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Whitelist or Leave Our Website! Advances in the Understanding of User Response to Anti-Ad-Blockers

Ignacio Redondo [1,*] and Gloria Aznar [2]

[1] Departamento de Financiación e Investigación Comercial, Universidad Autónoma de Madrid, 28049 Madrid, Spain
[2] Departamento de Marketing e Investigación Comercial, Universidad CEU San Pablo, 28003 Madrid, Spain
* Correspondence: ignacio.redondo@uam.es

Abstract: Website publishers cannot monetize the ad impressions that are prevented by ad-blockers. Publishers can then employ anti-ad-blockers that force users to choose between either accepting ad impressions by whitelisting the website in the ad-blocker, or leaving the website without accessing the content. This study delineates the mechanisms of how willingness to whitelist/leave the website are affected by the request's sensitivity to recipients as well as the users' psychological reactance and evaluation of the website advertising. We tested the proposed relationships using an online panel sample of 500 ad-blocker users, who were asked about their willingness to whitelist/leave their favorite online newspaper after receiving a hypothetical anti-ad-blocker request—four alternative requests with different sensitivity levels were created and randomly assigned to the participants. The results confirmed that (a) the request's sensitivity can improve the recipient's compliance, (b) users' psychological reactance plays an important role in explaining the overall phenomenon, and (c) a favorable evaluation of the website advertising can improve willingness to whitelist. These findings help to better understand user response to anti-ad-blockers and may also help publishers increase their whitelist ratios.

Keywords: advertising avoidance; ad-blocking; consumer behavior; website management

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1. Introduction

Ad-blockers—which are typically free-to-use browser extensions and mobile applications—allow users to significantly reduce the ads displayed on the websites visited. This remarkable efficiency, along with ease of use, has stimulated the rapid adoption of ad-blockers, which in a few years, could reach one billion users worldwide. As a side effect, ad-supported websites can no longer monetize the ad impressions that are prevented by ad-blockers, and this loss could represent almost 25% of total digital advertising revenues [1]. This situation is considered to be one of the most important inefficiencies in the current digital advertising ecosystem [2]. Website publishers have reacted by implementing various counter-ad-blocker strategies, the most popular of which is the wall strategy [3]. This strategy consists of showing a pop-up warning requesting users to choose between "whitelisting" the intended website in their ad-blockers (i.e., allowing the website's advertising to pass through the block) or leaving that website without accessing the content [3,4].

With the wall strategy, publishers aim to achieve both a high ratio of website whitelisting, which would enable monetizing a large amount of ad impressions, and a low ratio of website abandonment, which would imply a low reduction of visitor traffic and other monetizable metrics such as clicks and conversions. However, this strategy can produce poor results, as observed in a study in which 60% of users chose not to whitelist and left the website [4]. Despite its importance, surprisingly little is known about what users consider when forced to choose between whitelisting or leaving the intended website.

We aim to gain a better understanding of the role played by (a) the warning's content, (b) the user's attitude toward digital advertising, and (c) the user's psychological reactance.

The first objective is to improve the warning's effectiveness. Previous research suggests that appealing to reciprocity increases the likelihood of a compliant response [5], but using a serious, rational style versus a light, humorous style is inconsequential [6]. This study proposes appealing to reciprocity with more sensitivity to users—that is, in a more user-centric, less intimidating, and more friendly way. The second objective is to better understand the role of attitude toward digital advertising. Recent research highlights the existence of substantial heterogeneity in consumers' attitude toward digital advertising, which strongly influences their response to ad-blockers and anti-ad-blockers [1,7]. This study proposes that the response to an anti-ad-blocker wall is conditioned not only by the general attitude toward online advertising but also by the specific attitude toward the advertising of the corresponding website. The third objective is to assess whether the theory of psychological reactance can be used as a conceptual framework to understand users' responses to anti-ad-blocker walls. Previous studies [8,9] have confirmed a boomerang effect (i.e., the opposite of what was intended) when consumers perceive the message as a threat to their freedom, which provokes a psychological reaction (or "reactance") that is intended to restore their threatened freedom. The theory of psychological reactance has been widely used to explain online advertising avoidance [10], but to date, its explanatory power on the response to anti-ad-blocker walls has never been empirically confirmed.

Through a structural equation model, we delineate the mechanisms of how willingness to whitelist/leave the website is affected by the warning's sensitivity to recipients, the user's psychological reactance, and the user's evaluation of both online advertising in general and the advertising of the specific website. The model describes how the variables considered relate to each other and ultimately influence the willingness to whitelist/leave the website. The model allows for both the evaluation of the measures of the variables considered and the testing of the hypothesized relationships between variables.

As far as we know, some of the findings represent original contributions to the state of knowledge. First, designing the anti-ad-blocker warning in a more sensitive way to users can increase (reduce) their whitelist (abandonment) ratio. Second, improving the specific attitude toward the website's advertising can have a direct impact on users' complaint response to the anti-ad-blocker warning. Last but not least, using the theory of psychological reactance can help explain the set of mechanisms that affect the willingness to whitelist/leave the website.

2. Conceptual Framework and Hypothesis Development

Two parties are involved in the proposed model: individuals who use ad-blockers to reduce their exposure to advertising on the websites visited, and websites that use anti-ad-blockers to try to persuade such individuals to accept ad impressions in exchange for accessing the content. Anti-ad-blockers can detect ad-blocker users and display to the users a pop-up warning requesting the website whitelisting. The model suggests that users can evaluate such a request under the influence of their assessment of the warning's sensitivity and their tendency to react to freedom restrictions. Users can then choose either to whitelist or to leave the website, which are two decisions that are driven by the evaluation of both the warning and the website advertising. In turn, the specific evaluation of the website advertising can be influenced by the general evaluation of online advertising in terms of overall opinion, perceived intrusiveness, perceived harmfulness, and privacy concern, which are four factors that can be affected by users' tendency toward reactance. Figure 1 shows all the variables and relationships in the model. The following discussion of theoretical foundations and research hypotheses is divided into three subsections for better clarity.

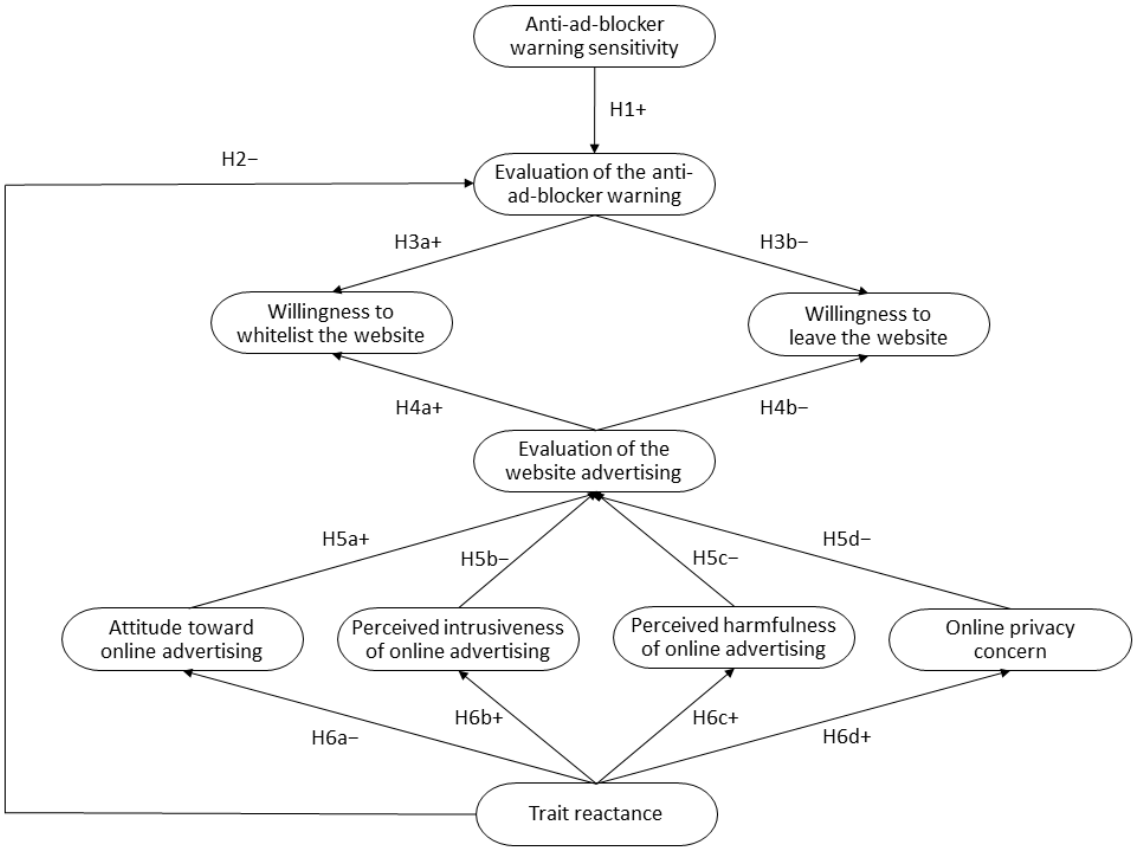

Figure 1. Hypothesized structural model.

2.1. Anti-Ad-Blocker Warning Evaluation Drivers

Anti-ad-blocker warnings are disturbing in themselves because they (a) treat ad-blocker users as responsible for inappropriate behavior, (b) interrupt the utilitarian/hedonic activities performed by users, and (c) claim website whitelisting as a requirement to access the content. The use of strong language in such warnings could seem justified both by a reasonable consistency between form and content and by the websites' legitimate claim of advertising revenue in exchange for published content. However, many previous studies (especially on the promotion of healthy and pro-environmental behaviors) have shown that normative messages are more effective when expressed in language that is sensitive to the recipients. More specifically, normative messages tend to be better evaluated when they avoid controlling/dogmatic language [11,12], moderate forceful expressions [8], show more cautiousness/politeness/tactfulness [13], and reduce assertive phrasing [14,15]. As normative messages, anti-ad-blocker warnings will probably also tend to be better evaluated when designed in a more user-sensitive way.

Hypothesis 1. *The sensitivity of an anti-ad-blocker warning to users will have a positive effect on their evaluation of such a warning.*

Psychological reactance theory, which posits that individuals tend to undergo motivational reactions to freedom-threatening stimuli in order to restore their affected freedoms [16,17], is by far the most widely used theory to underpin previous studies on online advertising avoidance [10]. Indeed, it has helped researchers to understand why users can develop aversive reactions and avoidance responses when exposed to a variety of online promotional stimuli, such as personalized advertising [18], pop-up ads [19], location-based advertising [20], YouTube video ads [21], and native advertising on Facebook [22]. Interestingly, it has also helped researchers to understand (a) why users can become motivationally

aroused to maintain their control over online advertising by means of ad-blockers that automatically filter the more intrusive and annoying ads [23,24] and (b) why ad-blocker users can develop aversive reactions whenever a website's anti-ad-blocker tool threatens their control over advertising by imposing ad-blocker deactivation as a precondition for accessing the website [25].

Psychological reactance has been conceptualized using two basically different but related approaches: as a situational response ("state reactance") that is induced by a freedom-threatening stimulus, and as a personality disposition ("trait reactance") that shapes responses to freedom-threatening stimuli [26]. The former approach was predominant in the early decades, whereas the latter has been gaining importance in subsequent decades [27]. We opted for the latter approach in order to use a standard measure that is applicable to both the general reaction to online advertising and the specific reaction to an anti-ad-blocker warning.

Trait reactance, sometimes also called "proneness reactance," is characterized by large individual differences and can even be used as a meaningful segmentation criterion [28,29]. The individual level of trait reactance determines to what extent each one perceives threats to freedom, experiences negative emotions and cognitions, and seeks freedom restoration [30,31]. In response to public health messages (e.g., anti-binge drinking), individuals higher (lower) in trait reactance tend to perceive greater (lesser) threats to their freedoms and then to develop less (more) favorable attitudes toward the message content [32,33]. However, the role of trait reactance could be more relevant in response to anti-ad-blocker warnings because, if the warning is not heeded, users would immediately and completely lose their threatened freedom. Thus, the trait reactance of ad-blocker users can be expected to exacerbate their perceived freedom threat and then negatively influence their evaluation of the anti-ad-blocker warning.

Hypothesis 2. *Users' level of trait reactance will have a negative effect on their evaluation of the anti-ad-blocker warning.*

2.2. Drivers of the Willingness to Whitelist/Leave the Website

The evaluation of persuasive messages can motivate recipients to act as intended, but the type of message can affect whether such influence is direct or indirect. With regards to advertising messages, the most suitable hierarchy of effects is that the ad evaluation influences the brand preference, which in turn influences the brand purchase intention/decision [34,35]. However, with respect to warning messages, it is most likely that the warning evaluation has a direct impact on compliance or non-compliance [36]. To achieve the intended persuasion, ads are advised to make creative claims that appeal to users and then improve their brand preferences [37], whereas warnings are advised to make reasonable claims that help users process the advantages of compliance over non-compliance [36]. In the case of anti-ad-blocker warnings, website visitors are confronted with a request of immediate ad-blocker deactivation, but this strong message can ironically lead them to leave the website. The degree to which an anti-ad-blocker warning is better (worse) evaluated by users is expected to encourage their willingness to whitelist (leave) the website.

Hypothesis 3a. *The more positively users evaluate the anti-ad-blocker warning, the greater their willingness to whitelist the website.*

Hypothesis 3b. *The more negatively users evaluate the anti-ad-blocker warning, the greater their willingness to leave the website.*

The willingness to whitelist/leave the website is also expected to depend on the website advertising evaluation, which can be derived from social exchange theory. According to this theory [38], subjective cost–benefit analyses guide decisions about social and economic

relationships. The parties involved in a relationship implicitly calculate the worth of the exchange by comparing the associated rewards and costs. If one party perceives that it is losing out in the exchange, it will probably try to end the relationship early. However, if the parties are mutually satisfied, the relationship will tend to be stable. Moreover, a more stable relationship is expected when the parties behave in accordance with the "norm of reciprocity" by returning benefits for benefits received [39].

Social exchange theory has helped understand advertising avoidance/acceptance within users' interactions with the media. Avoidance of TV commercials via remote controls is more prevalent among those users who perceive such ads as a psychological cost that diminishes the value provided by the content of programs [40]. Acceptance of targeted online advertising is more likely among those who value the benefits of receiving personalized offers more than the costs of disclosing personal data [5]. It is also possible to consider cost–benefit trade-offs such as when Facebook users perceive its ads as offering a relative balance of advantages (entertainment, informativeness, distinction, etc.) and disadvantages (intrusiveness, privacy invasiveness, etc.) [41].

Although not previously described, social exchange theory provides a promising approach for understanding responses to anti-ad-blocker warnings. Websites appealing to reciprocity in such warnings demand that the beneficiaries of content help finance its costs through advertising acceptance. Users who comply with the warning will have the reward of accessing content and the cost of enduring more ad impressions, while users who do not comply with the warning will obtain the reward of avoiding ad impressions but at the cost of not accessing content. The higher the users evaluate the website advertising, the more easily they will accept ad impressions and comply with the request to whitelist the website. In turn, the lower the users evaluate the website advertising, the more satisfaction they will find in avoiding ad impressions and rejecting the request by leaving the website. Therefore, the appeal to reciprocity may contribute to either compliance or non-compliance with the warning depending on whether users have favorable or unfavorable attitudes toward the website advertising.

Hypothesis 4a. *The more positively users evaluate the website advertising, the greater their willingness to whitelist the website.*

Hypothesis 4b. *The more negatively users evaluate the website advertising, the greater their willingness to leave the website.*

2.3. General and Specific Advertising Evaluation Drivers

Specific evaluation of a website's advertising is expected to depend on a general evaluation of online advertising, which can be derived from cognitive dissonance theory, as suggested by Bauer et al. [42] and Dix et al. [43]. This theory states that individuals have natural tendencies to (a) keep a balance among their cognitions (beliefs, attitudes, evaluations, etc.), (b) experience psychological discomfort when facing inconsistent cognitions, and (c) become motivated to reduce such discomfort by increasing consistency [44]. Individuals tend to have more consistent and stable cognition about advertising in general than about specific forms of advertising, implying that their evaluation of the advertising as a whole typically guides their evaluation of particular advertising practices [42]. In fact, a general attitude toward advertising has a direct influence on specific attitudes toward mobile [45], SMS [43], and in-game [46] advertising. Interestingly, Speck and Elliott [47] found remarkable levels of consistency in how some advertising-related problems (interference, disturbance, annoyance, etc.) were perceived in different media (magazines, newspapers, television, and radio).

We suggest that a website's advertising evaluation will be consistently influenced by the evaluation of four aspects of online advertising in general: overall attitude; perceived intrusiveness; perceived harmfulness (i.e., device performance reduction); and online privacy concern. None of the four proposed hypotheses has been specifically tested, but some

related supporting evidence is available: specific attitude toward Facebook advertising depends positively on general attitude toward online advertising [48], negatively on perceived intrusiveness of online advertising [49], and negatively on online privacy concern [50,51]. On the basis of this rationale and indirect evidence, we propose the following hypotheses.

Hypothesis 5. *Evaluation of the website advertising will be positively influenced by (a) attitude toward online advertising and negatively influenced by (b) perceived intrusiveness of online advertising, (c) perceived harmfulness of online advertising, and (d) online privacy concern.*

Trait reactance is hypothesized to influence the four considered aspects of general online advertising. With respect to attitude toward online advertising, individuals higher in trait reactance are characterized by a greater resistance to being persuaded by interpersonal and mass communications [33], so that they will have a worse disposition toward any media stimulus with perceived persuasive intention. The same individuals are reluctant to receive stimuli that are not voluntarily chosen, which explains their tendency to reject unsolicited promotional messages [52,53], such as the vast majority of online advertising impressions. Thus, trait reactance is expected to negatively influence attitude toward online advertising. In relation to perceived intrusiveness of online advertising, individuals using the Internet tend to experience high levels of control and to be very involved in achieving their hedonic/utilitarian goals [54]. In the online environment, users easily feel that advertising intrudes on processes, interrupts activities, and distracts attention, all of which create a perception of goal impediment [55]. Not surprisingly, forced exposure to intrusive digital advertising is perceived as a restriction of the desire for control over online behavior [19]. It is thus reasonable to expect that individuals who are more prone to psychological reactance will be more sensitive to the intrusiveness of online advertising. Regarding perceived harmfulness of online advertising, digital ads can slow down Internet speed, contain malicious code, and reduce device performance in other ways [20,55]. Users may then perceive online advertising as a threat or hindrance to the free use of the Internet on their devices. Thus, although there is no previous evidence, we suggest that individuals more prone to psychological reactance will likely be more concerned about the harmfulness of online advertising. Concerning online privacy concern, users may feel worried when their personal information is collected and used by third parties for advertising purposes [56,57]. The loss of control over personal information may then be perceived as an illegitimate invasion of privacy, which can elicit psychological reactance [18,58]. Interestingly, trait reactance and online privacy concern have been found to be strongly interconnected [56]. Therefore, individuals higher in trait reactance are expected to have more concern about online privacy.

Hypothesis 6. *Trait reactance will have a negative impact on (a) attitude toward online advertising, as well as a positive impact on (b) perceived intrusiveness of online advertising, (c) perceived harmfulness of online advertising, and (d) online privacy concern.*

3. Method

3.1. Survey Design and Administration

We conducted an online survey targeting ad-blocker users residing in Spain. The data collection was commissioned to a Spanish market research company with 22 years of experience. This company conducted the fieldwork on Cint's online survey platform, which incorporates a myriad of panels with about 155 million panelists in more than 130 countries. Cint's panelists are basically recruited using a passive method, in which any individual can register on a panel's website, and an active method, in which only individuals invited by the panel's managers can register. To encourage participation, each survey properly completed by a Cint panelist is rewarded with cumulative points, which then can be exchanged for cash, gift cards, or donations to charities.

We developed the survey questionnaire content and then were advised by the commissioned company to present it in a suitable form for any device (mobile, tablet, etc.) and the most popular web browsers. The questionnaire was pretested for suitability using a convenience sample of 31 university students.

The survey questionnaire data were collected in the following order: (a) a filter question to determine whether the respondent had an ad-blocker installed; (b) the identification of the ad-blockers installed on the desktop, mobile, or any other device (the names and logos of nine popular ad-blockers were suggested, and the possibility to specify "others" was added); (c) an assessment of the items of the five latent variables (the order of items and variable blocks varied randomly); (d) a question to identify the most frequently visited online newspaper (18 titles with their logos were suggested, and a space to specify a different one was provided); (e) items to assess the advertising of the online newspaper previously stated; (f) exposure to one of the warnings supposedly delivered by that online newspaper to request the website whitelisting (the warning options were assigned alternatively to respondents in the order of start time); (g) items to assess the warning to which each respondent had just been exposed; and (h) an evaluation of the willingness to whitelist/leave the website.

The sample size (500 valid subjects, with quotas of 125 for the four alternative warnings) was predetermined during the hiring of service as the highest rounded number of interviews we could contract without exceeding the budget limit. On 5 February 2021, the hired company began inviting panel members to participate in this survey, for whom the questionnaire was accessible online for 14 days until the predetermined number of valid participants was reached. To be considered valid, participants had to have an ad-blocker installed, complete the entire questionnaire, and be 16 years of age or older. In addition, participants were excluded if they had made an error in any of the five control questions, which were designed to identify inconsistent responses due to inattention, carelessness, or other reasons. In quantitative terms, the elimination of invalid subjects occurred as follows: of the 3328 panel members invited, 376 subjects did not want to participate; 1206 had no ad-blocker installed; 196 did not know what an ad-blocker was; 411 did not complete the entire questionnaire; 18 were under 16 years of age; 338 provided a zip code that did not correspond to their municipality of residence; 18 failed to select the smallest number among four alternatives; 79 did not mark the option indicated as mandatory in a question in the first third of the questionnaire; 61 did not mark another mandatory option in the second third of the questionnaire; and 125 failed to replicate the initially stated ad-blockers at the end of the questionnaire.

Regarding the demographic distribution of the final sample, (a) 263 subjects were male and 237 were female; (b) 112 subjects were aged between 16 and 25 years, 131 aged between 26 and 35 years, 133 aged between 36 and 44 years, and 124 aged 45 years or older; and (c) 32 subjects had completed primary education, 164 had completed secondary education, and 304 had completed tertiary education.

3.2. Variables

Seven relatively abstract/complex variables were defined as latent and measured through multiple items (Table 1). The five general variables were measured through four items used in or adapted from previous studies—namely, Trait reactance [59,60], Attitude toward online advertising [61,62], Perceived intrusiveness of online advertising [19,61], Perceived harmfulness of online advertising [20,55], and Online privacy concern [63,64]. These items of these variables were rated on a 5-point Likert scale (from 1 = *completely disagree*, to 5 = *completely agree*). The two specific variables, Evaluation of the website advertising and Evaluation of the anti-ad-blocker warning, were measured with four items rated on 5-point semantic differential scales (e.g., 1 = *unacceptable*, to 5 = *acceptable*).

Table 1. Measurement of latent variables.

Latent Variables	Items	Outer Loadings
Trait reactance	I become angry when my freedom of choice is restricted.	0.785
(AVE = 0.573; CR = 0.842)	I become frustrated when I am unable to make free and independent decisions.	0.750
	I am content only when I am acting of my own free will.	0.787
	I resist the attempts of others to influence me.	0.701
Attitude toward online advertising	I think Internet advertisements are worth it.	0.883
(AVE = 0.764; CR = 0.928)	Generally, I consider Internet advertising to be a good thing.	0.868
	My general opinion about Internet advertising is highly favorable.	0.873
	I appreciate seeing advertising messages on the Internet.	0.871
Perceived intrusiveness of online adv.	Online advertising gets in the way of my Internet searches.	0.812
(AVE = 0.583; CR = 0.846)	Online advertising distracts me from my objectives while on the Internet.	0.559
	Online advertising disrupts my activity on the Internet.	0.829
	Internet advertisements intrude on the content I am accessing.	0.822
Perceived harmfulness of online adv.	Advertising slows down the loading of the websites I visit.	0.846
(AVE = 0.611; CR = 0.862)	Advertising consumes resources from my Internet connection.	0.811
	Advertisements may contain malicious code.	0.653
	Advertising reduces the performance of my computer/mobile.	0.802
Online privacy concern	I feel uncomfortable when personal data are shared without permission.	0.665
(AVE = 0.570; CR = 0.840)	I am concerned about the potential misuse of personal information.	0.769
	I believe that personal data have been misused too often.	0.829
	I think companies share information without permission.	0.747
Evaluation of the website advertising	For me, the website advertisements are *unacceptable* to *acceptable.*	0.858
(AVE = 0.730; CR = 0.890)	For me, the website advertisements are *useless* to *useful.*	0.861
	For me, the website advertisements are of *low quality* to *high quality.*	0.845
Evaluation of the anti-ad-blocker warning	For me, the anti-ad-blocker warning is *unreasonable* to *reasonable.*	0.869
(AVE = 0.728; CR = 0.915)	For me, the anti-ad-blocker warning is *unpleasant* to *pleasant.*	0.789
	For me, the anti-ad-blocker warning is *disrespectful* to *respectful.*	0.886
	For me, the anti-ad-blocker warning is *unconvincing* to *convincing.*	0.867

Note: AVE = Average variance extracted; CR = Composite reliability.

The likelihood of the responses to anti-ad-blocker warnings was measured by single items: "After reading this anti-ad-blocker warning on [online newspaper chosen by the participant], how likely would I be to (a) disable my ad-blocker on this website (for Willingness to whitelist the website) and (b) leave this website without exploring its content (for Willingness to leave the website)?" Both items were rated on a 5-point Likert scale (from 1 = *very unlikely*, to 5 = *very likely*).

With respect to Anti-ad-blocker warning sensitivity, we designed four alternative messages that coincided in their structure but differed in their sensitivity to the receiver (Appendix A). On the one hand, the common structure consisted of presenting an introductory word and three sentences that successively informed about the access restriction, the need for advertising revenue, and the request for website whitelisting. On the other hand, the sensitivity to the receiver grew from Option 1 to Option 4: (a) the statements tended to become more user-centric and less publisher-centric; (b) the claims tended to become less intimidating and more sympathetic to the user; and (c) the tone was increasingly friendly, welcoming, and polite.

3.3. Statistical Analysis

Partial least squares structural equation modelling (PLS-SEM) was used to evaluate all latent variable measures and all formulated hypotheses in a single model. Regarding latent variables, we evaluated their internal consistency reliability through composite reliability scores, their convergent validity through outer loadings and average variance extracted (AVE), and their discriminant validity through cross-loading comparison and the Fornell–

Larcker criterion. Concerning hypotheses, we first checked for collinearity issues in the model and later tested the significance of path coefficients and assessed their magnitude through f^2 and q^2 values. Generally recommended criteria [65] were used to perform PLS algorithm, bootstrapping, and blindfolding procedures (300 maximum interactions, 5000 bootstrap samples, 7 omission distance, etc.) and to evaluate results (rules of thumb for internal reliability, convergent validity, size effect, etc.). All analyses were performed with *SmartPLS 3* [66], and the significance level was set at $p < 0.05$.

4. Results

4.1. Latent Variable Measurement

Regarding latent variables' convergent validity (Table 1), 24 items had outer loadings higher than the recommended value of 0.7; 3 items between 0.4 and 0.7 had to be considered for removal but were ultimately retained because their deletion did not lead to an increase in the composite reliability or the AVE above threshold; and 1 item ("For me, the website advertisements are *abundant* to *scarce*") was directly removed for having a value lower than 0.4. Moreover, all seven latent variables had AVE values above the required minimum level of 0.5. Therefore, the retained items shared enough variance for the corresponding latent variables to be considered sufficiently convergent.

With respect to internal consistency reliability, the seven latent variables had composite reliability values above the recommended cutoff of 0.7 (Table 1), suggesting that their corresponding items were sufficiently correlated between each other.

Latent variables' discriminant validity was assessed using two methods. First, by comparing cross loadings, the outer loading of each item was found to be higher than the cross loadings of such an item with other latent variables. Second, by using the Fornell–Larcker criterion, the square root of the AVE of each latent variable was found to be higher than the latent variable's highest correlation with any other latent variable in the model (Table 2). Overall, each latent variable was sufficiently distinct to capture phenomena not represented by the other latent variables.

Table 2. Assessment of discriminant validity.

Latent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Trait reactance	0.757						
(2) Attitude toward online advertising	−0.110	0.874					
(3) Perceived intrusiveness of online advertising	0.284	−0.435	0.764				
(4) Perceived harmfulness of online advertising	0.260	−0.339	0.420	0.782			
(5) Online privacy concern	0.441	−0.201	0.306	0.356	0.755		
(6) Evaluation of the website advertising	−0.096	0.563	−0.366	−0.214	−0.173	0.854	
(7) Evaluation of the anti-ad-blocker warning	−0.108	0.402	−0.284	−0.187	−0.110	0.380	0.854

Note: The square root of AVE values is shown on the diagonal; nondiagonal elements are the latent variable correlations.

4.2. Structural Model Assessment

The diagnostics of collinearity between the two predictors of Evaluation of the anti-ad-blocker warning, the two predictors of Willingness to whitelist/leave the website, and the four predictors of Evaluation of the website advertising showed variance inflation factor (VIF) values always below 1.5, which is much lower than the collinearity threshold (VIF = 5).

Regarding the hypothesized relationships (Table 3), the significance of path coefficients was tested, and their relevance was measured through the f^2 and q^2 statistics, the values of which of 0.02, 0.15, and 0.35 were interpreted as small, medium, and large effect sizes, respectively. Evaluation of the anti-ad-blocker warning was positively influenced by Anti-ad-blocker warning sensitivity and negatively by Trait reactance, although with very small effect sizes. Remarkably, Evaluation of the anti-ad-blocker warning had a medium-sized positive effect on Willingness to whitelist the website and a medium-sized negative effect on

Willingness to leave the website. In turn, Evaluation of the website advertising had a very small positive effect on Willingness to whitelist the website but had no effect on Willingness to leave the website. Evaluation of the website advertising was influenced by Attitude toward online advertising and Perceived intrusiveness of online advertising (with medium and quite small effect sizes, respectively), while the influence of Perceived harmfulness of online advertising and Online privacy concern was not confirmed. Trait reactance negatively influenced Attitude toward online advertising (with a very small effect size) and positively influenced Perceived intrusiveness of online advertising (small effect size), Perceived harmfulness of online advertising (small), and Online privacy concern (medium).

Table 3. Evaluation of the structural model hypotheses.

Hypothesized Relationships	Path Coeff.	*t* Values	Sig.	f^2	q^2
H1: Anti-ad-blocker warning sensitivity → Evaluation of the anti-ad-blocker warning	0.114	2.597	$p < 0.01$	0.013	0.009
H2: Trait reactance → Evaluation of the anti-ad-blocker warning	−0.102	2.159	$p < 0.05$	0.011	0.006
H3a: Evaluation of the anti-ad-blocker warning → Willingness to whitelist the website	0.455	9.966	$p < 0.001$	0.237	0.233
H3b: Evaluation of the anti-ad-blocker warning → Willingness to leave the website	−0.419	9.252	$p < 0.001$	0.185	0.180
H4a: Evaluation of the website advertising → Willingness to whitelist the website	0.101	2.102	$p < 0.05$	0.012	0.007
H4b: Evaluation of the website advertising → Willingness to leave the website	−0.037	0.751	0.453	0.001	−0.004
H5a: Attitude toward online advertising → Evaluation of the website adv.	0.502	12.622	$p < 0.001$	0.296	0.187
H5b: Perceived intrusiveness of online advertising → Evaluation of the website adv.	−0.149	3.429	$p < 0.001$	0.024	0.013
H5c: Perceived harmfulness of online advertising → Evaluation of the website adv.	0.032	0.788	0.430	0.001	−0.001
H5d: Online privacy concern → Evaluation of the website adv.	−0.038	0.920	0.358	0.002	0.000
H6a: Trait reactance → Attitude toward to online advertising	−0.110	2.265	$p < 0.05$	0.012	0.008
H6b: Trait reactance → Perceived intrusiveness of online advertising	0.284	6.083	$p < 0.001$	0.088	0.049
H6c: Trait reactance → Perceived harmfulness of online advertising	0.260	5.515	$p < 0.001$	0.073	0.040
H6d: Trait reactance → Online privacy concern	0.441	11.196	$p < 0.001$	0.242	0.120

5. Discussion

The results reveal that anti-ad-blocker warning evaluation can have a substantial effect on users' willingness to whitelist/leave the intended website. Importantly, a warning design improvement can increase publishers' wall strategy effectiveness. Such a task, however, does not seem easy because users' trait reactance negatively influences their anti-ad-blocker warning evaluation, albeit with low intensity. It would, therefore, be desirable to test the influence of additional factors such as sense of reciprocity, which could make users perceive publishers' warnings appealing to reciprocity more favorably. Interestingly, warnings can be more effective when they are made more user-sensitive (more user-centric, sympathetic, polite, etc.), although the expected improvement is small. It is worth remembering that making warnings with alternative styles (serious, rational versus light, humorous) was inconsequential [6].

A favorable evaluation of the website advertising can produce a slight improvement in the willingness to whitelist, which suggests that publishers' efforts to improve the acceptance of their ads can achieve the desired increase in the whitelist ratio. Asymmetrically, an unfavorable evaluation of the website advertising is not able to encourage willingness to leave the website. This counterintuitive observation could be tentatively explained by considering that ad-blocker users, with apparent prejudices against advertising, could have an (no) additional motivation to accept (reject) the websites with ads of unexpectedly high (expectedly low) standards.

Trait reactance plays a significant role in explaining the four aspects of general online advertising, but with different levels of explanatory power. Its influence is more powerful when users perceive a more intense threat to their freedoms: advertising itself is hardly perceived as a threat; advertising intrusiveness and harmfulness are perceived as more intense threats; and loss of privacy stands out as the greatest threat to users.

The confirmation of all the hypothesized effects of trait reactance suggests the suitability of this construct for conceptually framing user response to anti-ad-blockers, a suitability that previous studies [10] have confirmed in other areas of online advertising avoidance.

Overall view and perceived intrusiveness of online advertising have the expected effects on the specific evaluation of the website advertising, which is consistent with some previous indirect evidence [48,49]. However, perceived harmfulness and online privacy do

not have the expected effects on the same evaluation. As tentative explanations, those who perceive potential harms in online advertising could not perceive them on a trusted website in which advertising has not previously been harmful; and those who are concerned about online privacy could not be concerned when accessing a website that permits the rejection of cookies as prescribed by EU regulations.

6. Practical Implications

An increase in the whitelist ratio means much more than an increase in the number of monetizable ad impressions. Ad-blocker users who actively accept the advertising on some websites have a remarkable potential for the corresponding publishers and advertisers. The latter target many of their campaigns at consumer segments that have high rates of ad-blocker usage [2]. Compared to non-users of ad-blockers, those who whitelist are more likely to visit a greater number and variety of pages on the website [67], so this group will tend to receive more ad impressions and, thus, will be able to click on a greater number of ads and ultimately buy more advertised products, all of which could also be monetized by publishers.

7. Limitations and Future Directions

This study measured the willingness to whitelist/leave the website in a hypothetical scenario in which participants received an anti-ad-blocker warning when they tried to access their favorite online newspaper. Obviously, the results simply represent an approximation of what might be the actual response of users to receiving real anti-ad-blocker warnings in ordinary Internet browsing situations. It should also be noted that direct observation of real phenomena would have avoided the limitations inherent in our self-reported data, such as mistakes/inaccuracies that participants might have reported intentionally/inadvertently.

Regarding future avenues of research, a relevant challenge is to achieve a more complete explanation of the phenomenon by identifying new influential factors, such as users' sense of reciprocity and evaluation of the website content. It is also worth exploring new potential enhancers of the warning's effectiveness, such as a promise of receiving fewer ads after the website whitelisting and a delay in the warning until users have enjoyed some of the website content. However, we think that the most important challenge is to investigate the phenomenon in a real and dynamic scenario in which changes in users' actual responses can be adequately explained. Those who once chose to whitelist a website could, in their successive visits, keep or remove the whitelisted website in their ad-blockers depending on some factors that are important to know. In turn, those who once opted to leave a website could later try to access this website's content again and then reconsider accepting its advertising depending on other factors that are also important to know.

8. Conclusions

Three findings of this study represent modest but encouraging advances in the understanding of user response to anti-ad-blockers. First, designing anti-ad-blocker warnings with greater sensitivity to users tends to improve the evaluation of such warnings, which increases (reduces) users' willingness to whitelist (leave) the website. Second, improving the attitude toward the website's advertising tends to increase users' willingness to whitelist that website. Therefore, both findings disclose opportunities for website publishers to monetize a higher number of impressions, clicks, and conversions. Third, users' trait reactance plays an important role in explaining the set of mechanisms that affect the willingness to whitelist/leave the website. This finding suggests that psychological reactance theory could also be a robust conceptual framework for understanding the many issues that are still open regarding user response to anti-ad-blockers.

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Appendix A. Alternative Anti-Ad-Blocker Warnings

Imagine that the next time you access [online newspaper chosen by the participant], you have an ad-blocker installed and you receive the following message on your screen:

Option 1

Warning! Access denied because we have detected that you are using an ad-blocker. Without advertising revenue, we cannot cover the costs of producing our content. To access our content freely, it is imperative that you whitelist our website.

Option 2

Caution! Access not allowed to those who are using an ad-blocker. The use of ad-blockers reduces our advertising revenue and the ability to continue offering original content. If you whitelist our website, you will be able to access the content and help finance it.

Option 3

Sorry! Access interrupted because you appear to be using an ad-blocker. Ad-blockers reduce our ability to offer original content for free. We would appreciate it if you would whitelist this website so that it can be funded.

Option 4

Welcome! Access not yet available because you seem to have activated an ad-blocker. We are committed to free access to our content but need your help to fund us through advertising. Please whitelist this website so that we can continue to create the content you enjoy here.

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