Systematic review and meta-analysis of Erotic and Friendship-based Love

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Abstract

This systematic review aimed to find attitudes toward Erotic and Friendship-based love within Eastern cultures in comparison to Western cultures and appraise differences between individual Eastern countries vs. Western countries regarding these two styles of love. Likewise, addressing major moderators concerning Erotic and Friendship-based love are the secondary objectives of this review. The analysis included 89 articles compromising 25 countries ($N = 37786$), directly comparing Eastern and Western countries (as classified per U.N. conventions) in their attitudes toward love styles. The findings of our research revealed that Easterners identified themselves as having more Friendship-based love than Westerners.

On the contrary, the cross-cultural differences in Erotic love are considered to be culturally universal. In this sense, Erotic love ascribed to strong personal feeling is hardly affected by the culture, which is inconsistent with Friendship-based love as it is more attributed to strict social rules. To explain the role of moderators in key measures, the subgroup analysis and meta-regression show that both Erotic and Friendship love decrease over time, and these love styles improve with the presence of children in the family. No religious belief predicts positively toward Erotic love and a negative trend toward Friendship-based love.

Keywords: Erotic love, Friendship-based love, Love Attitude Scale, cross-cultural, East-West, meta-analysis.

Systematic review and meta-analysis of Erotic and Friendship-based Love

Love is considered as the most substantive component of the experience of human beings. Over the last decades, there has been increasing interest in the issue of love. These growing interests have led to the emergence of various typologies and theories. A number of theories and instruments have been constructed to measure love (e.g., Rubin's (1970) "Love" and "Liking"). [Rubin](#) (1970) was the first investigator to measure love through an objective scale. Concerning Rubin's dichotomy, [Hatfield and Walster](#) (1978) characterized love, including tenderness, emotion, and sexuality as "Passionate love" and love containing deep attachment and friendly affection as "Companionate Love". Although the Passionate Love Scale (PLS) was developed by Hatfield and Sprecher (1986), they did not establish their own scale of Companionate Love. Sternberg's (1986) triangular theory identified eight kinds of love through the mixture of three features: "passion", "intimacy," and "commitment". In Sternberg's (1986) work, the passion component is equated to passionate love, and intimacy is implicitly characterized as the liking construction of Rubin. A social psychological instrument arose from Lee's colors of love model called the Love Attitude Scale (LAS). Lee (1973) suggested an inclusive six-style model of love. The three primary styles embraced Eros (romantic love, passionate, Erotic and physical attraction to the partner), Storge (a style derived on slowly developing companionship, Friendship, and affection), and Ludus (game-playing love). The combination two of these primary styles shapes the secondary styles. Pragma as a logical love is viewed as a compound of Storge and Ludus and Mania is deemed as a combination of Eros and Ludus as well as Agape is characterized as a mixture of Eros and Storge. To test Lee's (1973) theory, two different scales have been developed by Lasswell and Lasswell (1976) and Hendrick

and Hendrick (1986). In a similar vein, it is argued that the Eros is equivalent to Erotic love, and Storge is equal to Companionate or Friendship-based love (Masuda, 2003; Sternberg, 1987).

Although all above-mentioned theories placed implicit and explicit emphasis on the distinction regarding Erotic and Friendship-based love, to maximize the clarity of comparison between East versus West at study and societal levels, this research aimed to focus on “Eros” subscale of the LAS (Hendrick & Hendrick, 1986) and shorter or refined measures to assess Erotic or passionate love, intending to address the “Storge” subscale of LAS (Hendrick & Hendrick, 1986) shorter or refined measures of Friendship-based or Companionate love.

The rationale for the review in the context of what is already known

There exist a number of factors projecting variation of Erotic and Friendship-based love. Hendrick and Hendrick (1986) pointed out that the ethno cultural heritage of oriental students has an influence on students’ attitudes toward love. Considering this, their analysis revealed that Asian students living in North America enjoyed more Friendship-based love and showed less Erotic love. Along the same line, Dion and Dion (1993, 1988) noted that the social construction of love styles might differ in Western countries as contrasted with Asian cultures. As a rebuttal to this perspective, some researchers viewed the cross-cultural difference of Erotic love to be very moderate, assuming that Friendship-base love associated with strict rules was not culturally universal (Doherty et al., 1994; Hatfield & Rapson, 1996; Neto, 2007; Neto et al., 2000). Theologians and philosophers have long assumed that there are strong associations between love and religion (Hendrick & Hendrick, 1987). A number of investigations reported that some love styles are affected by religious belief (Hendrick & Hendrick, 1987; Lin et al., 2005).

Variations between different age groups concerning love styles act as another moderator available in literature (Montgomery & Sorell, 1997; Murstein et al., 1991; Neto, 2001; Neto & Pinto, 2003). Some family theorists and practitioners subscribed to the belief that Erotic love is more dominant in young adults, and Montgomery and Sorell (1997) called into question this argument. These authors hold the view that Friendship-based love enhanced during the Middle age.

The relationship length is thought of as another variable having an impact on variations in love styles. In this respect, the association between relationship length and love styles is the subject of much debate. Some believe that Erotic and Friendship-base love are consecutive in such a way that the Erotic converts to Friendship love over time (Acker & Davis, 1992; Berscheid & Hatfield, 1978; Hatfield & Walster, 1978; Hatfield et al., 2008; Lee, 1973; Sternberg, 1988; Tucker & Aron, 1993). Other findings stand in stark contrast with previous results, where Erotic love is perceived to be altered, and Friendship love remains unchangeable (Bierhoff & Rohmann, 2000). In this vein, some literature conveys the idea that the length of the relationship may exert a negative influence on Friendship-base love (Smith & Klases, 2016). Incongruent with this perspective, the effort was made to illustrate that the length of the relationship shows a direct association with Erotic love (Graham, 2011).

Many studies seeking to deal with love status differences concerning love attitudes. The experience of love is deemed as a conspicuous component enabling to change love styles. Several studies accentuated that the experience of being in-love provides fertile ground for individuals to enjoy more Erotic love (Hendrick & Hendrick, 1986; Hendrick et al., 1988; Murstein et al., 1991; Neto, 1993; Neto & Pinto, 2003) and also Friendship-based love (Hendrick & Hendrick, 1986). Some investigations pointed out that the different styles of love are not

assumed to be independent of individual's current love situation such as the number of past love relationships (Hendrick & Hendrick, 1986) and married or common law (Montgomery & Sorell, 1997). Lee (1973) conceptualized the view that the size of the family is a pivotal predictor of love styles. To highlight this view, Montgomery and Sorell (1997) supported the view that Erotic and Friendship love improved in families having children.

The review of literature sheds light on the fact that Erotic and Friendship-based love is the subject of [controversial](#) and contradictory challenges concerning their moderators. It stands to the reason that conducting systematic review and meta-analysis aims to fill the gap regarding previous studies is an indispensable necessity to draw a novel picture of these two styles of love.

Literature review on the previous systematic review and meta-analysis of LAS

Considering prior systematic review on Erotic and Friendship love, it should be mentioned that no systematic review has been, up to now, carried out on this issue. Some meta-analyses have, however, approached this topic. Among them, the study of Masuda (2003) is a meta-analysis conducted in 2003. Thirty-three empirical investigations testing the correlation between relationship satisfaction and passion and companionate love were fed into this meta-analysis. The results of this research revealed that satisfaction is highly correlated with Erotic love, but that its correlation with companionate love remained unclear because of heterogeneity in the total sample of the all companionate love investigations. This meta-analysis set out to focus upon a potential moderator, that was, theoretical differences between Lee's (1973) theory and the other three theories. In this study, the databases of the PsycINFO from 1967 to April 2000, Social Sciences Citation Index from 1987 to 1999, and Dissertation Abstracts from 1980 to 1999 were searched for any study that used love, romantic love and satisfaction. A further meta-analysis partly addressed this issue conducted by Graham (2011), which included 81 studies

revealing 103 samples and 19,387 individuals as data for the meta-analysis. This research aimed to identify the higher-order factors underlying the most popular measures of love through meta-analytic factor analysis (Graham, 2011). Another meta-analysis touching on the issue of love was performed by Mirsu-Paun and Oliver (2017). Twenty manuscripts reporting on twenty-one unique studies ($N = 19,623$) were included for this investigation. This research intended to examine the association between adolescent romantic relationship quality, romantic relationship breakups, and mental health outcomes.

Why it is important to do this systematic review

Concerning the increasing importance of critical interpretation regarding love over the last few decades, a systematic review has been necessary to perform to approach this issue. A review of the literature on LAS implies that the aforementioned meta-analyses only addressed limited moderators, failing to pay comprehensive attention to detect the potential sources of heterogeneity and using the merely limited database with regard to the formal and informal literature.

Since some contentious challenges regarding Erotic and Friendship-based love were not exactly investigated in prior meta-analyses, touchy issues concerning these two styles of love remain undiscussed. Similarly, some of the aforementioned research lacked substantive necessity to perform meta-analysis such as the methodological risk of bias assessment (quality assessment), publication bias, and sensitive analysis. Taking these into consideration, it is of value to conduct a systematic review and meta-analysis to fill the gap in the literature.

In a plain language, no heed was given to draw a distinction concerning Erotic and Friendship-based love with a focus on interregional differences. Likewise, the assessment of

differences between Eastern countries vs. Western countries is still an open question.

Inconsistent with the aforementioned meta-analyses, the present review intends to address grey literature (theses and dissertations, conference papers, and final reporting), reference lists, and key journals, thereby setting out to develop new hypotheses never tested in previous meta-analyses.

As far as we know, this systematic review and meta-analysis treated, for the first time, the differences between Western culture vs. Eastern culture and interregional divergences among countries as well as differences between individual Western countries vs. Eastern countries with respect to the comparison between Erotic and Friendship-based love. It is of value to assert that a well-conducted systematic review and meta-analysis is pivotal to better inform social policy makers, counselors, and researchers when it comes to attitude toward love.

To make a clear departure from the shortcoming of previous meta-analyses and shine a light on the novel reality of love styles, the four primary aims of this systematic review are as follows.

1. Identifying attitude toward Erotic and Friendship love within East versus West culture.
2. The comparison between individual Eastern countries vs. Western countries with respect to Erotic and Friendship-based love.
3. Looking at the change of love styles over the course of time in each country.¹
4. Dealing with interregional comparisons with regard to Erotic and Friendship-based love.²

¹ This study viewed the Erotic and Friendship-based love not as being stagnant. In a similar vein, this study expects that these love styles would change over time.

² To draw distinctions concerning East and West difference and also interregional comparison, the current study used the classification of United Nations Statistics Division (https://unstats.un.org/unsd/mi/mi_worldmillennium_new.asp). It should be pointed out that Japan, in this

As previously pointed out, there exist profound gaps regarding moderators of Erotic and Friendship love. To put problematic views in the literature in the picture and advance a new perspective, this review sought to address the potential sources of variation in mean and heterogeneity according to the different versions of LAS (Hendrick & Hendrick, 1986, shorter and modified measures), number of items to measure Erotic and Friendship love, language in which LAS has been measured, kind of publication (journal articles, conference proceedings, final reports, dissertations and master's theses), types of sampling method (probability and non-probability sampling), ways of data collection (questioner survey, interview, mail survey, online measure, phone survey, other survey methods and mixed methods), the kind of design (relational and descriptive), the levels of education (college graduates, college students, high school graduates, high school students or other education), age groups (children , adolescents 16-19 , young adults 20-26 , adults 27-39 , middle aged adults 40-56 , elderly adults more than 57 and general public), the periods of relationship length, the percentage of people who were in-love, the percentage of parents who had children, the methodological risk of bias assessment, the level of alpha for Erotic and Friendship-based love, The number of subjects in each sample, the percentage of people who were in-relationship, the percentage of individuals married or common law, the percentage of people having relationships more than one, different percentages of religious beliefs (catholic, protestant, jewish, no-religious, Other religious), different percentages of ethnicities (White, Black, Asian, Hispanic, Caucasian, African, European and Other race).

investigation, was categorized as Eastern Asia and also United States, Canada, Australia and New Zealand were grouped into Western developed region.

To clarify the variation of Erotic and Friendship-based love at the societal level, this study intended to explore the means difference of Erotic and Friendship-based love between individual Eastern countries vs. Western countries hinged on greater individualistic traditions, Human Development Index (HDI), and Gender Inequality Index (GII). This study tentatively expected that greater differences in individualistic scores, HDI and GII between East-West countries, would be concerned with different levels of Erotic and Friendship love.

Methods

Inclusion criteria

Primary studies were searched for selection according to the objectives of this investigation. To maximize the clarity, all descriptive, cross-sectional and cross-cultural concerning LAS, the version developed by [Hendrick and Hendrick](#) (1986) and the shorter or modified measure of the same construct subsequently developed were assessed to enter into this meta-analysis. This research merely covered quantitative studies concerning LAS to appraise “Storge” and “Eros” as indicators of Friendship-based and Erotic love. It is worth mentioning that qualitative, trial (experimental), cohort (longitudinal) and clinical studies were not included in this meta-analysis.³ To calculate the effect size, it was of significance to report means, standard deviations, relevant sample size, or other statistics that were necessary to this end. To determine the eligibility criteria, the pilot was conducted by the authors of the paper independently. No limitation to the language of publication was utilized in the selection of primary research. Non-English research was translated by freelance language translators on the web (Applied Languages, Bing, Im Translator, and Babel fish, Google translate). In this meta-

³ In studies where two groups of non-violence and pathological cases (abused samples) were investigated, the non-violence group was fed into analysis.

analysis, the PRISMA flow diagram was employed to show the number of primary research included and excluded in each step of the selection process (Moher et al., 2009) (see Figure 1).

Types of participants

The participants of this review are males and females. In an attempt to make the most objective cross-cultural comparisons, it was substantial that primary studies had employed subjects raised and living in their home country. The Western participants who lived in the Eastern country for less than five years but were raised in their home countries were considered as culturally Western and conversely (North & Fiske, 2015). It is of importance to explain that abuse and homosexual samples were not included in this review.⁴

Time frame

The search covered all published and non-published studies through from 1 January 1986 and 23 December 2018.

Electronic searches

Authors conducted an electronic search through Scopus, Web of Science, PsycINFO, ProQuest, and also Science.gov, Science open and Microsoft Academic. To improve objectivity. The included primary studies and the reference lists of other published meta-analyses were examined to identify further studies not detected through electronic search. To find other studies, journals publishing the most relevant meta-analyses or primary studies were also examined⁵. The Institute of the Cochrane Handbook for systematic reviews and meta-analysis suggests applying

⁴ In the two following samples, the number of homosexuals was only less than 5 percent. In this regard, this project assumed that this negligible amount could be ignorable (Katz & Schneider, 2013; Kimberly et al., 2014).

⁵ . The Journal of Social Behavior and Personality and journal of social and personal relationship were also screened.

grey literature in reviews (Deeks et al., 2011). Grey literature was embraced in this review including conference proceedings, reports, dissertations, and theses (Deeks et al., 2008; Godin et al., 2015). If a study met the objectives of this meta-analysis, contact would be done with the corresponding author(s) for data, and an enquiry was made to the presence of other studies regarding the issue of this review. Recommended strategies for the electronic survey were recruited to augment the chance of response rates (Dillman, 2011). If no response was received, the missing data, if necessary, were estimated from the most similar research (more details are found in Supplementary Material S1).

The selection of studies

The reference manager software Endnote was applied to recognize and exclude duplicate records. Two authors independently estimated the full text of potentially relevant non-duplicated research. Where several publications from one research group were observed, contact was made to find whether their publications were from the same study or not, and then duplicated research was excluded. Disagreements among the authors, in the entire process of this review, were lessened by discussion to reach the agreement. If no consensus existed between the reviewers, the controversy would be settled by an expert. For each study selected for inclusion, the data extracted presented in Supplementary Material S2.

The assessment of methodological risk of bias (quality assessment)

The risk of bias (quality assessment) or the methodological quality of primary studies was appraised by the modified tool of Hoy et al. (2012). It is essential to point out that the questions (9,10,13) exactly used this tools and (1,6,7,11,12) were modified and (2,3,4,5,8,14,15,16,17) were added into the tool of Hoy et al.(2012). The questions were

answered as no (or unclear) and yes. All items of yes (low risk or high quality) were weighted as one score. The pilot of this instrument was conducted prior to performing the risk of bias assessment. The full texts of primary research were individually assessed by Authors. The reliability of these items was assessed and subsequently this tool was used in the systematic reviews of cross-cultural studies. The primary research which obtained scores of <10 on these items was deemed as “low quality,” and the studies achieving 11 were construed as “middle-low”. Similarly, studies attaining scores of 12 were viewed as “middle-high,” and those with scores more than 12 were considered as “high quality.” The quality assessment items appear in Supplementary Material S3.

Assessment of heterogeneity

Principle summary measure, in study level, was the mean, and the main estimate of effect, on the societal level, was pooled standardized means difference with 95% confidence intervals (95%-CIs). Heterogeneity among included studies was assessed by the p-value of Q Cochrane test and I^2 statistic, which estimates the proportion of variability in the meta-analysis caused by differences between studies rather than sampling error as proposed by the Cochrane Handbook for Systematic Reviews and meta-analysis (Deeks et al., 2008; Higgins & Green, 2011) (more details are found in Supplementary Material S4).

Assessment of publication bias and sensitive analysis

To address possible small study effects, “funnel plot,” “Egger’s test and Begg’s test,” and “Fill and trim method” were applied. If one of the Egger or Begg tests was significant, the “Fill and trim method” would be employed (Duval & Tweedie, 2000a, 2000b; Egger et al., 1997).

Sensitive analysis was applied to determine the robustness of systematic review outcomes. In this regard, the visual representation of sensitive jackknife was conducted to recognize the primary research showing the greatest change from pooled means. The key sources of these changes were also addressed by different items.

Results

89 articles compromising 25 countries (N = 37786) were cumulated in this meta-analysis (see Fig.1). The summary of the characteristics of the articles included was summarized in Supplementary Material S5.

Figure 1. PRISMA flow diagram

Synthesis of Results and Risk of Bias

The overall mean and 95%-CIs of Erotic love and Friendship-based love are presented in Table 1. Given the results of quality assessment of primary studies, 58 (46.4%), 27(21.6%), 27 (21.6%) and 13(10.4%) samples are identified as low, middle low, middle high and high quality. Along the same line, the overlapping between confidence intervals shows that no considerable difference is detected between low and high quality. The visual representation of the quality assessment appears in Figure 2.

Figure 2. Quality Status

Table 1: Number of observations and average effect sizes cumulated in the meta-analysis

	K	Mean	95% Lower confidence limit	95% Upper confidence limit	I ² (p-value)
Erotic love	125	3.6	3.5	3.71	99.4(0.000)
Friendship-based love	125	3.29	3.21	3.37	98.5(0.000)

Note: K is the number of effect sizes; p-value = p-value of Q-Cochran test; I² =homogeneity statistic based on the Random-effects model; I² values vary between 0 and100, where lower values imply homogeneity.

Sub-group Analysis (Study-Level Moderators)

To determine the potential sources of heterogeneity and the factors exerting an influence on key measure, subgroup analyses have been conducted for qualitative and some quantitative

variables (see in Supplementary Material S6). The percentage of people who were in-love acted as an important moderator in the changing of the key measures concerning Erotic love. The subtotal mean and 95%-CIs for a high percentage (more than 79.15%) was 3.93 (3.83, 4.02) and 3.63 (3.89, 3.87) for a low percentage (less than 37%). To assess the potential sources of heterogeneity of Erotic love, % people who have children is a crucial variable to delineate the variation of heterogeneity. Likewise, age groups act as a noticeable variable in the changing of mean in Friendship-based love. The subtotals of mean ranged from 3.13 (2.82, 3.44) for adults (27-39) to 3.79 (3.36, 4.22) for elderly adults (more than 55). To measure the potential sources of heterogeneity of Friendship-based love, % people having children is a significant variable to capture the variation of heterogeneity.⁶

A visual representation for subgroup analyses concerning the change of key measure in Erotic and Friendship-base love at study level appears in Supplementary Material S7.

Meta-regression Analysis (Study-Level Moderators)

To determine the factors having an impact on the key measure and the potential sources of heterogeneity, meta-regression was conducted on quantitative variables (see in Supplementary Material S8). The relationship length and % of people who were no-religious acted as two pivotal moderators in the variations of mean with regard to Erotic love, Adjusted R^2 and Beta for relationship length are 47.76 % ($B = -0.0022$, $p = 0.002$) and for % of people who were no-religious are 28.66% ($B = 0.0055$, $p = 0.163$). To explain the changes in heterogeneity. % of people who were not religious and % individuals who had children are considered to be two

⁶ . The results of moderators regarding the author disciplines, different kinds of language and the ways of data collection were not entered into subgroup analysis because two subgroups of these moderators lacked primary studies less than four.

notable quantitative variables in the variations of key measure regarding Friendship-based love. Adjusted R^2 and Beta for no religious sample are 82.94 % ($B = -0.017$, $p = 0.01$) and when it comes to people having children 23.54 % ($B = 0.017$, $p = 0.125$). To illustrate the highest change in heterogeneity for Friendship-based love, I^2 residuals is equated to 88.07 % for % of people who were no-religious.

The visual representations (scatter graphs) in Erotic and Friendship-based love are presented in Supplementary Material S9.

Temporal variation (Societal-Level Moderators)

To capture time trend, the countries enabled to enter into this level of analysis, which have at least one study in three periods of time (before 2000, 2000-2009 and 2010-2018). Along the same line, the United Kingdom, the United States and Portugal were included in this level of analysis.⁷ To determine the variations of heterogeneity and key measure, subgroup analyses have been conducted in each country. Considering the United States as a moderator involving the most primary studies, the overall mean and 95%-CIs for Erotic love was 3.638(3.484, 3.792) and the overall I^2 was 99.5 % ($p < 0.001$). The change of means ranges from 3.574 to 3.744 with median of 3.659. With regard to the variations of Friendship-based love over time, the overall mean and 95%-CIs of the United States are 3.315(3.204, 3.426) and the overall I^2 is 99 % ($p < 0.001$). Likewise, the change of means ranges from 3.215 to 3.346, with a median of 3.28 (see Supplementary Material S10).

⁷ To illustrate Table 4, a point that needs to be explained is that each sample was individually reported. On condition that a certain study includes two or more samples, it would be essential to document these samples separately. For example, if a study compared to China and Canada in 1999, it would be necessary to report these samples distinctively. Although the United Kingdom carried primary studies in these three periods of time, caution needs to be applied to the generalizability and reliability of the results because there are primary studies less than four in their subgroups.

Interregional variation (Societal-Level Moderators)

This level of analysis was developed to appraise the East vs. West, interregional, and intercountry differences regarding Erotic and Friendship-based love.⁸ The overall mean and 95%-CIs of Erotic love for Eastern and Western countries are 3.41 (3.11, 3.71) and 3.68 (3.53, 3.75). Similarly, the summary I^2 of Eastern and Western countries is 99.5 % ($p < 0.001$) and 99.3 ($p < 0.001$). The pooled mean and 95%-CIs of Friendship-based love for Eastern and Western countries are 3.34 (3.13, 3.55) and 3.28 (3.19, 3.37). The summary I^2 of Eastern and Western countries are 98.6 % ($p < 0.001$) and 98.5 % ($p < 0.001$). Among the Eastern regions, Southern Asia shows 4.06 (3.82, 4.29) and in Western regions CIS⁹ displays 3.66 (3.59, 3.73)¹⁰. Concerning Friendship-based love, southern Asia shows 3.712 (3.56, 3.86) in Eastern regions and Western developed regions in West reports 3.286 (3.19, 3.38) (see Supplementary Material S11).

A visual representation for interregional analyses concerning the change of key measure in Erotic and Friendship-base love appears in Supplementary Material S12.

Pairwise National Comparisons (Societal-Level)

This level of analysis was designed to assess pairwise societal differences. To appraise national-level moderator analyses, each Eastern vs. the Western country comparison was matched in terms of estimated year of data collection (e.g., see North & Fiske, 2015). For

⁸ By way of illustration, this level compared the pooled mean for Taiwan vs. China, India vs. Malaysia, and so on for other Eastern societies; then Germany vs. the U.S., and so on for all other Western societies. To do this, it was necessary for each sample to be separately documented. If a certain study included two or more samples, it would be substantial to report these samples individually.

⁹ Countries of the Commonwealth of Independent States.

¹⁰ Owing to this fact that the number of primary studies in these regions was less than four, the reliability of these results might be doubtful.

instance, Graham et al. (2012) provided the data for Japan, estimated as collected in 2010, and this study was jointed with other Western countries, which their data collected in 2010. Just as with the previous level of analysis, the studies having more than one sample were separately documented in this phase of analysis. On condition that there were a number of studies in a certain country in the same year (e.g., there exist two studies concerning Japan in 1998), the overall mean of these studies would be considered as the mean of this country with reference to the intended year.

The Erotic and Friendship-based love concerning individual Eastern societies vs. individual Western societies were measured through standardized means differences (*SMD*), with Cohen's *d*. This level of analysis, where suitable, allowed us to match national moderators (individualism, human development and gender inequality scores) by the year of data collection. If the year of data collection was unknown, a standard estimate of two years before the publication date would be applied as data collection (Konrath, O'Brien, & Hsing, 2011; Lee & Pratto, 2011; North & Fiske, 2015).

Pairwise comparisons permitted us to draw a distinction between Eastern vs. Western societies concerning these national variables. All scores were characterized as East minus West; in this regard, positive scores explain the Eastern countries being higher than Western countries, and negative scores report the reverse. The summary effect size for Erotic and Friendship love are equal to -0.11(-0.32, 0.09) and 0.31(0.19, 0.43) with I^2 and *p*-value 98.4 % ($p < 0.001$) and 95.2% ($p < 0.001$), respectively (see Supplementary Material S13).

Country-Level Structural and Socio-Cultural Predictors (Meta-regression)

All cultural and social statistics applied for pairwise East-West societal comparisons appear in Supplementary Material S13; the meta-regression analyses incorporating these statistics are summarized in Supplementary Material S14. To explain the role of Socio-Cultural moderators in the variation of differences in Erotic love and also Friendship based-love, meta-regression was tested concerning difference in individual Eastern vs. Western countries.

Individualistic tradition is a significant moderator in the variations of SMD (Cohen's d) with respect to Friendship love. In this point, Adjusted R^2 is equal to 2.63%. To delineate the changes in heterogeneity, I^2 residual is 95.21. East-West differences in individualistic scores negatively predicted the East-West differences Friendship based love ($B = -0.003$, $p\text{-value} = 0.148$).

Differences in human development and gender inequality indices are not a significant predictor of varieties in Erotic love and also Friendship love in individual Eastern countries vs. Western countries.

Sensitivity Analysis

The performing of sensitive analysis reports that prior to carrying out one out method, the overall mean and 95%-CIs and of Erotic love is 3.6 (3.5, 3.71). Having conducted sensitive jackknife, minimum, and maximum mean range from 3.59 (3.49, 3.7) to 3.62 (3.51, 3.73). Before conducting sensitive jackknife, the overall mean and 95%-CIs of Friendship-based love was 3.291 (3.209, 3.374) and following performing sensitivity analysis, minimum and maximum mean are altered from 3.29 (3.203, 3.37) to 3.03 (3.22, 3.38).

The visual representation of sensitive analysis displays that the nearly most primary studies showing the greatest change from the pooled mean of Erotic and Friendship love are

placed surrounding the 13.73, 15.19 percentage of the overall mean. In this regard, 20 and 19 studies are greater than this area concerning Erotic and Friendship loves, respectively.

To assess publication bias, the visual representation of the funnel plot illustrates that the pattern of data concerning Erotic love is, to some extent, homogeneous. In this sense, the publication bias is perceived to be partially ignorable (see Figure 3). The nearly homogeneous pattern of data in Friendship-based love demonstrates that the publication bias is also considered to be in-part ignorable (see Figure 3).

Figure3. A= funnel plot regarding key measure for Erotic love; B= funnel plot concerning key measure for Friendship-based love.

The significant results for the Begg test concerning Erotic and Friendship loves indicate that the publication bias is ($z = -3.8$, $p < 0.001$) and ($z = -1.98$, $p = 0.05$), respectively. These findings bear witness to the fact that the publication biases are non-ignorable.

The coefficient of bias and p-value in Egger test are -5.84 ($p = 0.101$). Contrary to the Begg test in regard to Erotic love, publication bias is ignorable. The result of the Egger test in Friendship-based love implies that publication bias is perceived to be non-ignorable. Because the coefficient of bias and p-value in Egger test are -7.75 ($p = 0.004$)

It is argued that when Begg and Egger tests produce contradictory results, Trim and fill test needs to be employed (Duval & Tweedie, 2000a, 2000b). In this regard, 19 studies were added by performing trim and fill test in Erotic love. The result of this test demonstrates that the pooled means and 95%-CIs of the random model are attenuated from 3.605 (3.5, 3.71) to 3.51 (3.413, 3.61). Since the overlapping between their confidence intervals is more than 50 percent, it would be argued that no-considerable difference was detected. Likewise, the p-value in the estimated random model is ($p < 0.001$). The significant p-value is indicative of the fact that the results of this study are hardly altered by the modification of publication bias. This fact, in turn, suggests that publication bias, in Erotic love, is ignorable. Continuing on this line, no study was added by conducting trim and fill test in Friendship-based love. The findings of this test show that the overall means of the random model remain stable. It attests to the reality that the publication bias is ignorable.

Discussion

Regarding the hypotheses, we found that East vs. West and also individual Eastern countries vs. Western countries indicate that oriental samples identified themselves as having more Friendship-based love than occidental (see Supplementary Material S11). This fact is in line with previous observations of Asian students living in North America (Hendrick & Hendrick, 1986) but runs counter to the study of Hendrick and Hendrick (1986) regarding Erotic love. In a similar vein, a non-significant difference was found between Eastern vs. Western countries with regard to the Erotic style of love. As with Dion and Dion (1993,1988), the finding of Friendship-based love shows that the social construction of love differs in Eastern as constructed in Western cultural tradition. Similar to the studies noting that the cross-cultural differences of Erotic love are culturally universal (Doherty et al., 1994; Hatfield & Rapson,

1996; Neto, 2007; Neto et al., 2000). The result of this study illustrates that Erotic love ascribed to strong personal feelings is hardly influenced by culture inconsistent with Friendship-based love, which is more attributed to strict rules. More than 50 percent overlapping 95%-CIs in visual representation (see Supplementary Material S11, S12) concerning Erotic love show that Southern Asia displays the greatest differences with other regions. Noticeable differences were observed between Eastern Asia and South-Eastern Asia. Likewise, no remarkable differences among the Western regions are detected. These findings bear witness to the argument that the regions carry the primary studies more concerned with collectivistic culture show higher varieties regarding Erotic love. Given Friendship-based love, there are notable differences between Southern Asia and South- Eastern Asia with Western Asia, and Western developed regions, the transition countries of south-eastern Europe ,and CIS. Similarly, a remarkable difference is identified between Western developed regions with Western Asia and CIS. This result indicates that Western compared to Eastern regions show less differences with respect to Friendship-based love. By the same token, the regions shared the primary studies more associated with collectivistic culture display more differences concerning Friendship-based love¹¹.

To explain the variation of Erotic and Friendship love over time, concerning the third hypothesis, cross-temporal meta-analysis shows that, among 25 countries entered into this meta-analysis, the United Kingdom, United States and Portugal which have at least one study in three periods of time (Before 2000, 2000-2009 and 2010-2018) were fed into this level of analysis (see Supplementary Material S10). To capture the change of key measures, Portugal exhibits the most

¹¹ As some subgroups involve primary studies less than four, caution needs to be exercised concerning the reliability and generalizability of this argument.

alteration on Erotic and Friendship-based love. As overlapping among 95%-CIs is more than 50 percent, no considerable differences in Portugal and U.S are detected among these three periods of time. However, there are differences concerning Friendship-based love between the period before 2000 and two other periods in the United Kingdom. It is worth mentioning that the number of primary studies in this subgroup analysis was less than four. This fact, per se, might affect the reliability and generalizability of this result. The current finding supports the perspective suggesting that love styles alter during the length of a relationship. Both Erotic and Friendship-based love decreased over time. Relationship length as a significant moderator negatively predicts the variation of Erotic love more strongly than Friendship-based love (see Supplementary Material S6, S8). This finding stands in a marked contrast to much prior research arguing that Erotic and Friendship love are consecutive such that the Erotic love converts into a more Friendship-based love over time (Acker & Davis, 1992; Hatfield et al., 1978; Hatfield et al., 2008; Lee, 1973; Sternberg, 1988; Tucker & Aron 1993; Walster & Berscheid 1978). Likewise, this result stands in stark contradiction with the assumption that Erotic love changes and Friendship-based love remains stable (Bierhoff & Rohmann, 2000).

Regarding the role of moderators, the experience of a phenomenon explained in Western societies as falling in love is concerned with the changes in Erotic and Friendship-based love. Our finding is convergent with a number of studies holding the view that the individuals who are in-love show more Erotic love (Hendrick & Hendrick, 1986; Hendrick et al., 1988; Murstein et al., 1991; Neto, 1993; Neto & Pinto, 2003) and also Friendship-based love (Hendrick & Hendrick, 1986). The findings of meta-regression indicated that % of people who were in love acted as a significant moderator, which positively predict the variation of Friendship-based love. This result, however, shows that this moderator is marginally significant to predict the change of

Erotic love (see Supplementary Material S8). In this regard, the subgroup analysis of these moderators showed that considerable differences are observed between low and high subgroups (see Supplementary Material S6, S15, and S16).

The presence of children in the family appears to exert an impact on love styles. Montgomery and Sorell (1997) subscribed to the belief that Erotic love is enhanced in families having children and Lee (1973) and Montgomery and Sorell (1997) adopted the perspective that the existence of children provides the fertile ground to improve Friendship-based love. In compliance with the literature, the finding of this study implies that Erotic and Friendship-based love improve when people have children. Keeping this in mind, the percentage of people who have children is a positively significant moderator to predicate the change in two love styles. This moderator, however, better delineated the variation of Friendship-based love than Erotic love. As the overlapping of 95%-CIs among some subgroups are less than 50 percent, it follows that there are striking and interesting variations between different age groups in Erotic and Friendship love styles as in some prior literature (Montgomery & Sorell, 1997; Murstein et al., 1991; Neto, 2001; Neto & Pinto, 2003).

To further illustrate this issue, considerable differences concerning Erotic love are detected between young adults (20–26) and adults (27–39) and also between adults (27–39) with middle-aged adults (40–54) and elderly adults (more than 55). Given the overlapping of 95%-CIs on Friendship-based love, there were considerable differences between elderly adults (more than 55) and adolescents (16–19), young adults (20–26) and adults (27–39) (see Supplementary Material S6, S15, and S16). In contrast with Montgomery and Sorell (1997), this research notes that Friendship-based love evolves during the Middle age and Elderly adulthood, casting light on the fact that Erotic love is stronger in young adults. Some previous studies intended to reveal the

association between religious beliefs and love styles (Hendrick & Hendrick, 1987). Comparing % of people adhering to protestant, Catholic, Jewish, and other religions, % of people showing no religious beliefs is an essential variable in Erotic and Friendship-based love. No religious belief as a significant moderator positively predicts Erotic love. However, the negative trend toward Friendship-based love is predicted by this variable (see Supplementary Material S8).

In line with previous studies, there exist differences between the love-styles concerning some kinds of ethnicity (Hendrick & Hendrick, 1986). Among % white, %black, %Asian, %Hispanic, %Caucasian, %African and %other races, %Hispanic as significant and %Black as a significant marginal moderator negatively predicted the variation of Friendship-based love. Similarly, being Hispanic was a significant moderator, which negatively predicted the variation of Erotic love (see Supplementary Material S8).

It appears, from the results of this research, that the Erotic and Friendship-based love are independent of one's current love situation. In this regard, engaging in a relationship or the lack of relationship play no significant part in Erotic and Friendship-based love. In like manner, no significant relevance was found between % married samples and Erotic and Friendship-based love (see Supplementary Material S8). These findings are somewhat incongruent with investigations showing that married people conceptualize relationships differently (Montgomery & Sorell, 1997).

Just as in the two above mentioned variables, no significant relationship is found between the % of people having relationships more than one and the variation of Erotic and Friendship-based love (see Supplementary Material S8). When it comes to the variable of education, no considerable differences were identified among the high school students, college students, and college graduates with regard to Erotic love. Considering Friendship-based love, there existed,

however, slight differences between confidence intervals of college students and college graduates (see Supplementary Material S6, S15, and S16).

The results of subgroup analyses indicated that there are no differences between the different kinds of love attitude scale concerning Erotic love. On the contrary, remarkable differences were identified between short measure 1998 (24) and Hendrick1986 (42) and modified scales with respect to Friendship-based love (see Supplementary Material S6, S15, and S16). The results of meta-regression in Supplementary Material S6 showed that the number of items of LAS is a significant moderator positively predicting the change in Friendship-base love.

Meta-regression showed that the sample size is significant and marginally significant for Erotic and Friendship-based love respectively. This variable has the potential to predict the change in both styles of love positively. As opposed to Eros, the reliability of the storgic scale acted directly as a significant moderator showing the variation of Friendship love (see Supplementary Material S8).

Subgroup analysis of the kind of publication indicates that there are notable differences between the confidence intervals of master or bachelor theses and other groups in Erotic love. The small number of primary studies in this subgroup may cast doubt on the reliability of this result. No remarkable differences are, however, observed as regards Friendship love (see Supplementary Material S6, S15, and S16).

The findings in Supplementary Material S6 show that there are no noticeable differences among the subgroups of quality assessment, the kind of design, kind of sampling, and measure in groups or individually in both Erotic and Friendship loves (see Supplementary Material S6, S15, and S16).

To show the variation of Erotic and Friendship-based love at societal level, multiple-moderators meta-regression were conducted to explore the means difference of Erotic and Friendship-based love between individual Eastern countries vs. Western countries according to greater individualistic traditions, human development index (HDI) and gender inequality index (GII) (see Supplementary Material S14). The finding of meta-regression, at the societal level, shows that a significant difference was observed concerning the association between the East-West differences of individualistic tradition regarding Friendship-based love. The greater difference in individualistic score negatively predicts the East-West difference in Friendship love.

The limitations of the study.

The limitations of this systematic review are as follow:

1. Based on the foregoing, the results of sensitive jackknife analysis show that the greatest change from the overall mean of Erotic and Friendship love is situated surrounding the 0.2 percentage of the pooled mean. The underlying sources of these changes lacked the quality of primary studies, large sample size, and the reliability of scales. These factors appear in Table 2:

Table 2: The summary of result concerning one out remove method						
	K	Low and medium quality	Insufficient sample size	Non-probability	The reliability of Eros less than 65 percent	The reliability of Storge less than 65 percent
Erotic love	14	86%	79%	100%	64%	
Friendship-based love	12	84%	84%	92%		71%

2. The collectivism and individualism, human development, and gender inequality indices were not directly measured in this research, but they were inferred from prior investigations.
3. The controversial comparability of meaning across different cultural samples is a weakness of any cross-cultural research. While this research aimed to appraise the experience of love in a cross-cultural context, this study still retains Western bias because the different versions of LAS originated in Western culture. This difficulty remains significant because one cannot assume that words, and hence scales and questionnaire items, share the same meaning and interpretation from culture to culture.
4. One of the drawbacks of primary studies is selection bias. The subjects who have been investigated may not be the exact representations of that intended culture. For example, it could be posited that the Iranian participants were more likely to be representative of “elite” in the intended culture because this sample was exclusively surveyed from university students and college settings rather than the country as a whole.
5. One of the shortcomings of primary studies is that much of the research relied on the convenience sampling which suffers from an unknown range of representation of its culture. This fact, in turn, might compromise the generalizability of the findings.
6. In a wide range of primary studies, the subjects filled out a questionnaire which shared, at the same time, several measures. This fact, per se, might affect the concentration of these participants to respond to the questions of love styles exactly.
7. To focus on Erotic and Friendship-based love, this review merely addressed the different versions of the love attitude scale while other scales may have examined this issue.

However, drawing on the other scales might tip the scale in favor of the scope of investigation and against clarity of research.

8. Despite conducting different tests for small study effects, there remains the possibility of reporting bias.
9. Severe heterogeneity is thought of as an essential nature of descriptive meta-analysis. To compensate for this drawback, subgroup-analyses and meta-regression were employed.
10. To draw a picture of the difference in individual Eastern country-versus-Western country, the primary studies were jointed according to the year of data collection. This fact, in turn, could be construed as a shortcoming of this study. To shed more light on cross-cultural evaluations and maximize the clarity of cross national comparisons with respect to the East-West difference of Erotic and Friendship love, it would be better if the studies entered into the meta-analysis had at least one Eastern and Western sample. But the paucity of ample primary studies which realize this criterion was one of our limitations.
11. The number of primary studies, in some subgroups, was less than four. This drawback would have an impact on the reliability and generalizability of their results.

Implications for policy makers

For all the limitations, our results attest to the significance of considering both gender and features and factors for a fuller insight into the social psychology of love. The findings of this study provide implications for researchers, educators, and counselors who work with children, adolescents, adults, and elderly adults from different cultural contexts. It is pivotal for researchers, educators, and counselors to be culturally aware and sensitive because the

interpretations and explanations of Erotic and Friendship-based love are varied through culture, age, the length of relationship, having children, religion, ethnicity, etc.

Suggestions for future research.

1. It is of importance to carry out longitudinal research that would enable us to track the potential factors on different styles of love.
2. As mentioned above, the LAS scales were originally established in Western cultures, which had been almost exclusively developed through United States samples. It is of value to suggest that collaborative cross-cultural investigations, in the future, be conducted through a team of investigators from various cultures.
3. Future research concerning love styles could pay more attention to the assessment of the interactions between further demographic variables (e.g., income, socioeconomic status, urban and rural differences).
4. Another pitfall intertwined in the plethora of primary studies is the fact that causal direction cannot be exactly inferred from the cross-section studies. To throw more insight into causality issues, the experimental approach would be warranted to broaden this realm of knowledge.
5. Based on the fact that there has existed little systematic review and meta-analysis concerning love attitude scale, it is recommended that the other styles of love attitude scale be appraised through the approach of systematic review involving comprehensive search, the risk of bias assessment, publication bias, no language bias and sensitive analysis.

6. The association between Erotic and Friendship-based love with other love styles using the procedure of systematic review and meta-analysis is an unanswered question to be addressed in future research.
7. To provide better insight into the role of relationship length in the variation of love styles, conducting longitudinal studies to follow individuals is essential.
8. The multitude of research incorporated in this review suffered from a high methodological risk of bias. More attention needs to be paid in the methodological quality of primary studies.
9. This review has covered several major databases. In upcoming systematic reviews concerning this issue, further databases can be searched. Likewise, in the realm of grey literature, final reports, theses, dissertations, conference papers have been assessed by this current review. For upcoming investigations, books can be analyzed to provide better insight into love styles.
10. Two subgroups were having primary studies less than four were not entered into the level of comparisons with other moderators. In this respect, for future systematic review and meta-analysis, we recommend that further databases be screened to select more primary studies. This fact enables researchers to augment the primary research in certain subgroups having study less than four, and subsequently, generalizability and reliability of their results would certainly be improved.

Conclusion

To assess differences between Eastern cultures vs. Western cultures and between individual Eastern countries vs. Western countries concerning Erotic and Friendship-based love,

the results of this meta-analysis reveal that Easterners identified themselves as having more Friendship-based love than Westerners. On the contrary, the cross-cultural differences in Erotic love are revealed to be culturally universal. In this regard, Erotic love ascribed to strong personal feeling is affected by the culture, which is incompatible with Friendship-based love as it is more attributed to strict social rules. To show the role of moderators in key measures, the subgroup analysis and meta-regression reveal that both Erotic and Friendship love decrease over the course of time, and these two love styles increase with the presence of children in the family. No religious belief consider positively toward Erotic love and a negative trend toward Friendship-based love.

References.

This part is deliberately omitted until the paper is accepted.