Meta-analysis about brand trust: antecedents and consequents analysis

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Resumo

Brands aim to achieve a competitive advantage, and a way to accomplish this goal is to build brand trust, making its consumers assume a long-term relationship with the brand. Brand trust is a topic that has been gaining great relevance in the literature since the early 2000s. However, the results found present divergences regarding the relationships tested and effects found in the relationships between brand trust and other variables. This study aims to defragment the literature and identify the antecedents and consequences of brand trust using the meta-analysis method, and meta-regression tests were performed to identify possible moderators in some cases. The strongest antecedent relationships found were brand satisfaction, brand quality and brand value, while the main consequent relationships were word of mouth, brand loyalty and brand commitment. The main possible moderators found were uncertainty avoidance and country corruption, considering the countries where the studies were applied.

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Abstract: Brands aim to achieve a competitive advantage, and a way to accomplish this goal is to build brand trust, making its consumers assume a long-term relationship with the brand. Brand trust is a topic that has been gaining great relevance in the literature since the early 2000s. However, the results found present divergences regarding the relationships tested and effects found in the relationships between brand trust and other variables. This study aims to defragment the literature and identify the antecedents and consequences of brand trust using the meta-analysis method, and meta-regression tests were performed to identify possible moderators in some cases. The strongest antecedent relationships found were brand satisfaction, brand quality and brand value, while the main consequent relationships were word of mouth, brand loyalty and brand commitment. The main possible moderators found were uncertainty avoidance and country corruption, considering the countries where the studies were applied.

Keywords: Brand trust. Meta-Analysis. Marketing. Brand. Systematic Review**.**

Introduction

Research on brand trust (BT) began with theories that focus on firms strategies to build long-term relationships with consumers (Morgan & Hunt, 1994) where consumers associated trust as a key to perceiving offerings as high quality and as a bridge to establishing loyalty (Sung, Kim, & Jung, 2010). Thus, building strong BT is a goal of many organizations to evoke high margins, brand extension opportunities, brand equity, and brand loyalty (Delgado-Ballester & Munuera-Alemán, 2005).

From an academic perspective, many primary studies have been published to identify possible constructs as antecedents (e.g. Srivastava, Dash & Mookerjee, 2015) that determine the extent to which they influence BT and as consequences that determine the extent to which trust influences consumers future responses (e.g. Park, 2009). The evolution BT comprehensive was accompanied with quantitative scales (e.g. Chaudhuri & Holbrook, 2001; Delgado-Ballester, Munuera-Alemán & Yagüe-Guillén, 2003).

While the dissemination of BT studies has promoted a better understanding of the phenomenon, they also have provided a fragmentation about the BT knowledge. Studies have been conducted on different sectors, samples, and countries and have sometimes promoted conflicting finds. For example, most primary studies suggested a positive relationship between BT and brand loyalty (e.g. Park & Kim, 2016), however, Shi, Lin, Liu & Hui (2018) identified neutral effects (r = -.032).

Several are the possibilities to hypothesize these conflicting primary results. First, the different context where BT was analyzed could cause some discrepancy in results. In this case, our systematic review of studies identified more than 30 different sectors that BT was analyzed (e.g. wine; banks; fashion industry; social media). Second, cultural influence could explain some differences in the perception of BT. We identified that BT studies were applied with samples from 49 countries. Third, different methodologies were applied across the primary BT research (e.g., collect type; sample type; scale type; sample size). Fourth, diverse were the type of publications that published research on BT (e.g. top journals; peripherical journals; thesis; dissertations; work papers).

In order to cover the fragmentation of BT research, we proposed a meta-analysis. With these results, it was possible to identify the consolidated effects of BT and its antecedents and consequences. We were able to identify the quality of the primary studies produced, because of the heterogeneity of the results. The meta-analysis also promoted the investigation of possible moderators that could explain the fragmentation of primary research. With this meta-analysis, we hope to guide BT theories, since this method promotes a state of the art on what we know

and how the effects work in these relationships (Borenstein, Hedges, Higgins, & Rothstein, 2009).

Important note that other meta-analyses applied on brand context have been produced in recent years. For example, Eisend & Stokburger-Sauer (2013) and Santini, Ladeira, Sampaio, & Pinto (2018) published a meta-analysis of brand personality and brand experience, respectively, and promoted a good guide to better understand the constructs relationships.

Brand trust construct

Trust is defined as "the willingness to trust a partner of exchange in whom there is trust" (Moorman, Zaltman & Deshpande, 1992, p. 315). The BT construct was created with theories of relationship marketing and brand personality. While marketing relationships focused on firm strategies to attract, maintain and expand relationships with customers (Morgan & Hunt, 1994), brand personality was associated with people who use brands to express their personalities traits, seeking differentiation as individuals (Aaker, 1997). Based on the theory of brand personality, it is suggested that people can trust brands in the same way they trust people (Belaid & Behi, 2011). In the relationship marketing theories, the BT construct appeared when it was detected as one of the essential factors for maintaining long-term relationships (Morgan & Hunt, 1994).

After a few years, Chaudhuri & Holbrook (2001) presented the term BT quantitative construct. The construct was conceptualized as "the willingness of the average consumer to rely on the ability of the brand to perform its stated function" (Chaudhuri & Holbrook, 2001, p. 82). In the study, BT was associated as one of the main antecedents of brand loyalty, with a strong focus on performance. In the same year, Delgado-Ballester & Munuera-Alemán (2001) presented a literature review about BT, and despite various evidence that brand satisfaction and brand loyalty were associated with brand confidence, there were very few studies exploring this link. Two years later, Delgado-Ballester, Munuera-Alemán & Yagüe-Guillén (2003), developed and validated a BT scale. In this case, BT was considered as "the confident expectations of the brand's reliability and intentions in situations entailing risk to the consumer" (Delgado-Ballester, Munuera-Alemán & Yagüe-Guillén, 2003, p. 37).

Trust scales

The primary studies that investigated trust with brand contexts inspired scales that measure trust in a global context. One of the first scales that proposed to evaluated trust was presented by Morgan & Hunt (1994) as being measured by two dimensions: reliability and integrity. Such scale was mainly applied on B2B context, although some studies had made some adaptions to B2C relationships (e.g. Jin, Line & Merkebu, 2016).

The other relevant trust scale was presented by Chaudhuri & Holbrook (2001). The authors proposed that trust becomes relevant only when the consumer has uncertainty. The authors also proposed trust as a key element in establishing consumer loyalty. Another important note is that the scale proposed by Chaudhuri & Holbrook (2001) considers whether the consumer explicitly says that he or she trusts the brand, thinks it is trustworthy and perceives it as an honest and safe brand. The Chaudhuri & Holbrook's scale has been applied in the most diverse contexts, for example, smartphone (e.g. Lam & Shankar, 2014); wine (e.g. Drennan et al., 2015) and social media (e.g. Laroche, Habibi & Richard, 2013). The other important scale, as above-mentioned, was produced by Delgado-Ballester, Munuera-Alemán & Yagüe-Guillén (2003). This measurement produced good internal reliability (α = .73) and has been applied to vast contexts, such as restaurants (e.g. Ong, Md. Salleh & Zien Yusoff, 2015) and mobile phones (Hawass, 2013).

Conflicting results with brand trust investigation

As pointed out in the introduction section, a meta-analysis also presents a definitive conclusion for divergencies found in primary studies (Hedges & Olkin, 1985). We present below some examples of these conflicts. The first one is present in the relationship between brand awareness and BT. While Dennis, Papagiannidis, Alamanos, & Bourlakis (2016) found strong positive and significant effect for the relationship (r = .832), Esch, Langner, Schmitt & Geus (2006) found no significant effects (r = .108). In the other case, Japutra, Keni & Nguyen (2015) found significant but moderate effect (r = .255). Another example can be found in the relationship between BT and word-of-mouth (WOM). Jain , Kamboj, Kumar & Rahman (2018), found and positive and significant effects (r = .800), while Ruparelia, White & Hughes (2010) showed no significant effect (r = .121). Additionally, divergences could be found on the relationship between brand attachment and BT. Liang, Zhang & Guo (2019) observed no significant effects (r = .153), while Beneke & Wickham (2015) published strong and significant influence of brand attachment on BT (r = .754). One of the most tested relationships with BT is the behavioral intention. Some divergencies were also detected in this relationship. While some studies produced neutral effect between BT and behavioral intentions (e.g. Chae, Kim, Lee, & Park, 2020), others produced very consistent effects (e.g. Hegner & Jevons, 2016).

The meta-analysis of brand trust

Results of primary studies investigating BT cannot escape diversity. By multiplying the theories, researchers identify several antecedents and consequents of BT. It is important to note that the constructs tested as antecedents and consequents in this meta-analysis emerged by the systematic review and were incorporated into the analysis since they presented a minimum of three relationships with BT, as recommended by Hunter and Schmidt (2004). The moderators were organized as follows. Regarding sample size, we divided the studies into two groups: small (0) or large (1).To do so, we accessed the methodological section of each study and adopted the median of the sample sizes as the cut-off point (Santini et al., 2018). We also classified the sample type as (0) student or (1) non-student. This information was collected by the methodological description of each study (Eisend & Stokburger-Sauer, 2013). The manuscript status of each study were classified as (0) published or (1) unpublished (Eisend & Stokburger-Sauer, 2013). We considered the Hofstede (2011) parameters to access uncertainty avoidance (UA) by the country origin of each study and we adopted the median of the UA as the cut-off point. For country corruption (CC), we are considering the Global Corruption Index 2020 (CPI, 2021) parameters based on the country of origin of each study and we adopted the median of CC as the cut-off point for Low CC (0) or High CC (1). We did not investigate the moderators for some relationships due to the small number of estimates per relationships.

Methodological design

We followed the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol (Moher, Liberati, Tetzlaff, & Altman, 2009; Moher et al., 2015) to perform this research through four steps. *The first one* was the literature search; *the second*, the inclusion criteria; *the third*, was the codding process and finally, *the fourth step* was to comprise the analysis procedures.

The literature search aims to cover all typical empirical BT studies that should be part of this meta-analysis. We performed a manual search in representative databases such as Taylor & Francis, Web of Science, Emerald, ScienceDirect, JSTOR and Google Scholar. The main keyword investigated was "brand trust". This term was searched in the titles, abstracts and keywords of papers published until April 2020, only in English. Since the results for Google Scholar were overwhelming, we searched for articles who cited the scale development for BT with the most citations. This initial search identified 1.315 primary studies.

After the initial primary studies identification, we applied the second step, the inclusion criteria, to identify valid studies to be part of this meta-analysis. In this case, to be part of our analysis the primary research must present: (1) investigating BT with other variable(s) (e.g., antecedents or consequences); (2) presenting statistical results (e.g., correlation; beta; t-test; F-ratio; chi-square) on BT and other variable(s). By these requirements, 1.001 studies were eliminated from the initial search. Thus, our final sample included 314 articles, and of those, 272 were published in scientific journals, 14 were congress papers, 28 were masters or doctoral thesis. The final sample generated a cumulative sample of 137.775 cases and a total of 859 effect sizes among BT and other variables. A total of 146 journals were involved in the analysis.

The third step was the coding process. In this case, the Rust & Cooil (1994) suggestion was applied. Hence, the codding process was made by one assistant researcher and coordinated by one senior researcher. Before starting the coding process, all procedures were discussed by all the researchers. After finished by the assistant researcher, the generated coding was validated by the senior researcher. In any case of disagreement or doubt, the senior researcher reviewed the case to consolidate the understanding and the coding.

The last step was the analysis procedures. In this case, we followed the traditional procedures applied to meta-analysis research (Hunter & Schmidt, 2004). We calculated the Pearson's correlations corrected by the sample size of each study. In case that studies did not present correlation effects (e.g. standard regressions), we made the conversions following the Hedges & Olkin (1985) procedures. All effects were calculated by random effect method as suggested by Hunter & Schmidt (2004). The random effect model control was chosen because this method promotes more generalizable results to studies with heterogeneous sample sizes (R. Rosenthal & DiMatteo, 2001). We also evaluated the heterogeneity level of each relationship by Cochran's Q and I^2. In the Cochran's Q, the heterogeneity is proved by the significance level (Lau, Ioannidis, & Schmid, 1998). The I^2 presents the heterogeneity by range from 0 to 100%. We also checked publication bias (Egger's Intercept), for each relationship tested, using Egger's test (Egger, Smith, Schneider, & Minder, 1997; Thornton & Lee, 2000). The Egger regression gives the degree of funnel plot asymmetry as measured by the intercept from the regression of standard normal deviates against precision (Egger et al., 1997). When the Egger's intercept is not significant, the publication bias does not influence the results (Egger et al., 1997). However, when we found significance for publication bias, we applied the bias-correct by trim and fill process (Duval & Tweedie, 2000). Finally, the failsafe number by Rosenthal parameter (Robert Rosenthal & Rubin, 1991). It comprises the number of non-significant or unpublished studies that would be necessary to refute the findings of each relationship tested. The moderation analysis was performed by meta-regression analysis. In this case, we used raw effect sizes from primary studies as a dependent variable in weighted regression analysis. The moderators codded were used as independent variables (Combs, Crook, & Rauch, 2019). The analyses for the traditional meta-analytic approach were conduct by using packages of R (version 4.0.2) – Metacor, Metafor, Metareg (Viechtbauer, 2010).

Antecedents and consequences of brand trust

The first objective of the study was to promote an investigation and integration of antecedents and consequents of BT. To this end, table 1 initially presents the main antecedents of BT. We observed 7 constructs identified as antecedents of BT that registered more than 20 effects. The Egger's test showed that five of seven relationships were not influenced by asymmetry, as the effects were not significant (Egger et al., 1997). In the other two relationships that presented significance for Egger's (*brand awareness and brand trust; brand quality and brand trust*), we applied the bias-correct by trim and fill process (Duval & Tweedie, 2000). A sensitivity analysis was also applied, and we repeated both publication bias tests after removing unusually large studies. When the unusually large samples were removed, Egger's test was not

statistically significant (t = .570; *p* = .570; t = -.836; *p* =.405; respectively). Through trim and fill remove studies, the effect-sizes were corrected to *r* = .308 on the relationship between brand awareness and BT, and to *r* = .664 for the relationship between brand quality and BT.

Table 1 – Antecedents of brand trust[i]

Variable	*O*	*N*	*r*	*ICI (95%)*	*ICS (95%)*	*Q*	I^2	*fsn*	*Egger's Intercept*
Brand awareness	49	21242	.420*	.351	.485	1775.62*	97.2%	121692	2.582**
Brand engagement	30	9901	.320*	193	.436	1584.60*	98.2%	254.22	-.523 ns
Brand experience	36	13053	.512*	.426	.589	1407.82*	97.5%	155701	1.502 ns
Brand image	61	27668	.559*	.491	.620	3533.56*	98.3%	585475	1.700 ns
Brand quality	48	20111	.563*	.496	.622	1963.99*	97.7%	351359	-2.408**
Brand satisfaction	85	33600	.708*	.660	.751	5873.49*	98.6%	6081458	.218 ns
Brand value	47	19994	.543*	.478	.602	1864.92*	97.5%	337253	-.664 ns

By these corrections, the first most influential antecedent was brand satisfaction (*r* = .708), followed by brand quality (*r* = .664), brand value (*r* = .543) and brand experience (*r* = .512). All other relationships also presented positive and significant relationships. We also noted, for all antecedents' effects, consistent findings, as all fail safe numbers were greater than one hundred thousand. Therefore, to reject the finds, we would need to find more than one hundred thousand studies with different effects than those found in this meta-analysis (Robert Rosenthal & Rubin, 1991).

Table 2 presents the main consequences of BT. In this case, five relationships were identified with more than 10 effects. Again, all relationships were significant and positive. It is important to note that the relationship between BT and word of mouth presented problems of asymmetry (*Eggers's Intercept* = -2.342; p <.05). Thus, we applied, again, the Trim and fill process. Consequently, the correct effect size was *r* = .675 and the Egger's Intercept was insignificant (*t* = -.880; p = .383).

Table 2 – Consequences of brand trust

Variable	*O*	*N*	*r*	*ICI (95%)*	*ICS (95%)*	*Q*	I^2	*fns*	*Egger's Intercept*
Behavioral intention	63	22178	.462*	.422	.472	1760.69*	96.4%	255299	1.722ns
Brand attachment	66	29006	.552*	.488	.591	3102.86*	97.9%	645398	-1.502 ns
Brand commitment	58	26908	.557*	.498	.610	2581.70*	97.8%	502616	-1.647 ns
Brand loyalty	152	67157	.573*	.534	.608	8721.63*	98.3%	4826075	.887 ns
Word of mouth	35	11707	.522*	.399	.626	2487.19*	98.6%	198460	-2.342**

By this correction, the stronger consequences of BT were word of mouth (*r* = .675), followed by brand loyalty (*r* = .573), brand commitment (*r* = .557), brand attachment (*r* = .552) and behavioral intention (*r* = .462). Hence, all consequences presented positive, significant, and very consistent finds.

Moderators analysis

We performed several moderation analyses in order to identify possible explanations about heterogeneity found on the direct relationships (Hedges & Olkin, 1985). It is important to note that we analyzed relationships that presented more than 60 observations (Combs et al., 2019). Therefore, the analysis was carried on the followed relationships: *(1) brand image and brand trust*; *(2) brand satisfaction and brand trust; (3) brand trust and behavioral intentions; (4) brand trust and brand attachment; (5) brand trust and brand loyalty.*

The firsts moderators analyzed were linked to sample characteristics (sample type and size). It was expected that students and small samples tended to potentiate the direct effects since they are more homogeneous (Fern & Monroe, 2002). Our analyses found a significant effect of the sample size only on the relationship between BT and behavioral intention ($r_{\_student}$=

.614; $r_{\_non\text{-}student}$= .425; p = .002). Specifically, we found stronger effects in studies with samples composed by students when compared to studies with real consumers.samples

The other moderator analyzed was the manuscript status. According to Lipsey and Wilson, (2001), stronger effects were expected on published studies, as the scientific journal tends to prioritize research with significant relationships. However, this assumption was not confirmed in our analysis. Here, we found a significant effect of manuscript status on the relationships between *brand image and brand trust* ($r_{\_published}$= .513; $r_{\_unpublished}$= .734; p = .007); and *brand trust and brand loyalty* ($r_{\_published}$= .507; $r_{\_unpublished}$= .624; p = .006). In both cases, the stronger effects were found on unpublished research.

We also investigated the cultural dimension, uncertainty avoidance, proposed by Hofstede (2011). Uncertainty avoidance reflects a culture that feels threatened by ambiguous or unknown situations and has beliefs and institutions that try to avoid them (Hofstede, 2011). Consumers embedded in cultures with high level of uncertainty avoidance tend to have more rigid codes and value precision and punctuality (Hofstede, 2011). These characteristics are directly linked to BT (Delgado-Ballester & Munuera-Alemán, 2005; Morgan & Hunt, 1994). Thus, we might expect higher effects of BT and its related constructs in cultures with a high level of uncertainty avoidance. However, our research showed a opposity pattern for the relationship between BT and brand loyalty ($r_{\_high\_UA}$ = .460; $r_{\_low\_UA}$ = .572; p = .020). But, the relationship between BT and brand satisfaction, the moderation effects presented the expected effect ($r_{\_high\_UA}$ = .696; $r_{\_low\_UA}$ = .570; p = .014).

The final moderator analyzed was the country's corruption index. Corruption is defined as the misuse of public power for private benefit (CPI, 2021). In case of the possible moderation effects, it was expected that countries with higher CC would evaluate the BT dimension more. Accordingly, countries with higher CC index were expected to enhance the relationship between BT and other constructs. Our analysis identified only one moderation effect. In this case, the results showed that the relationship between brand satisfaction and BT was stronger in low CC countries ($r_{\_CC}$= .599; $r_{\_CC}$ = .675; p = .009). This finding is the opposite of what we expected.

Final discussions, limitations and future avenues.

The main goal of this meta-analysis was to defragment the literature about BT, to identifie the consolidated effects of BT and its antecedents and consequences and to test some possible moderators that could explained some heterogeneity found on the direct effects. Through a large systematic review, we identify 1.315 potential studies that could be tested BT, in quantitative way, and by the elimination criteria, we accessed 314 studies that produced 859 effects sizes to do this meta-analysis. From the primary studies we identified the 7 main antecedents and 5 main consequents that were quantitative investigated with BT, confirming that brand awareness, brand engagement, brand experience, brand image, brand quality, brand satisfaction and brand value are antecedents of BT. We also confirmed that behavioral intention, brand attachment, brand commitment, brand loyalty and word of mouth are consequences of BT. The results found for the main direct relationships were strongly supported by the fail safe numbers generated by this research. In order to investigate the heterogeneity on the directed results, we performed some moderation analysis on the most popular direct relationships. Table 3 summarizes the main findings of this meta-analysis, theoretical and practical implications.

Limitations and future research avenues on Brand Trust theory

Our study had some limitations. First based on the nature of meta-analytic studies, our research considerer only quantitative results. Thus, other methodological settings could be useful to promote a better knowledge about BT, including qualitative data. Our theoretical model considered the most tested relationships with BT. We made this conclusion through the

systematic review preceding the meta-analysis calculations. Still, other variables related to BT (e.g., hedonic and utilitarian benefits; brand love) could be tested in future meta-analysis.

Table 3 – Summary of Brand Trust meta-analysis findings

Main findings	***Theoretical implication***	***Practical implications***
The BT primary studies have shown high levels of heterogeneity.	The high heterogeneity indicates that results found in BT studies have differences according to the contexts in which they were applied.	Marketing managers should pay attention in primary studies selection to make decisions in their activities. It is important to see if the sample used in the studies matches the goals of the manager. This evaluation could be helped by methodological details of each published studies.
Brand awareness, brand engagement, brand experience, brand image, brand quality, brand satisfaction and brand value are antecedents of BT.	The results present very reliable evidence that these constructs are antecedents of BT, requiring a high number of unpublished articles with opposing results to deny it.	The most influential BT antecedents are brand satisfaction, brand quality, brand value and brand experience, respectively. If the intention is to build trust, those variables should be considered in the marketing managers strategies.
Behavioral intention, brand attachment, brand commitment, brand loyalty and word of mouth are consequences of BT.	The results also require a high number of unpublished studies to refuse the relations found here, confirming that these variables are consequences of BT.	The stronger consequences of BT are word of mouth and brand loyalty. If the intention of the marketing manager is to have repeated purchase and consumers recommending their products or services, then BT should come to their strategies.
Uncertainty avoidance moderates the relationship between brand satisfaction and BT.	This result was expected since in countries with high uncertainty avoidance, trust plays a vital role in transactions. Higher effects were found in this relationship in countries with higher levels of UA.	Uncertainty avoidance is a behavior common in countries with higher levels of corruption. Consumers in those countries tend to value trust, in a sense that the levels of satisfaction and trust are correlated and have stronger effects when UA is higher.
Uncertainty avoidance moderates the relationship between BT and brand loyalty	The countries with lower levels of UA presented higher effects in the relationship between BT and brand loyalty. The moderation effect of UA in this relationship was tested in other studies with different results, such as non-significant moderation at the attitudinal dimension of brand loyalty (Anuwichanont, 2010). Perhaps the result obtained here could have been different if we treated the brand loyalty dimensions isolated, but there were not many studies analyzing the BT and brand loyalty showing behavioral and attitudinal loyalty separately.	In the case of brand loyalty and BT, the effects are higher where there are lower levels of uncertainty avoidance. That way we recommend searching for studies that have been applied in countries with cultural context similarities so the effects would be more reliable, especially if the studies consider attitudinal and behavioral loyalty separately.
Country corruption moderates the relationship between brand satisfaction and BT.	Countries with lower CC presented higher effects in the relationship between brand satisfaction and BT. This result can be explained by the lack of trust in higher CC (Davis & Ruhe, 2003), which could weaken the relationship of BT with brand satisfaction in those countries.	Higher CC is characterized by lack of trust. In this line, while the consumers value more the presence of trust, they do not seem to trust in many brands in those countries.

Our study presented some moderators (e.g., cultural and country corruption effects) that have not been tested much by primary studies. Consequently, new avenues to produce better

knowledge about BT could be driven to test some of these moderators by primary studies on different samples and countries. It will be interesting to test the effects of BT on social media consumers behaviors (e.g., Instagram; Twitter and WhatsApp posts). We also noted that most studies applied surveys and cross-sectional data. Future studies could explore BT theories by experimental and longitudinal studies. In this line, Eye-tracking and FaceReader could be interesting to obtain greater understanding and spontaneous responses about some marketing stimulus.

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[i] (O) number of observations taken from the analysis of the studies; (N) number of accumulated samples of the assessed studies; Effect r=correlation found in the studies correct by sample size; ICI (95%)=confidence interval lower; ICS (95%)=confidence interval higher; Q= test of heterogeneity at the individual; I^2=scale-free index of heterogeneity; (*) = $p < .001$; (**) = $p < .05$ ns= not significant