by Williams et al. [124], and is often used as a threshold value. In addition, the change in CFI ($\Delta CFI = 0.0003$) was below the threshold of 0.01 [17], suggesting that the fit with the data was not substantially different when we included the method factor in the model. When we added the method factor to the structural model, the path estimates remained statistically significant, and changes were marginal. Based on these results, we conclude that common method bias is not a major concern in our study.

5. Results

5.1. Treatment comparisons

We used multivariate analysis of variance (MANOVA) to test

whether the treatments differed significantly regarding the variables: web seal unreliability, seal authority incredibility, disbelief in web seal, and mistrust in seal authority. We identified homogeneity of the error variances for disbelief in web seal ($p = 0.162$) and mistrust in seal authority ($p = 0.065$) but not for web seal unreliability ($p < 0.001$) and seal authority incredibility ($p < 0.001$), as assessed by Levene’s test. The one-way MANOVA showed a statistically significant difference between the treatments on the combined variables ($F(12, 1566.576) = 5.620, p < 0.001, \text{partial } \eta^2 = 0.036, \text{Wilk's } \Lambda = 0.894$). Post-hoc univariate ANOVAs were conducted, yielding a statistically significant difference between the treatments for web seal unreliability ($F(3, 595) = 12.201, p < 0.001, \text{partial } \eta^2 = 0.058$), seal authority incredibility ($F(3, 595) = 11.556, p < 0.001, \text{partial } \eta^2 = 0.055$), disbelief in web seal ($F(3, 595) = 18.848, p < 0.001, \text{partial } \eta^2 = 0.087$), and mistrust in seal authority ($F(3, 595) = 15.781, p < 0.001, \text{partial } \eta^2 = 0.074$).

We then performed post hoc tests to check whether identified differences were significant. Games–Howell post hoc tests revealed that treatment 4 (credible / reliable; Table 3) differed significantly on web seal unreliability and seal authority incredibility from the remaining

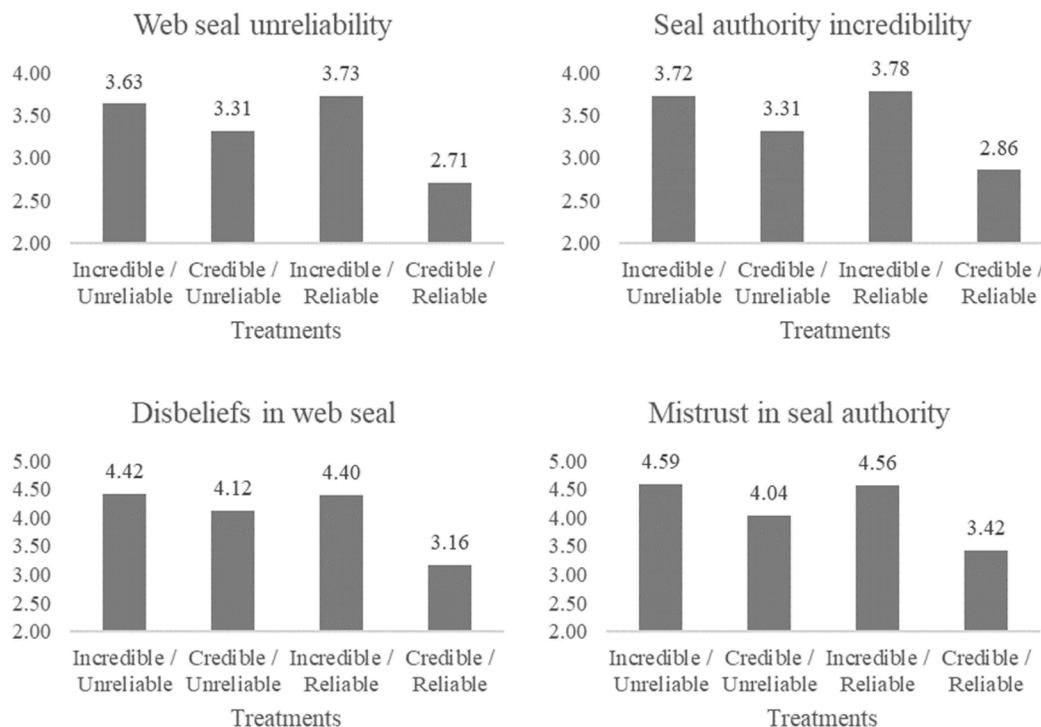


Fig. 3. Mean treatment comparisons.

three treatments, confirming that we successfully decreased web seal reliability and seal authority credibility with our manipulations. Similarly, Tukey–HSD post hoc tests substantiated these findings, showing that treatment 4 (credible/reliable) significantly differed in disbelief in web seal and mistrust in seal authority from the remaining three treatments. The mean differences between treatments are illustrated in Fig. 3.

Notably, we observe a potential interaction effect between seal authority incredibility and web seal unreliability. Participants in treatment 3 (reliable/incredible) rated web seal unreliability equally high to treatment 1 (unreliable/incredible), as shown in Fig. 3. The PKM provides reasoning for the observation. Friestad and Wright [30] argue that “in addition to activating persuasion knowledge, consumers will also activate agent knowledge and topic knowledge, at some level, when they observe or interact with marketers.” (p. 4). Consequently, we conclude that consumers may consider seal authority credibility by accessing their agent knowledge when elaborating on web seal reliability. For example, during our experiment, participants may have concluded that an incredible seal authority has insufficient expertise to uncover a low IS provider honesty, or a biased seal authority may try to conceal a low fit. Hence, if participants encountered an incredible seal authority, they also questioned the reliability of its web seal. We will consider this potential interaction effect when testing our hypotheses.

5.2. Hypothesis testing

We used the Amos software to assess the significance of the structural path estimates in our theoretical model. Fig. 4 presents the model testing results. The model explains 74.9 % of the variance in mistrust in the IS provider, 61.1 % in perceived assurance, 56.5 % in inferences of manipulative intent, 51.5 % in disbelief in web seal, and 57.3 % in mistrust in seal authority.

5.2.1. Direct effects

Hypotheses H1–H4 pertain to the direct effects in the model. The

standardized path coefficient between web seal unreliability and disbelief in the web seal was significant (standardized β -value: 0.680; p -value < 0.001). Thus, H1a is supported. The effect of web seal unreliability on mistrust in seal authority is also significant ($\beta = 0.185$; p -value < 0.001), supporting H1b.

H2a examines the influence of seal authority incredibility on mistrust in seal authority. The significant positive path coefficient ($\beta = 0.492$; $p < 0.001$) supports H2a. In contrast, the effect of seal authority incredibility on disbelief in the web seal is not significant ($\beta = 0.037$; p -value = 0.507), not supporting H2b.

H3 examines the direct negative effect of disbelief in web seal on perceived assurance. The path coefficient was significant ($\beta = -0.249$; $p < 0.001$), supporting H3. H4 considers the direct influence of mistrust in seal authority on IS provider mistrust, which is positive and significant ($\beta = 0.290$; $p < 0.001$), supporting H4.

We controlled for several confounding variables to test the robustness of our model (Fig. 4). Significant control variables include consumer’s persuasion knowledge (e.g., “I know when a web seal is ‘too good to be true,’” item PK1), increasing consumers’ disbelief in web seals ($\beta = 0.150$; $p < 0.001$), mistrust in seal authority ($\beta = 0.106$; $p < 0.01$), and manipulative intent ($\beta = 0.082$; $p < 0.05$), among others. Also, consumers’ dispositional skepticism decreased perceived assurance ($\beta = -0.326$; $p < 0.001$). Similarly, consumers’ personality trait cynicism (e.g., “I find that most people disguise their true motives for doing something”, Item CY5) increases consumers’ disbelief in web seals ($\beta = 0.188$; $p < 0.001$) and mistrust in seal authority ($\beta = 0.277$; $p < 0.001$).

5.2.2. Mediation effects

Hypothesis H5 pertains to the hypothesized mediation effects of manipulative intent. To obtain the estimates for the mediation effects, we used SPSS Amos’s “estimands” function with bootstrapping (5000 repetitions, 95 % bias-corrected confidence intervals), as recommended by MacKinnon et al. [82]. We calculated the product of the

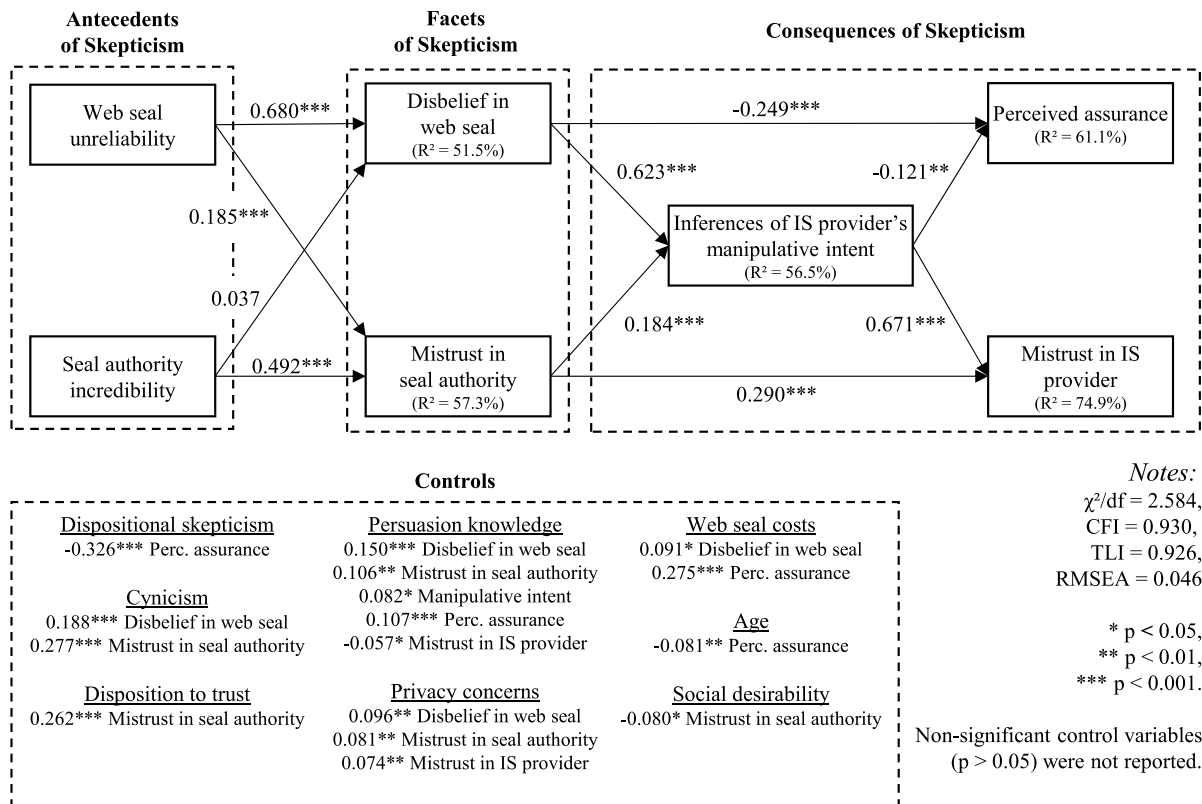


Fig. 4. Model testing results.

unstandardized path estimates between the independent variable and the mediator variable (path a) and between the mediator variable and the dependent variable (path b) and assessed the significance of the direct effect between the independent and the dependent variable (path c; [127]).

H5a examines the mediating influence of manipulative intent in the relationship between disbelief in web seal and perceived assurance. The product term for the indirect effect between disbelief in web seal and perceived assurance via manipulative intent was significant and negative ($ab = -0.074$; $p < 0.05$; bias-corrected confidence interval $[-0.149; -0.015]$). The direct effect of disbelief in web seal on perceived assurance was also significant and negative ($c = -0.243$; $p < 0.001$; $[-0.361; -0.127]$). These results suggest a complementary mediation (i.e., both effects point in the same direction; [127]), supporting H5a.

H5b examines the mediating influence of manipulative intent in the relationship between mistrust in seal authority and mistrust in IS provider. The product term for the indirect effect between mistrust in seal authority and mistrust in IS provider via manipulative intent was significant ($ab = 0.116$; $p < 0.05$; $[0.025; 0.217]$). The direct effect of mistrust in seal authority on mistrust in IS provider was also significant ($c = 0.273$; $p < 0.001$; $[0.182; 0.374]$). The results indicate a complementary mediation, supporting H5b.

5.2.3. Post hoc analyses

We further calculated the total and specific indirect effects of web seal unreliability and seal authority incredibility using SPSS Amos’s “estimands” function with bootstrapping (5000 repetitions, 95 % bias-corrected confidence intervals). Web seal unreliability has a significant total indirect effect (TIE) on perceived assurance (TIE = -0.224 ; $p < 0.001$; $[-0.309; -0.151]$). Notably, web seal unreliability has a significant specific indirect effect via disbelief in the web seal on perceived assurance ($ab = -0.185$; $p < 0.001$; $[-0.303; -0.093]$). Seal authority incredibility has a significant TIE on mistrust in IS provider (TIE = 0.219 ; $p < 0.01$; $[0.088; 0.351]$). Particularly, seal authority incredibility has a significant specific indirect effect via mistrust in seal authority on mistrust in IS provider ($ab = 0.141$; $p < 0.001$; $[0.088; 0.206]$).

We conducted further post hoc analyses to examine our observations during treatment comparisons. We tested whether seal authority incredibility impacts web seal unreliability, and therefore added a path between both variables in our model. Using the Amos software, we confirm a significant positive effect of seal authority incredibility on web seal unreliability ($\beta = 0.848$; $p < 0.001$). Comparing path coefficients with the initial model reveals minimal changes in path coefficient strength (i.e., the greatest change in path coefficient = 0.031). We conclude that adding a relationship between the two antecedents of skepticism does not disturb our findings. We then calculated the specific indirect effect of seal authority incredibility via web seal unreliability on disbelief in web seal, using SPSS Amos’s “estimands” function with bootstrapping. Results show a significant full mediation effect ($ab = 0.615$; $p < 0.001$; $[0.486; 0.777]$) since the direct effect of seal authority incredibility on disbelief in web seal is not significant ($c = 0.045$; $p = 0.648$; $[-0.147; 0.230]$). Thus, in contrast to H2b that assumes a direct effect of seal authority incredibility on disbelief in web seal, post hoc analyses reveal a mediation effect via web seal unreliability only. These findings strengthen our assumption that consumers will question a web seal’s reliability more strongly if an incredible seal authority issues it, which in turn increases their skepticism toward the web seal.

6. Discussion

6.1. Principal findings

This study set out to identify and empirically test the antecedents and consequences of skepticism toward web seals. We conducted an online experiment to test the proposed hypotheses in a cloud service market

context. Our results support the harmful effects of skepticism toward consumers’ perception of IS providers (Table 6) and particularly emphasize the central role of seal authority incredibility in the nomological net. This study uncovers skepticism as a critical boundary condition for the effectiveness of web seals because skepticism can lead to the opposite effect of what is intended with them.

6.2. Contributions to research

Our study makes several contributions to research (Table 7). First, prior web seal research has predominantly focused on web seals’ positive and intended effects ([65,76]; Appendix A). With this study, we develop and empirically test a theoretical model, first, to understand how consumer skepticism toward web seals arises, and second, to understand the adverse impact of skepticism on consumers’ perception of IS providers. This study’s findings enrich researchers’ understanding of skepticism as a crucial but thus far unexplored concept in web seal research. Indeed, this paper revealed a “boomerang effect” [101] of web seals: If consumers question a web seal and the respective seal authority, they become more skeptical and will start to doubt the qualities of an IS provider and infer the provider’s intentions to use web seals as a means to manipulate consumers. This study answers recent calls to unpuzzle counterintuitive findings of web seals (e.g., [6,76]) and also offers theoretical explanations for why some consumers become skeptical about web seal claims and why others perceive less trust in the authority

Table 6
Summary of hypothesis testing results.

Hypothesis (direction)	Path coefficient	p-value	Supported?
<i>Direct effects:</i>			
H1a: Web seal unreliability → Disbelief in web seal (+)	0.680	< 0.001***	Yes
H1b: Web seal unreliability → Mistrust in seal authority (+)	0.185	< 0.001***	Yes
H2a: Seal authority incredibility → Mistrust in seal authority (+)	0.492	< 0.001***	Yes
H2a: Seal authority incredibility → Disbelief in web seal (+)	0.037	0.507	No
H3: Disbelief in web seal → Perceived assurance (-)	-0.249	< 0.001***	Yes
H4: Mistrust in seal authority → Mistrust in IS provider (+)	0.290	< 0.001***	Yes
<i>Mediation effects:</i>			
H5a: Disbelief in web seal → Manipulative intent (+) → Perceived assurance (-)	$ab = -0.074$ [-0.149; -0.015] $c = -0.243$ [-0.361; -0.127] $abc = 0.018$ [0.009; 0.035]	$ab: 0.018$ * $c: <$ 0.001*** $abc:$ 0.006**	Yes (complementary mediation)
H5b: Mistrust in seal authority → Manipulative intent (+) → Mistrust in IS provider (+)	$ab = 0.116$ [0.025; 0.217] $c = 0.273$ [0.182; 0.374] $abc = 0.032$ [0.008; 0.067]	$ab: 0.012$ * $c: <$ 0.001*** $abc:$ 0.009*	Yes (complementary mediation)

Notes: Coefficients and confidence intervals (CI) for mediation effects are obtained using bootstrapping (5000 repetitions, 95 % bias-corrected CI). The letter “a” denotes the path between each independent and mediating variable, “b” is the path between the mediating and dependent variable, and “c” is the path between the independent and dependent variable.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Table 7

Key contributions of this study and implications for research.

State of the literature	This study's findings	Contributions and implications
Web seal research has predominantly focused on web seals' positive and intended effects.	Showing that web seal unreliability and seal authority incredibility lead to skepticism, which reduces perceived assurance and increases mistrust in IS providers.	<ul style="list-style-type: none"> • Confirm and explain counterintuitive phenomena related to web seals. • Enrich researchers' understanding of skepticism. • Answer recent calls to unpuzzle counterintuitive findings of web seals.
Skepticism research has focused on examining dispositional skepticism, and the influence of consumers' personality traits and individual factors, while neglecting situational factors.	Confirming that web seal unreliability and seal authority incredibility become relevant situational factors.	<ul style="list-style-type: none"> • Emphasize the value of taking a situational perspective when studying skeptical beliefs. • Complement prior insights on situational antecedents that have not yet been identified in prior research.
Research lacks evidence for the mediating effect of manipulative intent.	Confirming that skepticism is positively associated with manipulative intent, which mediates skepticism's influence on outcome variables (i.e., perceived assurance and mistrust in IS providers).	<ul style="list-style-type: none"> • Provide support for manipulative intent's adverse mediating role. • Encourage future research to consider manipulative intent as a mediator when examining skepticism's consequences.
Literature on signaling theory often neglects to consider the unintended effects of signals and the role of intermediaries (i.e., seal authorities).	Confirming that doubtful signals can backfire on signalers.	<ul style="list-style-type: none"> • Highlight web seals' potentially harmful effects. • Confirm that the credibility of seal authorities, acting as intermediaries, can evoke skepticism.

[113]. To this end, our study aligns with recent research efforts identifying contingency and boundary conditions of web seal effectiveness (e.g., [52,65,78]).

Second, we contribute to skepticism research by uncovering situational factors related to consumer skepticism. Consistent with calls for contextualized theorizing in IS [39], we include context-specific factors grounded in signaling theory that provide a more nuanced understanding of the situational factors that influence consumer skepticism. Therefore, we complement prior insights into consumer skepticism on situation-specific antecedents not yet identified in prior research. We also show that signaling theory is an appropriate lens for understanding context-specific antecedents of skepticism. Our results highlight that situational factors (web seal unreliability and seal authority incredibility) strongly influence skepticism, which in turn leads to adverse outcomes. This finding emphasizes the value of taking a situational perspective when studying skeptical beliefs [27], while a large amount of skepticism-related research has focused on examining dispositional skepticism and the impact of consumers' personality traits and individual factors [92,93].

In contrast to most skepticism research, which has focused either on disbelief in a message (e.g., [89,117]) or on mistrust in a persuasion agent (e.g., [104,108]), we examined consumers' disbelief in the web seal and mistrust in the seal authority simultaneously. In doing so, we were able to test different effects of skepticism on consumers' perceptions of the IS provider, namely, its impact on perceived assurance and mistrust in IS providers.

We also align with prior skepticism research arguing for a relationship between skepticism and manipulative intent (e.g., [13,44,60]). Our

results confirm the mediating role of manipulative intent between skepticism and the outcomes of a persuasion attempt. To our knowledge, this study is one of the first to provide empirical evidence for this mediation effect. We encourage future research to consider consumers' inference of manipulative intent as a potential mediator when examining skepticism's consequences since consumers can access their persuasion knowledge in addition to their topic and agent knowledge [14,30]. Considering manipulative intent can also be promising for future web seal research to control for web seals' unintended and adverse outcomes.

Finally, this study has implications for the literature on signaling theory. With this study, we align with an emerging literature stream that considers the adverse effects of signaling (e.g., [22,79]) by highlighting the emergence of skepticism toward web seals and their potentially harmful effect on consumers' perceptions. Whereas prior research has largely examined the impact of signalers' characteristics on signal strength (e.g., IS providers' reputation; [35]), we examined how seal authorities' credibility impacts consumers' perceptions. Seal authorities act as neutral intermediaries in the signaling process because they are responsible for attesting and issuing the web seal to convey third-party generated information about the IS provider. Our findings show that incredible seal authorities evoke consumer skepticism. We particularly confirm that seal authorities' objectivity is an essential dimension of their perceived credibility, which has been an "understudied contributor to source credibility" ([122], p. 12). By examining seal authorities, we also answer calls from prior research to examine the role of intermediaries in signaling in more detail (e.g., [79,120]).

6.3. Contributions to practice

Our study makes notable contributions to practice. First, we raise awareness among seal authorities and IS providers about the role and relevance of skepticism toward web seals. IS providers should be cautious when embedding less reliable seals issued by doubtful seal authorities, because doing so may backfire. Instead of using web seals as mere marketing tools, we advise IS providers to select appropriate seals carefully and truthfully embed them into their communications.

Our research lays the foundation for developing strategies to mitigate consumer skepticism toward web seals. Our results show that web seal unreliability and seal authority incredibility can evoke consumer skepticism. To mitigate consumers' doubt about web seal reliability, we recommend incorporating verification mechanisms into the seal, because prior research on skepticism shows that consumers become more skeptical when claims are difficult to verify [26,27]. For example, a web seal can provide a link to a website containing additional information, such as information on the seal authority's attestation. Consumers unfamiliar with a web seal or questioning the truthfulness of its contents can then inform themselves about it by clicking on the link and verifying, for example, whether an IS provider is indeed certified or merely displays a fake seal. Similarly, while existing web seal websites primarily provide information about the seal itself, our results highlight that seal authorities should also offer information to prove and reinforce their credibility.

Finally, we want to motivate consumers to engage with web seals more deeply to reduce prevalent information asymmetry since they can be a source of reliable and objective information. To make informed decisions about whether to depend on the web seal and engage with IS providers, consumers should scrutinize which attestation the seal authority performs (i.e., ensuring the high fit of communicated versus actual qualities) and elaborate on whether it is a credible seal authority (i.e., expert, honest, and unbiased). In addition, we want to raise consumers' awareness of web seals' deceptive potential and potential misuse by IS providers as a means to persuade consumers.

6.4. Limitations and future research

This study has limitations that open up valuable avenues for future research. First, our results are limited to web seals in electronic markets. Our findings might not be generalizable to other contexts due to skepticism’s context-dependent and situational nature. Future research should validate our findings in different contexts and use other assurance mechanisms, such as examining consumer skepticism toward privacy policies.

Second, our experiment remains limited in terms of treatment variety and scope. We focused on two situational factors and developed four treatments to examine skepticism. While signaling theory guided our examination of antecedent factors of consumer skepticism, including other theoretical lenses (e.g., trust theory) may offer additional situational factors that we have not included in this study. Future research may test the influence of further situational factors in the context of web seals. Our experiment does not entirely replicate an authentic real-life scenario because we used a hypothetical cloud service, a fictional web seal, and an invented online magazine (presenting information about the web seal). To realize the cloud service scenario, we chose a design with a visual appearance similar to that of real cloud storage services but based on our arrangement and adjustments (e.g., including an adapted website layout and a fictional logo). Measures of our dependent variables (i.e., consumers’ mistrust in IS providers) may differ in real market situations. Nevertheless, the participants indicated high study realism, ranking the cloud service scenario ($M = 5.57$ on a seven-point Likert scale; $SD = 1.36$), the Trusted Cloud web seal ($M = 5.52$; $SD = 1.42$), and its seal authority ($M = 5.46$; $SD = 1.42$) as highly realistic.

Third, a signaling environment may include many different signals [19,96]. Our survey focused only on consumers’ perceptions of a web seal. We see a valuable opportunity to conduct further empirical studies on the complementary and contrasting effects of related signals—for example, by studying whether additional assurance mechanisms may mitigate the harmful effects of doubtful web seals.

Finally, findings from our online experiment can be corroborated by other methodological approaches (e.g., field experiments) to improve realism and gain deeper insights into behavioral outcomes associated with consumer skepticism toward web seals.

Appendix A. : Overview of related research on web seals

Prior research on web seals and related IS certifications has been increasing in recent decades and can be divided into three major streams. First, scholars have examined web seals as an institutional mechanism, such as developing novel web seals (e.g., [81]) or innovating underlying attestation processes (e.g., [73]). Second, research taking an IS provider perspective analyzes the motivations of IS providers to acquire web seals, how they internalize the requirements and best practices contained in a web seal, and whether they can harness the benefits of web seals (e.g., [41,72]). Third, research adopting a consumer perspective seeks to explain how web seals affect consumers, why these effects occur, and how to predict them (e.g., [1, 75]). This study is positioned in the consumer-centric research stream because we examine unintended outcomes of web seals on consumers’ perceptions.

Consumer-centered researchers have studied whether the presence of a web seal leads to specific effects (i.e., via A/B tests), such as increases in consumers’ trust, perceived assurance, or purchase intention (e.g., [88,96]). For example, Mavlanova et al. [84] show that embedding verification seals (i.e., Verisign, TRUSTe, and VIPPS) increases consumers’ trust in a website. More recent seal research has started to examine how consumers interpret and process web seals in more detail. Related studies reveal, for example, that consumers’ perceptions of a seal are influenced by their understanding of the seal [78], their personality traits [75], their perception of the seal’s structural elements [65], and the website’s baseline trustworthiness [1].

Table 8
Example web seal research.

Studies	Effects		Context	Sample	Theoretical foundations
	T	PA			
[88]	o		Service information: legal advice	Students	Trust theory

(continued on next page)

7. Conclusion

In this study, we explore how consumer skepticism toward web seals arises and how it undermines seals’ intended outcomes. Integrating three related literature streams, namely, IS research on web seals, research on consumer skepticism, and signaling theory, we derived a contextualized theoretical framework comprising situational factors (web seal unreliability and seal authority incredibility) that influence consumer skepticism, leading to harmful outcomes. We tested our model in an online experiment with 757 participants, demonstrating that situational factors can foster consumer skepticism toward web seals and that skepticism reduces consumers’ perceived assurance, increases mistrust in IS providers, and even lead to inferences of IS providers’ manipulative intent. This study’s findings enrich researchers’ understanding of skepticism as an important but neglected concept in web seal research.

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CRedit authorship contribution statement

Sebastian Lins: Conceptualization, Formal analysis, Investigation, Methodology, Project administration, Visualization, Writing – original draft, Writing – review & editing. **Malte Greulich:** Conceptualization, Formal analysis, Investigation, Methodology, Visualization, Writing – original draft, Writing – review & editing. **Julian Löbbers:** Conceptualization, Writing – original draft. **Alexander Benlian:** Conceptualization, Funding acquisition, Resources, Supervision, Writing – review & editing. **Ali Sunyaev:** Conceptualization, Funding acquisition, Resources, Supervision, Writing – review & editing.

Declarations of competing interest

None

Table 8 (continued)

Studies	Effects <i>T</i>	PA	Context	Sample	Theoretical foundations
[103]	+	<i>o</i>	Online shopping: music	Students	Social cognitive theory
[125]		+	Online shopping: web cameras	Students	Elaboration Likelihood Model
[49]	<i>M</i>		Online shopping	Students	Trust theory
[50]	<i>o</i>		Online shopping	Students	No explicit theory
[43]	<i>M</i>		Online shopping	Students	Cue consistency / cue utilization theory
[53]	+	+	Online shopping: running shorts	Students	No explicit theory
[78]		<i>o</i>	Online booking: traveling	Students	Elaboration Likelihood Model
[16]	+		Online shopping: books	Internet Users	Social exchange theory
[84]	+		Online shopping: medicine	Students	Signaling theory
[15]	<i>M</i>		Online shopping: books	Millennials	No explicit theory
[75]		<i>M</i>	Online shopping: computers	Internet Users	Five-factor model of personality, Theory of planned behavior
[107]	<i>M</i>		Online shopping: computers	Internet Users	Expectation confirmation theory
[2]	<i>M</i>		Service selection	Internet Users	Cognitive complexity
[74]	+		Service selection	Internet Users	Elaboration Likelihood Model
[1]	<i>M</i>		Service selection	Internet Users	Swift Trust, Trust Tipping Point, Notion of humans as cognitive misers

Notes: *T* = trust; PA = perceived assurance; + = positive significant effect; *o* = no (significant) effect; *M* = under some conditions an effect was observed.

Prior research has mostly investigated the intended positive effects of seals (Table 8). Notable exceptions are studies by Löbbers et al. [76] and Balboni and Dragan [6], which provide initial insights into why counterintuitive effects emerge and call for more studies on the potential adverse effects of web seals. Löbbers et al. [76] conducted a Delphi study (*N* = 60). They identified consumer apathy (i.e., an emotion of indifference) and, more importantly, consumer skepticism (i.e., disbelief) as potential factors that dampen web seal effectiveness. The authors emphasize that some study participants, upon seeing web seals, “tend to question the seriousness and reliability of the respective vendor” ([76], p. 21) and propose that consumer skepticism may emerge from consumers’ limited familiarity with a seal, fake signals in the market, or dishonest seal authorities that do not conduct attestations with due care and diligence. However, we lack empirical validation for these assertions. Balboni and Dragan [6] discuss similar controversies and challenges of web seals in the context of novel data protection seals. They conclude that while many recommendations to overcome existing challenges were “made ten years ago, very few differences can be noted” today ([6], p. 93).

This study uses signaling theory [109] as a theoretical lens to identify situational factors that lead to consumer skepticism. As a fundamental premise for signaling, the costs associated with the web seal need to be sufficiently high to prevent low-quality IS providers from using it. Signal costs reflect one of the signaling theory’s core principles [109]. Obtaining a web seal is costly for an IS provider because it involves completing an attestation process in which the seal authority checks the IS provider’s adherence to the prescribed requirements. Hence, obtaining a web seal may require a disproportionate investment for low-quality IS providers compared with high-quality ones [9]. Similarly, low-quality IS providers might face high penalties or negative word-of-mouth effects if they fail to adhere to the seal requirements or use a web seal without permission (i.e., fake signal). Assuming that these penalizing effects offset the potential gains from cheating (i.e., sending a fake seal), web seals can be considered effective signals to reduce information asymmetries between consumers and IS providers.

Appendix B. Experiment screenshots

See Fig. 5–8.

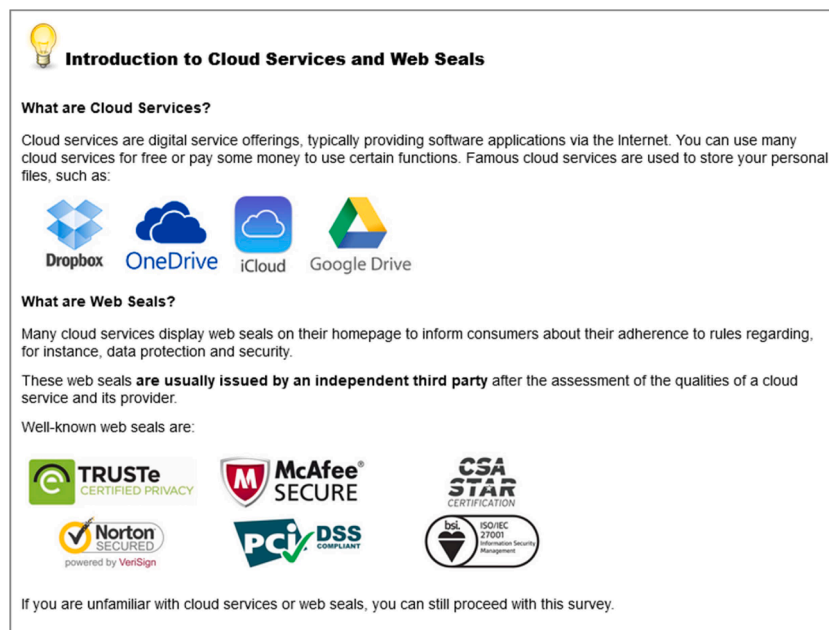


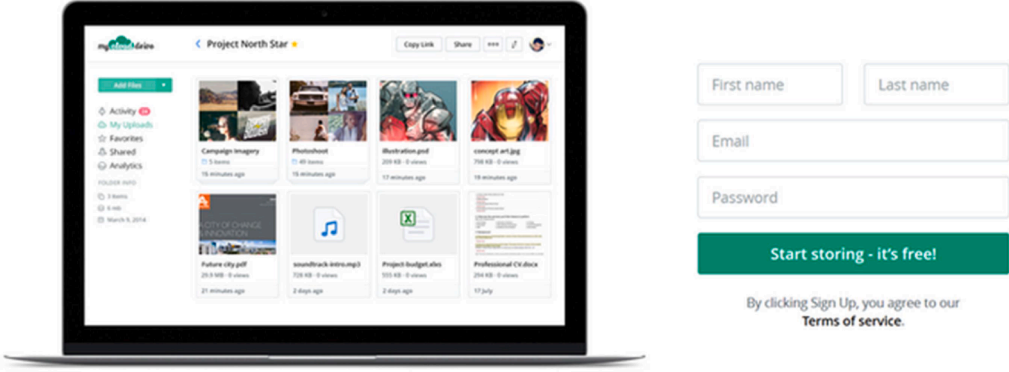
Fig. 5. Onboarding information.

Download | Login

mycloud drive

Store everything, Share anything

Get to all your files from anywhere, on any device, and share them with anyone.




The screenshot shows a laptop displaying the MyCloudDrive web interface. The interface includes a sidebar with navigation options like 'Activity', 'My Clouds', 'Favorites', 'Shared', and 'Analytics'. The main area shows a file gallery for 'Project North Star' with various files like 'Campaign Imagery', 'PhotoShoot', 'Illustration.pdf', 'concept art.jpg', 'Future city.pdf', 'Workshop Intro.mp3', 'Project Budget.xlsx', and 'Professional CV.docx'. To the right of the laptop is a sign-up form with fields for 'First name', 'Last name', 'Email', and 'Password', followed by a green 'Start storing - it's free!' button. Below the button is a note: 'By clicking Sign Up, you agree to our Terms of service.'

Learn what MyCloudDrive can do for you [Take a tour](#)

Quickly store and share anything

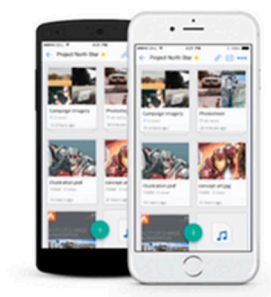
MyCloudDrive is fast file sharing built into the system tray. Upload your files, folders, links, screenshots, and notes. Instantly get a link to share, or send via email.



The screenshot shows a laptop with the MyCloudDrive system tray icon in the bottom right corner. The icon is a small window showing a file gallery, similar to the one on the laptop screen above.

Take your files anywhere

Save files on your computer, then access them on your phone from the road. Everything you keep in MyCloudDrive is synced automatically to all your devices.




The screenshots show the MyCloudDrive mobile app interface on a smartphone and a tablet. Both screens display a file gallery with various images and documents, matching the desktop view.

Protected Clouds are Better Clouds

MyCloudDrive has been awarded the Trusted Cloud assurance seal. Trusted Cloud certifies cloud services by carefully checking a set of globally recognized data protection and security requirements.







[Read more!](#)



The logo for Trusted Cloud Certified Security, featuring a shield with a padlock icon and the text 'Trusted Cloud™ CERTIFIED SECURITY' and 'Click for more information'.

Fig. 6. MyCloudDrive’s website shows information about the cloud service and the “Trusted Cloud” web seal.

MyCloudDrive - Next generation of file transfer

-  **Simple**
Whether you're uploading, sharing, or viewing files, everything is just a click away!
-  **Plenty of space**
25 GB free cloud storage to store all your precious files.
-  **Powerful**
View photos, videos, documents, presentations, spreadsheets, books, audios, fonts, codes & more, online.
-  **Fast**
While your files are uploading, you can share them instantly with a link or email, in real-time. No waiting!
-  **No limits**
Send files and folders of any size or format from a complete photo collection to a HD movie.
-  **Secure**
All files are encrypted with AES-256 standard and we ensure no one can gain unauthorized access.

MyCloudDrive has everything you need to share files better - and it's free!

[Sign up for free](#)

Do more with MyCloudDrive Plus!

MyCloudDrive Plus is a single home for your work and your personal stuff. With 1 TB (1,000 GB) of space and unrivaled sync, your photos, videos, docs and other files are ready no matter where or when you need them.

[Get MyCloudDrive Plus](#)

Just \$9.99/month or \$99/year

[MyCloudDrive Plus](#) [Tour](#) [Apps](#) [Blog](#) [Formats](#) [Terms](#) [Privacy](#) [Help](#) [Contact](#)

Fig. 6. (continued).

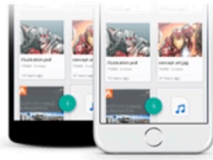
1. Which of the following elements did you recognize on the website?

Kindly note, not each item listed below was shown previously

- MyCloudDrive's logo
 - Information on MyCloudDrive's functionalities and properties
 - The "Trusted Cloud" web seal
 - A red box with question marks
 - Pricing information on MyCloudDrive Plus
 - A red fox
-
- I do not remember



Please note that MyCloudDrive has been awarded the web seal "Trusted Cloud". If you did not recognize the web seal on the previous website, please take a look at this website excerpt again.



road. Everything you keep in MyCloudDrive is synced automatically all your devices.

Protected Clouds are Better Clouds

MyCloudDrive has been awarded the Trusted Cloud assurance seal. Trusted Cloud certifies cloud services by carefully checking a set of globally recognized data protection and security requirements.

[Read more!](#)



MyCloudDrive - Next generation of file transfer

Fig. 7. Attention check and reminder that MyCloudDrive was awarded the trusted cloud web seal.



What is the “Trusted Cloud” web seal?

We have summarized the most important information for you.

Aim and scope of the “Trusted Cloud” web seal

The “Trusted Cloud” web seal provides security and privacy assurances to consumers. The seal helps consumers to gauge the security posture of cloud service providers and determine if their services are suitably secure. It covers over 50 security and data protection controls, including encryption and key management, data center security, secure access management, cloud monitoring, and security incident management. The “Trusted Cloud” web seal is issued and managed by the Cloud Protection Alliance.

Trusted Cloud: A web seal that reliably protects the interests of consumers

To use the “Trusted Cloud” web seal, cloud service providers must fulfill a wide range of criteria based on international standards and industry best practices. Consumers can review the criteria catalog in case they are interested in better understanding what is safeguarded by the web seal.

To prove adherence to the criteria catalog, cloud service providers undergo a comprehensive assessment, including on-site assessments, technical security tests, and employee interviews. Customers can review assessment reports of cloud service providers on the web seal’s website and get detailed information about the assessment process and its results. This comprehensive assessment substantiates that cloud service providers are honest about fulfilling the respective criteria.

The web seal is valid for a maximum of three years. Cloud service providers must undergo yearly re-assessments (on a spot-check basis) to ensure compliance throughout the validity period. The web seal will be revoked in case of cloud service providers’ non-compliance.

Consumers can easily verify the reliability of a web seal they encounter on a provider’s website. They can click on the web seal and get redirected to the seal’s website, which provides up-to-date information about the compliance status.

Cloud Protection Alliance: The doubtful organization behind “Trusted Cloud”

The Cloud Protection Alliance (CPA) is a for-profit organization that earns money by issuing web seals. Founded three years ago, the CPA is a fairly new player in the market, making it difficult to judge its reputation and competence in assessing cloud services.

The CPA was recently charged with a \$200,000 fee by the US Federal Trade Commission because it failed to conduct re-assessments of over 500 previously certified cloud services between March 2021 and January 2022, despite promising otherwise to consumers.

Surprisingly, the CPA seems not to be accredited by the American National Standards Institute (ANSI), which is usually the case for this type of organization. The ANSI typically attests that seal authorities fulfill key principles of the ISO/IEC 17065 standard, including being impartial and having technical and legal knowledge.

Fig. 8. Example treatment (high reliability, low credibility).

Appendix C. : Manipulation texts

High web seal reliability.

Trusted Cloud: A web seal that reliably protects the interests of consumers.

To use the “Trusted Cloud” web seal, cloud service providers must fulfill a wide range of criteria based on international standards and industry best practices. Consumers can review the criteria catalog in case they are interested in better understanding what is safeguarded by the web seal.

To prove adherence to the criteria catalog, cloud service providers undergo a comprehensive assessment, including on-site assessments, technical security tests, and employee interviews. Customers can review assessment reports of cloud service providers on the web seal’s website and get detailed information about the assessment process and its results. This comprehensive assessment substantiates that cloud service providers are honest about fulfilling the respective criteria.

The web seal is valid for a maximum of three years. Cloud service providers must undergo yearly re-assessments (on a spot-check basis) to ensure compliance throughout the validity period. The web seal will be revoked in case of cloud service providers’ non-compliance.

Consumers can easily verify the reliability of a web seal they encounter on a provider’s website. They can click on the web seal and get redirected to the seal’s website, which provides up-to-date information about the compliance status.

Low web seal reliability.

Trusted Cloud: A simplistic web seal.

To use the “Trusted Cloud” web seal, cloud service providers must fulfill vague criteria. It is challenging for consumers to assess the reliability of the web seal and truly understand what is safeguarded because the criteria catalog is not publicly available.

To prove adherence to the criteria catalog, cloud service providers conduct an unsupervised self-assessment and submit their assessment results into a public registry. Afterward, they are allowed to use the web seal on their website. Compared to other web seals, cloud service providers are not required to undergo any assessments by an independent party. Self-assessments bear the risk that cloud service providers answer them dishonestly.

The seal is valid for six years and does not require re-assessments to ensure compliance throughout the validity period. This is in contrast to other

well-known web seals that require yearly re-assessments. Fraudulent actions of cloud service providers may thus not be revealed during the validity period.

Consumers cannot verify the reliability of a web seal they encounter on a provider’s website. The problem is that consumers lack information to check if providers legitimately use the web seal. Recent news reports even show that some cloud service providers have placed the “Trusted Cloud” logo on their websites without permission.

High seal authority credibility.

Cloud Protection Alliance: The credible organization behind “Trusted Cloud”.

The Cloud Protection Alliance (CPA) is a non-profit organization with a good reputation in the market, aiming to create a safe environment for consumers to use cloud services. The CPA was founded in 2007 and is known for its competence and longstanding experience in certifying cloud services.

The CPA is renowned for protecting the interests of consumers and handling complaints about certified cloud services promptly.

The American National Standards Institute (ANSI) officially accredited the CPA, which underlines its credibility in the market. The ANSI attests that the CPA fulfills key principles of the ISO/IEC 17065 standard. For example, the ANSI monitors that the CPA’s experts are impartial and have technical and legal knowledge.

Low seal authority credibility.

Cloud Protection Alliance: The doubtful organization behind “Trusted Cloud”.

The Cloud Protection Alliance (CPA) is a for-profit organization that earns money by issuing web seals. Founded three years ago, the CPA is a fairly new player in the market, making it difficult to judge its reputation and competence in assessing cloud services.

The CPA was recently charged with a \$200,000 fee by the US Federal Trade Commission because it failed to conduct re-assessments of over 500 previously certified cloud services between March 2021 and January 2022, despite promising otherwise to consumers.

Surprisingly, the CPA seems not to be accredited by the American National Standards Institute (ANSI), which is usually the case for this type of organization. The ANSI typically attests that seal authorities fulfill key principles of the ISO/IEC 17065 standard, including being impartial and having technical and legal knowledge.

Appendix D. : Measurement instrument

Measurement instrument

Constructs and corresponding items	Mean (SD)	Loading
<u>Web seal unreliability</u> , parcel construct ($CR = 0.967$; $AVE = 0.806$)		
Web seal unreliability: Signal Fit (adapted from [31])		
SF1 (r) Very unbelievable / Very believable	3.34 (1.80)	0.893
SF2 (r) Very inaccurate / Very accurate	3.37 (1.80)	0.892
SF3 (r) Very unauthentic / Very authentic	3.32 (1.81)	0.897
Web seal unreliability: Signaler Honesty (adapted from [95])		
PH1 (r) Dishonest / Honest	3.19 (1.75)	0.906
PH2 (r) Unreliable / Reliable	3.13 (1.74)	0.905
PH3 (r) Insincere / Sincere	3.22 (1.77)	0.894
PH4 (r) Undependable / Dependable	3.17 (1.75)	0.895
<u>Seal authority incredibility</u> (adapted from [4,95]) ($CR = 0.972$; $AVE = 0.797$)		
AC1 (r) Dishonest / Honest	3.33 (1.77)	0.927
AC2 (r) Unreliable / Reliable	3.34 (1.80)	0.933
AC3 (r) Insincere / Sincere	3.38 (1.75)	0.914
AC4 (r) Not an expert / Expert	3.25 (1.74)	0.906
AC5 (r) Not knowledgeable / Knowledgeable	3.09 (1.72)	0.893
AC6 (r) Not skilled / Skilled	3.23 (1.72)	0.906
AC7 (r) Close-minded / Open-minded	3.33 (1.62)	0.866
AC8 (r) Subjective / Objective	3.43 (1.72)	0.871
AC9 (r) Partial / Impartial	3.34 (1.80)	0.814
<u>Disbelief in web seal</u> (adapted from [89]) ($CR = 0.951$; $AVE = 0.765$)		
StS1 I am skeptical about the accuracy of assurance claims made by the ‘Trusted Cloud’ web seal	4.17 (1.97)	0.918
StS2 Because assurance claims are exaggerated, consumers would be better off if the ‘Trusted Cloud’ web seal is removed from the website	3.84 (1.98)	0.882
StS3 Most assurance claims of the ‘Trusted Cloud’ web seal are intended to mislead rather than inform consumers	3.85 (1.93)	0.878

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(continued)

Constructs and corresponding items	Mean (SD)	Loading
StS4 I don't believe assurance claims of the 'Trusted Cloud' web seal until the CPA provides evidence that the claims are true	4.19 (1.91)	0.763
StS5 Assurance claims of the 'Trusted Cloud' web seal lead people to believe things that aren't true	4.04 (1.91)	0.887
StS6 I do not believe the assurance claims made by the 'Trusted Cloud' web seal	3.90 (1.93)	0.911
<u>Mistrust in seal authority</u> (adapted from [88], applying the mistrust conceptualization from [18,47,68]) (CR = 0.978; AVE = 0.830)		
StA1 * Overall, I question whether CPA is an excellent assessment body	4.13 (1.89)	–
StA2 I'm skeptical that CPA performs its role of giving assurance very effectively	4.09 (1.89)	0.909
StA3 I'm unsure whether CPA is competent and effective in providing their assurance services	4.12 (1.89)	0.925
StA4 I'm doubtful that CPA is concerned about what is best for me	4.04 (1.89)	0.909
StA5 If I required help, I do not know whether CPA would do what it could on my behalf	4.17 (1.88)	0.895
StA6 I'm unsure whether to believe that CPA is interested in helping me, not just in serving itself	4.17 (1.92)	0.907
StA7 Overall, I'm unsure whether CPA is truthful	4.05 (1.93)	0.904
StA8 I'm skeptical that CPA provides me factual information	4.08 (1.90)	0.925
StA9 I'm cautious about whether CPA keeps its promises and commitments	4.23 (1.83)	0.893
StA10 I'm skeptical that CPA is trustworthy	4.08 (1.93)	0.933
<u>Inferences of IS provider's manipulative intent</u> (adapted from [13]) (CR = 0.949; AVE = 0.861)		
MI1 MyCloudDrive tried to manipulate the audience by embedding the 'Trusted Cloud' web seal in ways that I don't like	3.74 (1.99)	0.928
MI2 I was annoyed by the 'Trusted Cloud' web seal because the MyCloudDrive seemed to be trying to inappropriately manage or control the consumer audience	3.66 (2.01)	0.925
MI3 MyCloudDrive tried to be persuasive by being excessively manipulative with the 'Trusted Cloud' web seal	3.87 (2.00)	0.931
<u>Perceived assurance</u> (adapted from [51]) (CR = 0.973; AVE = 0.877)		
PA1 I feel confident that MyCloudDrive won't use or sell my personal data for other purposes without my authorization	4.71 (1.88)	0.942
PA2 I feel confident that MyCloudDrive won't share my personal data with other entities without my authorization	4.72 (1.87)	0.936
PA3 * I'm confident of the privacy of my personal data when using MyCloudDrive	4.73 (1.86)	–
PA4 I feel confident that MyCloudDrive implements appropriate security measures to protect stored data	4.81 (1.83)	0.939
PA5 I feel confident that MyCloudDrive protects my data from accidentally being altered or destroyed during a transmission on the Internet	4.73 (1.87)	0.945
PA6 I feel safe storing my data in MyCloudDrive	4.69 (1.89)	0.921
<u>Mistrust in IS provider</u> (adapted from [88], applying the mistrust conceptualizations from [18,47,68]) (CR = 0.968; AVE = 0.750)		
MCP1 I'm doubtful that MyCloudDrive keeps my best interests in mind	4.05 (1.93)	0.887
MCP2 I'm concerned that MyCloudDrive will be ready and willing to help me	4.20 (1.82)	0.762
MCP3 I'm unsure whether MyCloudDrive is interested in my well-being, not just its own	4.25 (1.92)	0.874
MCP4 I'm skeptical that MyCloudDrive is honest	4.09 (1.92)	0.903
MCP5 I'm cautious about whether MyCloudDrive would keep its promises and commitments	4.43 (1.88)	0.849
MCP6 I question whether MyCloudDrive is sincere and genuine	4.25 (1.90)	0.895
MCP7 I'm unsure whether MyCloudDrive is competent and effective in providing their services	4.13 (1.92)	0.887
MCP8 Overall, I cannot tell whether MyCloudDrive is a capable and proficient cloud service provider	4.28 (1.99)	0.878
MCP9 In general, I doubt that MyCloudDrive is very knowledgeable about cloud services	3.68 (1.90)	0.801
MCP10 I'm skeptical that MyCloudDrive is a trustworthy cloud service provider	4.24 (1.93)	0.911
<u>Web seal costs</u> (adapted from [123]) (CR = 0.902; AVE = 0.754)		
SC1 Achieving and maintaining the 'Trusted Cloud' web seal takes significant effort and expense	4.73 (1.74)	0.892
SC2 When I see the 'Trusted Cloud' web seal, I assume that MyCloudDrive must invest a lot of time and money to achieve and maintain it	4.80 (1.69)	0.862
SC3 The achievement and maintenance of the 'Trusted Cloud' web seal requires MyCloudDrive to make a significant financial investment	4.75 (1.66)	0.851
<u>Disposition to trust</u> (adapted from [33]) (CR = 0.875; AVE = 0.639)		

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(continued)

Constructs and corresponding items		Mean (SD)	Loading
DtT1	I generally have faith in humanity	4.68 (1.64)	0.844
DtT2	I generally trust other people unless they give me reason not to	5.03 (1.64)	0.744
DtT3	I tend to count upon other people	4.15 (1.75)	0.706
DtT4	I feel that people are generally reliable	4.48 (1.61)	0.889
<u>Dispositional skepticism</u> (adapted from [92]) ($CR = 0.955$; $AVE = 0.780$)			
DS1	(r) We can depend on getting the truth in most web seals	3.31 (1.57)	0.898
DS2	(r) Web seals' aim is to inform the consumer	2.92 (1.46)	0.790
DS3	(r) I believe web seals are informative	3.03 (1.48)	0.880
DS4	(r) Web seals are generally truthful	3.19 (1.49)	0.905
DS5	(r) Web seals are a reliable source of information about the quality and performance of products and services	3.14 (1.55)	0.908
DS6	(r) In general, web seals present a true picture of the product or service being assessed	3.20 (1.53)	0.910
<u>Social desirability</u> (adapted from [34]) ($CR = 0.729$; $AVE = 0.475$)			
SDRS1	I am always polite, even to disagreeable people	5.52 (1.35)	0.689
SDRS2	I am always willing to admit it when I make a mistake	5.83 (1.15)	0.592
SDRS3	No matter who I'm talking to, I'm always a good listener	5.62 (1.25)	0.774
<u>Cynicism</u> (adapted from [112]) ($CR = 0.909$; $AVE = 0.668$)			
CY1	I often wonder what hidden reason another person may have for doing something nice for me	4.65 (1.61)	0.827
CY2	Most people pretend to care about things they hate so that they will gain profit or an advantage	4.64 (1.57)	0.836
CY3	In order to get ahead, people pretend to care more about one another than they really do	5.00 (1.49)	0.784
CY4	I tend to be on my guard with people who are more friendly than I had expected	4.89 (1.57)	0.782
CY5	I find that most people disguise their true motives for doing something	4.75 (1.55)	0.854
<u>Persuasion knowledge</u> (adapted from [7]) ($CR = 0.889$; $AVE = 0.667$)			
PK1	I know when a web seal is "too good to be true"	4.44 (1.64)	0.852
PK2	I can tell when a web seal has strings attached	4.23 (1.69)	0.862
PK3	I have no trouble understanding the tactics used by web seals	4.48 (1.55)	0.752
PK4	I know when a web seal is pressuring me to buy	4.50 (1.64)	0.797
<u>Web seal involvement</u> (adapted from [67]) ($CR = 0.940$; $AVE = 0.840$)			
SI1	I have a strong interest in web seals	4.22 (1.83)	0.905
SI2	Web seals are very important to me	4.45 (1.76)	0.922
SI3	For me web seals matter a lot	4.45 (1.78)	0.923
<u>Privacy concerns</u> (adapted from [12]) ($CR = 0.956$; $AVE = 0.815$)			
PC1	I am concerned that companies are collecting too much personal information from me	5.47 (1.54)	0.902
PC2	I am concerned that companies will use my personal information for other purposes without my authorization	5.38 (1.56)	0.903
PC3	I am concerned that companies will share my personal information with other entities without my authorization	5.48 (1.53)	0.913
PC4	I am concerned that unauthorized persons (e.g., hackers) may have access to my personal information collected by companies	5.46 (1.56)	0.898
PC5	I am concerned about the privacy of my personal information during online transactions	5.44 (1.53)	0.897

Note: * items removed during confirmatory factor analysis. (r) items are reverse scaled.

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