

The Impact of Ambivalence on Persuasion: A Preliminary Meta-Analysis

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Received: January 19, 2024 Accepted: March 9, 2024 Published: April 21, 2024

doi:10.5296/ijssr.v12i2.21865 URL: <https://doi.org/10.5296/ijssr.v12i2.21865>

Abstract

This study is the first meta-analysis on the relationship between ambivalence and persuasive outcomes in communication. The meta-analysis included 22 studies with 51 effect sizes based on 14,173 (68–1,604) participants. When all the persuasive outcomes were considered together, ambivalence had a significant but small negative overall impact, $r = -0.134$, 95% CI [-0.192, -0.076], $k = 33$, $z = -4.471$, $p < 0.001$. Specifically, ambivalence had a small influence on attitude and intention. Its impact on perception and behavior were less pronounced. There was significant heterogeneity across effect sizes in overall persuasion, as well as specific persuasive outcomes. The ambivalence targeting behavior had a stronger influence on attitude than did ambivalence targeting other objects. Methodology significantly moderated the magnitude connecting ambivalence and behavioral intention, studies using experiments yielded greater sizes compared to those using surveys. With respect to context, the influence of ambivalence on attitude was stronger in advertising and health communication, compared to political communication. Studies in advertising yielded significantly greater effect sizes on behavioral intention compared to those in health communication. This study suggests that the implication of ambivalence in communication is likely a complicated and nuanced matter. Limitations and future research have also been outlined.

Keywords: meta-analysis, ambivalence, persuasion, communication

1. Introduction

When explicating characteristics of schizophrenia, Bleuler ([1911] 1950) coined the term “ambivalence” and identified three types of this construct. Whereas sociological ambivalence is conceptualized as an outcome of conflicting social roles and norms, cultural ambivalence refers to conflicts between cultural values (Hajda, 1968). The “psychological ambivalence” pertains to the internal experience of jointly mixed evaluations, when people hold positive and negative responses toward an object simultaneously (Priester & Petty, 1996). Naturally, ambivalence is intricately related to and often confounded with attitude (Zhao & Cai, 2008). The relevance and magnitude of ambivalence varies across situations (Zhao, 2005). Ambivalence is more prevalent than univalent or apathetic response across a variety of persuasive and communicative contexts (e.g., advertising, O’Donohoe, 2001). Ambivalence and its implications represent critical topics in persuasion literature, contributing to a more complete understanding on the nature of people’s attitudes and behaviors. Understanding the genesis and consequences of ambivalence, therefore, is an important endeavor in communication research.

Compared with systematic or thematic reviews, meta-analysis provides aggregated effect sizes after controlling for sampling and measurement errors. It delineates the boundary conditions by identifying possible moderators responsible for the heterogeneity of effects across primary studies (Borenstein, Hedges, Higgins, & Rothstein, 2009). A meta-analytic inquiry on this subject is of both theoretical and practical significance. To the best of our knowledge, this is the first meta-analysis on the associated outcomes relating to ambivalence in communication, which includes three key persuasive contexts: advertising, health, and political communication. The study aims to paint an overall picture on the field, the findings will serve as a stepping-stone for future research.

2. Literature Review

2.1 Ambivalence Research: A Bird’s-eye View

Conner and Sparks (2002) and Jonas, Broemer and Diehl (2000) provided earlier reviews of the psychology literature on ambivalence. Research has principally focused on predictions for the general construct of ambivalence, although there has also been interest in ambivalence in specific domains. Recently, there have been continuous efforts to synthesize various approaches to ambivalence (e.g., Baek, 2010; Chang, 2012; Ran & Yamamoto, 2015; Song & Ewoldsen, 2015). The literature on ambivalence research is both heterogenous and ambivalent. A coherent theoretical framework encompassing various ambivalence phenomena has yet to be established (Song & Ewoldsen, 2015). Song and Ewoldsen (2015) reviewed subjective (felt) versus objective (potential) ambivalence, implicitly measured versus explicitly measured ambivalence, and vertical versus horizontal ambivalence. Zhao (2005) identified three forms of ambivalence: potential ambivalence, felt ambivalence, and affective-cognitive ambivalence. Scholars have used various measures of ambivalence using both self-report and formula in the existing studies. Extant evidence suggests that each facet of this construct and corresponding measure is unique and not easily interchangeable. Priester and Petty (1996) found a positive correlation between potential ambivalence and felt

ambivalence at .44, demonstrating discriminant validity of the two forms. Affective-cognitive ambivalence has not been studied extensively in the literature yet (Zhao & Cai, 2009).

Extant literature presents three primary streams on the impact of ambivalence. The first stream examines ambivalence and information processing. Some posit that people with greater ambivalence are likely to engage in deeper information process, which aims to resolve the ambivalence (Petty, Tormala, Briñol, & Jarvis, 2006). The second stream assesses whether ambivalence is linked with vulnerability to persuasion. The third stream focuses on the impact of ambivalence on attitude-behavior connection (Chang, 2012).

Ambivalent individuals appear more neutral in their global evaluations due to the joint activation of positive and negative responses. They typically report greater conflict, doubt, or mixed feelings with respect to the attitude object (Petty et al., 2006). Ambivalence has been shown to impede the formation of attitudes, behavioral intentions, and behavior (Baek, 2010). Ambivalence indicates low attitude strength (Conner & Armitage, 2008); therefore, it tends to make attitudes less durable and impactful (Chang, 2012). Moreover, because stronger attitudes are more capable of predicting behaviors than weak attitudes, ambivalence is less able to predict and guide behaviors (Song & Ewoldsen, 2015).

Prior research has demonstrated that ambivalence about specific behaviors likely generates hesitancy and deters individuals from carrying out behaviors (Hänze, 2001). Health communication studies have examined how and whether ambivalence affects engagement in health behaviors (Conner et al., 2002; Zhao & Cappella, 2008). In cancer prevention, perceived risk was positively linked to ambivalence, which generated lower screening intentions for fecal occult blood test/sigmoidoscopy (Han, Moser, & Klein, 2006; Lipkus et al., 2003). Studies with the sample of college-aged and teen smokers found that those who reported greater felt ambivalence toward smoking had higher intention to quit (Lipkus, Green, Feaganes, & Sedikides, 2001; Lipkus et al., 2005). Kim, Pjesivac, and Jin (2019) found that increased felt ambivalence towards receiving a flu vaccine led to vaccine hesitancy. Costarelli and Colloca (2004) revealed that there was a negative relationship between ambivalence toward pro-environmental behaviors and intentions such as recycling and donating money to environment protection.

2.2 Persuasive Variables

Following the recommendation by extant meta-analytic literature, we examined theoretically grounded persuasion variables related to ambivalence, including perception, attitude, behavioral intention, and actual behavior. These variables operationalized by both observed and self-report measures were commonly examined in existing literature.

Perception refers to participants' assessment of the message, which is strongly correlated with message effectiveness (Dillard, Weber, & Vail, 2007). Attitude refers to the positive or negative responses to the object or behavior in target. Behavioral intention is conceptualized as the expectancy to act in accordance with the persuasive message. Behavior deals with verifiable conduct and activity. O'Keefe (2018) demonstrated that different persuasive outcomes (e.g., attitude, intention, and behavior) can be conceptually equivalent to a certain

degree. We propose the following research questions for this meta-analysis regarding the overall association between ambivalence and persuasion:

RQ1: What is the average weighted effect size of ambivalence on persuasion?

RQ2: What is the average weighted effect size of ambivalence on a) perception, b) attitude, c) behavioral intention, and d) behavior?

2.3 Potential Moderators

This meta-analysis also inspects potential moderators that might account for the variances in effect sizes across primary studies. Prior studies employed two major ways to operationalize ambivalence and accordingly used different scales. It would be theoretically intriguing and practically important to uncover the magnitude of the effect of subjective (felt) vs. objective ambivalence. The specific target of ambivalence varies, including behaviors, events, or states of affairs. Sizable studies have been principally concerned with ambivalence towards behaviors (Conner & Sparks, 2002). Hence, we differentiated whether the assessment of ambivalence is related to the specific evaluation of behaviors or not. Ambivalence has also been examined in a wide range of communication contexts. Therefore, it is worthwhile to examine its association with persuasive outcomes in different topic areas (e.g., health, advertising, and political communication).

Similar with the practice in past meta-analytic studies (e.g., Walter, Tukachinsky, Pelled, & Nabi, 2019), the present study also assessed the following potential moderators: study location, sample type, methodology, sex, and age of the sample. Study location refers to the country where a study was conducted (US vs. non-US). Three sample types are categorized: adult, student, or teen samples. Methodology refers to whether the study used experimental or survey design. Last, average age and percent of female participants are coded, both demographic variables frequently examined in prior meta-analytic studies (e.g., Ratcliff & Sun, 2020). Taken together, the present meta-analysis endeavors to understand the following:

RQ3: What factors (i.e., ambivalence type, ambivalence target, context, study location, sample type, methodology, age, and sex of the sample), if any, moderate the association between ambivalence and overall persuasion?

RQ4: What factors (i.e., ambivalence type, ambivalence target, context, study location, sample type, methodology, age, and sex of the sample), if any, moderate the influence of ambivalence on a) perception, b) attitude, c) behavioral intention, and d) behavior?

3. Method

3.1 Study Retrieval

The meta-analysis included primary studies that examined the influence of ambivalence on perceptions, attitudes, behavioral intentions, and behaviors. Our retrieval approach followed the procedures endorsed by other meta-analyses in the communication literature (e.g., Eisend, 2017). We conducted a keyword search of electronic databases to identify relevant studies. The databases included Communication Abstracts, Communication and Mass Media

Complete, EBSCO, Elsevier, Emerald, ISI Social Science Index (Web of Science), and Proquest Dissertations and Theses. The search subject keywords included *ambivalence, persuasion, advertising, political communication, health, and communication*. A Google Scholar Internet search and a snowball search based on references followed. Please refer to Figure 1 for details of the search and screening procedure.

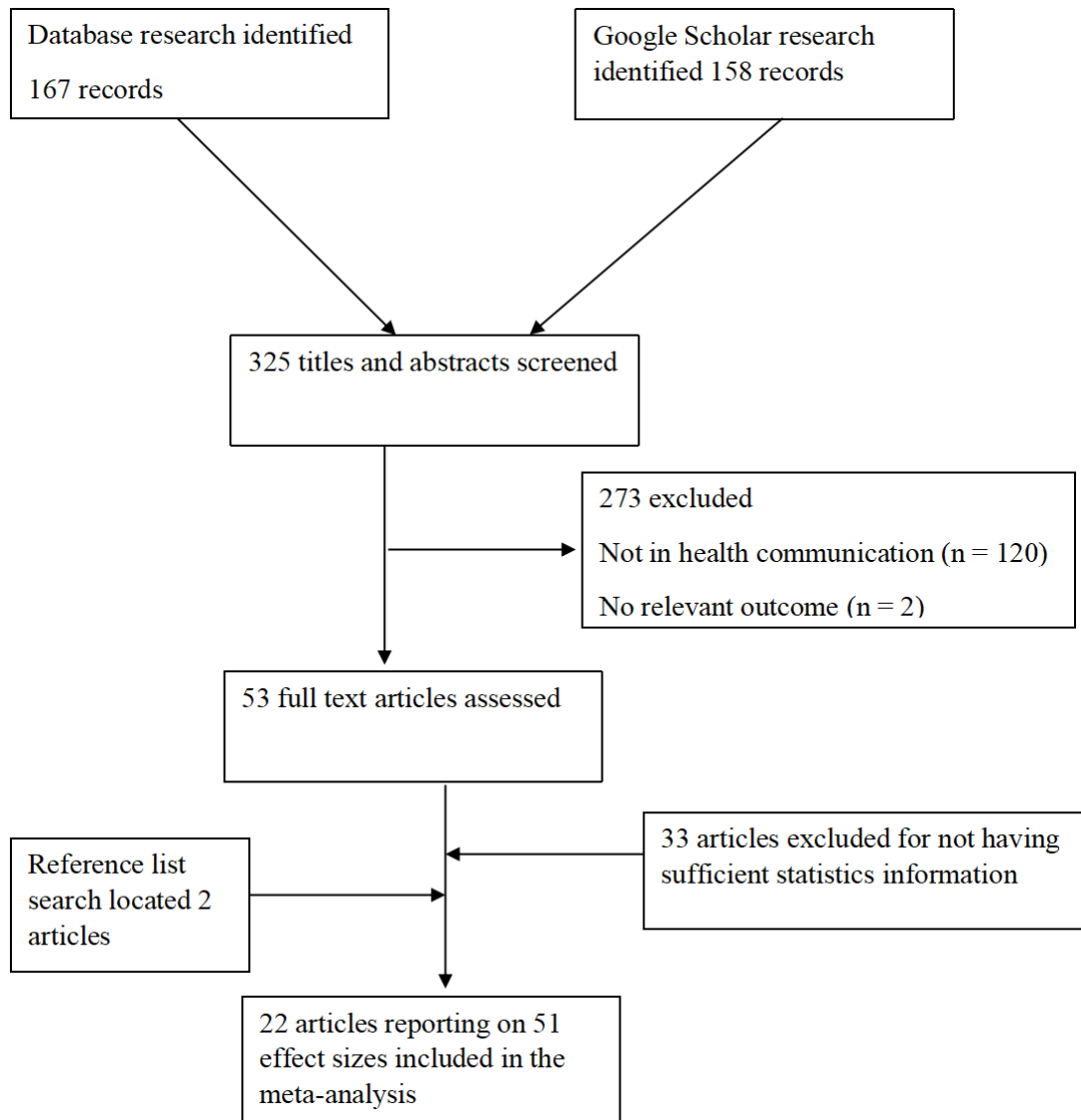


Figure 1. Summary of article retrieval process

The search period covered all manuscripts that were available by December 2022. While the process cannot guarantee to produce an exhaustive list in which every single study is included, we are confident that in the rare case of missing studies, they are likely to appear at random rather than systematically, which should not affect key findings in any major way (Eisend, 2017).

3.2 Inclusion and Exclusion Criteria

We screened and selected primary studies to the main analysis based on the following criteria. First, each study should examine the connection between ambivalence and at least one of the persuasion measures (i.e., perception, attitude, behavioral intention, or behavior). Second, appropriate quantitative data necessary to calculate the effect size had to be available, which included statistics such as correlations, means, sample sizes, and standard deviations. We reached out to the authors and requested such information if the essential statistics were not reported in the original articles. Articles for which we were unable to obtain the required statistics for meta-analytical purposes were therefore excluded. In the end, 22 articles with 51 effect sizes were included in the final sample for the current meta-analysis.

3.3 Unit of Analysis

The unit of analysis is the association between ambivalence and a persuasive variable. When a study reported more than one measure, each outcome was treated as providing a separate effect size estimate. The zero-order Pearson's correlation coefficient (r) was extracted as the indicator of effect size, representing the magnitude of association between ambivalence and persuasion variables. Positive correlations indicated that a higher level of ambivalence was related to a greater rating on perception, attitude, intention, behavior, or overall persuasion.

The main dependent variables in this study were persuasion effects as indicated by changes in perception, attitude, behavioral intention, and behavior. If one study documented associations between ambivalence and multiple persuasion measures, we examined indicators separately and then averaged them to form a single effect-size measure for overall persuasion. For example, intention changes would represent persuasion impact if a study measured intention only. When a study reported both intention and behavior, we examined them separately as individual effect sizes. We then used the mean of the two measures to indicate the overall impact. The procedure followed closely with prior meta-analytic projects in various persuasive contexts (e.g., Shen, Sheer, & Li, 2015; Zebregs, van den Putte, Neijens, & de Graaf, 2015).

3.4 Moderator Coding

Based on an extensive review of extant meta-analytic studies and the conceptualization articulated in the ambivalence literature, we coded the following moderators: context (health, advertising, or political communication), type of ambivalence (subjective vs. objective), target of ambivalence (behavior vs. other), sample type (adults, college students, or teens), method (experiment vs. survey), and study location (US vs. other). Besides these categorical moderators, we also coded two continuous variables: the average age of the sample and the percentage of female participants. The author coded the entire sample, 20% of the units ($n = 10$) were also coded independently by another researcher familiar with the field. The Krippendorff's Alpha ranged from 0.93 to 1. The rare disagreements were resolved by discussion.

3.5 Correction of Measurement Errors

The effect sizes were corrected for measurement errors of both the ambivalence measure and the dependent variables (i.e., the persuasive outcomes). Following standard practice, we multiplied the square root of the reliability coefficient (Cronbach's α) of the corresponding variable (Schmidt & Hunter, 2015). In the cases when reliability coefficients were not provided or a single-item measure was employed, we adopted a conservative reliability estimate $\alpha = 0.8$ (Schmidt & Hunter, 2015).

3.6 Analytical Procedure

We used the Comprehensive Meta-Analysis Software (CMA) program to conduct the analyses based on the random effects model, CMA corrects statistical artifacts such as sampling error. A random effects model assumes that between-study differences in effect sizes are driven by between-study differences in populations and methods rather than due to sampling error alone (Field & Gillert, 2010). We followed the guidelines and reporting standards of the American Psychological Association (APA), known as MARS 2010 (Meta-Analysis Reporting Standards). We used r as an effect size measure and the Q statistics on the heterogeneity of effect sizes (Borenstein et al., 2009).

4. Results

4.1 Weighted Average Effect Sizes

The meta-analysis included 22 studies with 51 effect sizes based on 14,173 (68–1,604) participants.

RQ1 asked the average weighted effect size of ambivalence on persuasion. We examined the overall persuasion effects of ambivalence by computing the correlations using the random-effects model. When all persuasive outcomes are considered altogether, ambivalence had a significant but small negative overall impact, $r = -0.134$, 95% CI [-0.192, -0.076], $k = 33$, $z = -4.471$, $p < 0.001$. According to Dillard's review (1998), the average effect size r of nine persuasion variables commonly assessed in meta-analyses was .18. Cohen (1992) has labelled benchmarks of r at .30, .50 and .80 as representing small, medium, and large effects, respectively. Please see effect sizes, sample sizes, and key moderating variables coded for all primary studies in our analysis in Table 1.

Table 1. Sample Sizes, Corrected Effect Sizes, and Moderating Variables

Study	Outcome	Effect size	Ambivalence/Target ^a	Sample size	Sample Type	Country	Method	Context	Female Percent	Age ^b
Chang, 2011 study 1	attitude	-0.1276	Felt/NB	100	Students	US	Survey	Advertising	52	21.6
Chang, 2011 study 1	attitude	0.0901	Felt/B	100	Students	US	Survey	Advertising	52	21.6
Chang, 2012 experiment 1	attitude	0.0137	Objective/NB	120	Students	TW	Experiment	Advertising	51.7	22
Chang, 2012 experiment 2	attitude	0.1288	Objective/NB	68	Students	TW	Experiment	Advertising	56.5	22

Cohen, 2010	intention	-0.1747	Felt/B	149	Students	US	Experiment	Health	64.5	22
Cohen, 2010	attitude	-0.0208	Felt/B	149	Students	US	Experiment	Health	64.5	22
Conner et al., 2002 study 1	attitude	-0.3664	Objective/B	139	Adults	UK	Survey	Health	70.6	50.4
Conner et al., 2002 study 1	intention	-0.3224	Objective/B	139	Adults	UK	Survey	Health	70.6	50.4
Conner et al., 2002 study 2	behavior	-0.2004	Objective/B	361	Adults	UK	Survey	Health	79.5	37.1
Conner et al., 2002 study 2	attitude	-0.2407	Objective/B	361	Adults	UK	Survey	Health	79.5	37.1
Cornelis et al., 2020 study 1a	attitude	-0.4869	Felt/B	94	Students	US	Experiment	Advertising	56.4	22.2
Cornelis et al., 2020 study 1a	intention	-0.4242	Felt/B	94	Students	US	Experiment	Advertising	56.4	22.2
Cornelis et al., 2020 study 1b	attitude	-0.412	Felt/B	95	Students	US	Experiment	Advertising	65.4	22.8
Cornelis et al., 2020 study 1b	intention	-0.2229	Felt/B	95	Students	US	Experiment	Advertising	65.4	22.8
Cornelis et al., 2020 study 2	attitude	-0.1359	Felt/B	106	Adults	US	Experiment	Advertising	44.3	30
Cornelis et al., 2020 study 2	intention	-0.1399	Felt/B	106	Adults	US	Experiment	Advertising	44.3	30
Dormandy et al., 2006	attitude	-0.042	Objective/B	403	Adults	UK	Survey	Health	100	28.6
Dormandy et al., 2006	intention	-0.0757	Objective/B	403	Adults	UK	Survey	Health	100	28.6
Dormandy et al., 2006	behavior	-0.0478	Objective/B	403	Adults	UK	Survey	Health	100	28.6
Hmielowski & Nisbet, 2016	attitude	-0.0543	Objective/NB	829	Adults	US	Survey	Health	49.8	49.3
Hmielowski et al., 2017 wave 1	cognition	-0.5232	Average/NB	1148	Adults	US	Survey	Politics	45.5	49.9
Hmielowski et al., 2017 wave 2	cognition	-0.1402	Average/NB	669	Adults	US	Survey	Politics	45.5	49.9
Hmielowski et al., 2017 wave 3	cognition	-0.0263	Average/NB	408	Adults	US	Survey	Politics	45.5	49.9
Hohman et al., 2014 round 1	Intention	-0.0302	Objective/B	1604	Teens	US	Survey	Health	49.3	13.5
Hohman et al., 2014 round 2	behavior	-0.043	Objective/B	1604	Teens	US	Survey	Health	49.3	13.5
Kim & Hyun, 2017	cognition	-0.1512	Objective/NB	548	Adults	Korea	Survey	Politics	49.6	30.6
Kim & Hyun, 2017	attitude	-0.146	Objective/NB	548	Adults	Korea	Survey	Politics	49.6	30.6
Kim & Hyun, 2017	behavior	-0.1751	Objective/NB	548	Adults	Korea	Survey	Politics	49.6	30.6
Kim et al., 2019	intention	-0.1769	Felt/B	86	Students	US	Experiment	Health	82.6	20.41
Maio et al., 1996	attitude	-0.199	Objective/NB	113	Students	Canada	Experiment	Politics	64.6	22
Menning et al., 2011	attitude	-0.1694	Felt/B	352	Adults	UK	Survey	Health	50	30
Priester, 2002	attitude	0.0159	Felt/B	193	Students	US	Survey	Health	50	20
Priester, 2002	attitude	-0.4776	Felt/B	125	Students	US	Survey	Health	50	20
Priester, 2002	behavior	-0.1592	Felt/B	125	Students	US	Survey	Health	50	20
Ran & Yamamoto,	intention	-0.0404	Felt/B	495	Students	US	Survey	Health	68	19.8

2015										
Russell et al., 2018 study 1	attitude	-0.1475	Objective/B	433	Teens	US	Experiment	Health	46.5	15
Russell et al., 2018 study 1	intention	-0.2229	Objective/B	433	Teens	US	Experiment	Health	46.5	15
Russell et al., 2018 study 2	attitude	-0.1378	Objective/B	115	Teens	France	Experiment	Health	47.4	15
Russell et al., 2018 study 2	intention	-0.2038	Objective/B	115	Teens	France	Experiment	Health	47.4	15
Shen & Wang, 2015	intention	-0.0478	Objective/B	1020	Adults	China	Survey	Health	50	30
Sukalla et al., 2017	attitude	-0.1928	Felt/B	308	Adults	US	Experiment	Health	68.8	35.3
Sukalla et al., 2017	intention	-0.2775	Felt/B	308	Adults	US	Experiment	Health	68.8	35.3
Yan, 2015	attitude	-0.2732	Objective/B	256	Students	US	Experiment	Health	61	19.9
Yan, 2015	intention	-0.1689	Objective/B	256	Students	US	Experiment	Health	61	19.9
Yan, 2015	cognition	0.0835	Objective/B	256	Students	US	Experiment	Health	61	19.9
Zhao & Cai, 2008	attitude	-0.0856	Felt/B	779	Students	US	Survey	Health	68.2	19.8
Zhao & Cai, 2008	cognition	0.0906	Felt/B	779	Students	US	Survey	Health	68.2	19.8
Zhao & Cappella, 2008	attitude	-0.08	Objective/B	386	Teens	US	Experiment	Health	54	15.2
Zhao & Cappella, 2008	intention	-0.1194	Objective/B	386	Teens	US	Experiment	Health	54	15.2
Zhao & Nan, 2009	attitude	-0.0456	Felt/B	133	Students	US	Survey	Health	66.9	19.9
Zhao & Nan, 2009	cognition	0.0304	Felt/B	133	Students	US	Survey	Health	66.9	19.9

Note. ^aTarget(B-behavior; NB-nonbehavior); ^baverage age.

RQ2 investigated the average weighted effect size of ambivalence on each of the persuasion outcomes, including perception, attitude, behavioral intention, and behavior. When the persuasion items were examined separately, ambivalence had similarly small effects on attitude ($r = -0.146$, 95% CI [-0.213, -0.077], $k = 24$, $N = 6,305$, $z = -4.116$, $p < 0.001$) and intention ($r = -0.182$, 95% CI [-0.265, -0.096], $k = 15$, $N = 5,689$, $z = -4.132$, $p < 0.001$). The impact of ambivalence on perception ($r = -0.107$, 95% CI [-0.226, 0.015], $k = 7$, $N = 3,941$, $z = -1.72$, $p = 0.085$) and behavior ($r = -0.123$, 95% CI [-0.263, 0.022], $k = 5$, $N = 3,041$, $z = -1.669$, $p = 0.095$) were approaching significance and smaller.

4.2 Moderator Analysis

The results of the Q statistics tests showed that there was significant heterogeneity across effect sizes in overall persuasion, $Q = 54.843$, $df = 32$, $p < 0.001$. As for specific persuasive outcomes, there was significant heterogeneity across the board: perception: $Q = 274.464$, $df = 6$, $p < 0.001$; attitude: $Q = 84.662$, $df = 23$, $p < 0.001$; behavioral intention: $Q = 62.746$, $df = 14$, $p < 0.001$; and behavior: $Q = 13.546$, $df = 4$, $p < 0.01$. Therefore, we followed up with analyses on potential moderators for these outcomes. Meta-regression analysis revealed that neither age nor percentage of female participants significantly moderated the effect sizes.

We ran subgroup analyses on the following categorical moderators on overall impact, which included context, type and target of ambivalence, sample type, method, and study location. There was not much variation across these different factors on the overall persuasive effects. One caveat was that although sample type did not materially affect the results ($Q = 0.321$, $df = 2$, $p = 0.852$), the data seemed to suggest that the association between ambivalence and overall persuasion tended to be weaker among teens ($r = -0.102$, $k = 5$, 95% CI, -0.241 to 0.041, $p = 0.163$) compared to adults ($r = -0.171$, $k = 13$, 95% CI, -0.257 to -0.084, $p < .001$) and students ($r = -0.108$, $k = 15$, 95% CI, -0.196 to 0.018, $p = 0.018$).

We also conducted subgroup analyses on specific persuasive outcomes. There was a similar finding revealed on attitude, although sample type did not significantly affect the results ($Q = 0.321$, $df = 2$, $p = 0.852$), the association between ambivalence and attitude tended to be weaker among teens ($r = -0.12$, $k = 3$, 95% CI, -0.261 to 0.026, $z = -1.615$, $p = 0.106$) compared to adults ($r = -0.163$, $k = 8$, 95% CI, -0.248 to -0.076, $z = -3.658$, $p < .001$) and students ($r = -0.138$, $k = 13$, 95% CI, -0.138 to -0.213, $z = -3.493$, $p < 0.001$). A similar pattern emerged regarding the context and target. Despite the overall insignificant heterogeneity data based on the random effects model ($Q = 0.387$, $df = 2$, $p = 0.824$), the influence of ambivalence on attitude was stronger in advertising ($r = -0.115$, $k = 7$, 95% CI, -0.224 to -0.004, $z = -2.025$, $p = 0.043$) and health communication ($r = -0.152$, $k = 15$, 95% CI, -0.214 to -0.088, $z = -4.649$, $p < 0.001$), compared to political communication ($r = -0.167$, $k = 2$, 95% CI, -0.335 to 0.011, $z = -1.838$, $p = 0.066$). In spite of the overall non-significant heterogeneity result ($Q = 2.201$, $df = 1$, $p = 0.138$), ambivalence targeting behavior had a stronger influence on attitude ($r = -0.166$, $k = 18$, 95% CI, -0.223 to -0.108, $z = -5.576$, $p < .001$) than did ambivalence targeting other objects ($r = -0.076$, $k = 6$, 95% CI, -0.179 to 0.029, $z = -1.425$, $p = 0.154$).

When considering behavioral intention as the outcome, two variables emerged as significant moderators. Methodology moderated the influence of ambivalence on behavioral intention ($Q = 10.808$, $df = 1$, $p < 0.01$). Studies using experiments yielded significantly higher magnitude ($r = -0.221$, $k = 10$, 95% CI, -0.277 to -0.163, $z = -7.349$, $p < 0.001$) compared to those using surveys ($r = -0.076$, $k = 5$, 95% CI, -0.14 to -0.011, $z = -2.282$, $p = 0.022$). Context also moderated the influence of ambivalence on behavioral intention ($Q = 5.606$, $df = 1$, $p = 0.018$). Studies in advertising withheld significantly higher magnitude ($r = -0.327$, $k = 3$, 95% CI, -0.454 to -0.186, $z = -4.397$, $p < 0.001$) compared to those in health communication ($r = -0.142$, $k = 12$, 95% CI, -0.142 to -0.2, $z = -4.723$, $p < 0.001$).

4.3 Diagnosis of Publication Bias

A typical weakness of meta-analysis is that it is susceptible to an overestimation of the average effect size, because sample size and effect size are inversely proportional, particularly in the published research literature (Levine, Asada, & Carpenter, 2009). Although we did not set any filter to exclude unpublished studies purposively in the search process, unpublished studies (e.g., book chapters and conference papers) were screened out due to various inclusion and exclusion criteria. This meta-analysis included only published studies, which warrants extra caution when interpreting the findings.

To inspect publication bias, we applied various methods recommended by previous meta-analytic studies. First, a preliminary analysis (Eisend, 2017) showed the correlation between sample size and effect size was nonsignificant, $r = .15$, $p = .30$. We then conducted further analysis using the funnel plot, Egger's regression test, and the trim and fill method (Vevea, Coburn, & Sutton, 2019). The funnel plot is presented in Figure 2. The effect sizes were distributed nearly evenly on two sides with the shape resembling a funnel. Egger's regression test yielded nonsignificant result, $t(49) = 0.97$, $p = 0.17$. Moreover, the trim and fill result indicated that no study should have been eliminated to achieve symmetry of the distribution. Summarizing the evidence gleaned from the assessments, we were confident that publication bias was not a major concern for this meta-analysis.

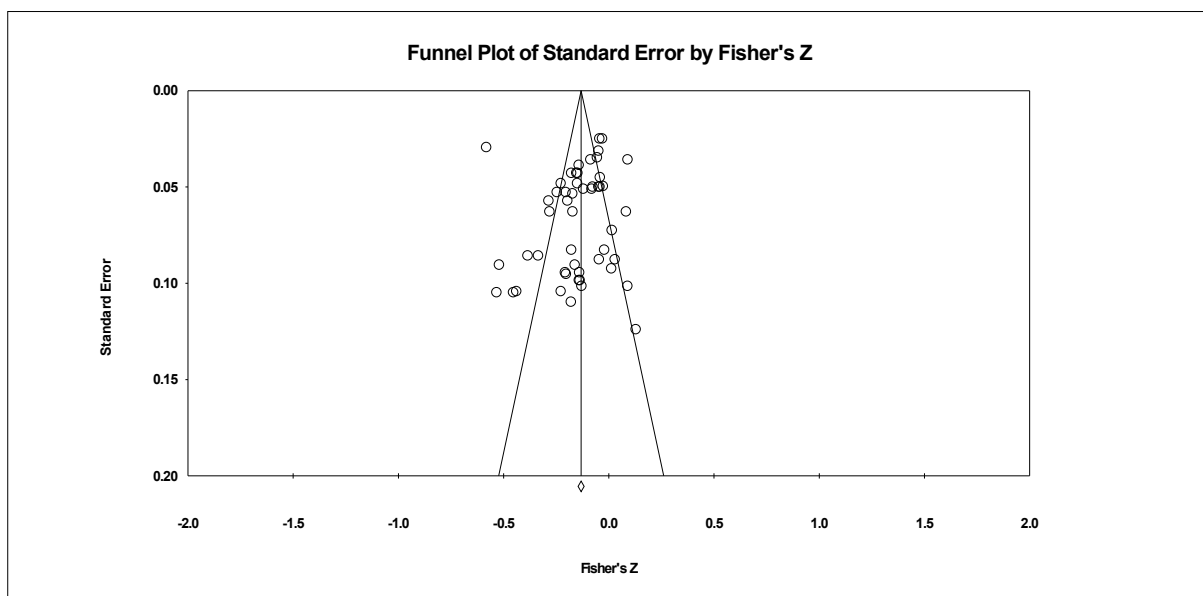


Figure 2. The Funnel Plot

5. Discussion

We interpret meta-analytic findings based on two major indicators: 1) the point estimation referring to the range of values; and 2) the confidence interval referring to the amount of uncertainty in the estimate. The absence or weakness of statistical significance does not equal zero or negligible effect (Eisend, 2017). We reported confidence intervals in addition to the p values for all analyses, which can be more informative than the power analysis alone (Valentine, Pigott, & Rothstein, 2010).

There has been growing scholarly attention on the role of ambivalence in communication. It is important to examine how and to degree this intriguing construct is linked with various persuasion outcomes. Overall, this meta-analysis takes the initial step and provides a preliminary overview synthesizing the latest literature. It answers the broader call in the field to examine the nuances and subtlety in persuasion research, particularly in the context of ambivalence.

Overall, ambivalence had a significant but small negative impact on persuasion. Specifically, ambivalence had a small influence on attitude and intention. Its impact on perception and behavior were less pronounced. It is worth noting that it is common practice in meta-analytic literature to analyze outcome variables separately, some revealing disparate or inconsistent results about various outcomes (Walter et al., 2019; Zebregs et al., 2015). We attribute the small effect sizes to the following observations. First, the conceptualizations and operationalizations of ambivalence vary widely across primary studies. There is no single, universally agreed upon definition or measurement of ambivalence. The degree and context of ambivalence has a big range, and the operationalizations on related factors used in each study may have their unique influence. Second, extant research suggests that it is genuinely challenging for communication efforts to materialize, as persuasive outcomes are largely dependent upon people's existing mental schemas. There was some evidence indicating ambivalence was related to need for cognition and fear of invalidity (Conner & Sparks, 2002). People with ambivalent attitudes have a more elaborate set of ideas despite the incoherency, with higher level of sophistication in their knowledge structure (Zhao & Cai, 2008). Still, we know relatively little about how people with different traits process message features that might connect with varied degrees of ambivalence. There is limited research on individual factors linked with conflicting emotions and evaluations. These are important areas for further research.

There was significant heterogeneity across effect sizes in overall persuasion, as well as specific persuasive outcomes. The association between ambivalence and overall persuasion (and attitude in particular) tended to be weaker among teens compared to adults and college students. This finding is attributable to the discrepancy of sample sizes amongst the three groups. Moreover, it seems to suggest that the linkage between ambivalence and persuasion is more uncertain among younger audiences undergoing formative years compared to adults. The ambivalence targeting behavior had a stronger influence on attitude than did ambivalence targeting other objects. Ambivalence is typically associated with more complex schemas surrounding the target issue. In large part, attitude refers to the favorable or unfavorable evaluations of the behavior. This finding highlights the closer connection between attitude and behavior.

Methodology significantly moderated the magnitude connecting ambivalence and behavioral intention, studies using experiments yielded greater sizes compared to those using surveys. Relative to correlational data, experimental data held a natural advantage on the magnitude of effect size, the edge was confined in one specific persuasive outcome based on the current data. With respect to context, the influence of ambivalence on attitude was stronger in advertising and health communication, compared to political communication. Studies in advertising yielded significantly greater effect sizes on behavioral intention compared to those in health communication. It echoes extant empirical investigations, which have yielded inconsistent results across topic areas (Shen et al., 2015). These results lend additional support for research that suggests that ambivalence varies greatly among a variety of contexts.

Most moderator analysis yielded nonsignificant findings, the key plausible explanation of

which is the small sample size in many of the categories. Moreover, the characteristics of the primary studies of apparently divergent findings in a meta-analysis sets the upper limit for the moderator investigation (Eisend, 2017). It is also worth noting that the power of detecting moderator effects in a meta-analysis is typically low. Although a prospective power analysis is preferred over a retrospective power analysis, it is difficult to carry out because a prospective one requires assumptions about parameters that are unknown before the review (Ratcliff & Sun, 2020). Therefore, it is exceedingly challenging to assess power for a meta-analysis, particularly when random-effects models are concerned.

The findings are limited by the small sample size of primary studies. Despite the effort, we were only able to locate 22 eligible studies after screening based on the inclusion and exclusion criteria. We are hence reluctant to claim that the weighted average effect size based on the random effects model is a precise assessment of the population effect size. Rather, this finding might be interpreted as a closer step toward population effect size estimate compared to primary studies, because meta-analysis has the advantage of correcting for statistical artifacts such as sampling and measurement errors (Borenstein et al., 2009). As communication research continues to investigate the implications of ambivalence, our study suggests that the subject is likely a complicated and nuanced matter. This preliminary meta-analysis enhances scholarly understanding and encourages empirical modesty and conscientiousness when attending to ambivalence. Our results add to a growing body of evidence indicating that the impact is peculiarly multifarious, with potentially multiple moderating variables shaping the association magnitude. The present study found curious and somewhat puzzling effects insofar. It helps to advance our understanding of ambivalence, which is important for both theoretical and practical purposes. The results reported here are likely to be of interest to researchers and practitioners interested in optimizing the persuasion effectiveness. Lastly, we suggest when more empirical studies have been accumulated in the future, a more comprehensive meta-analysis should be conducted to provide updated results on this topic in general and in each partitioned area.

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