



Correlates of the Short Form Love Attitudes Scale among Portuguese People

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Abstract

In this paper, we analyze the psychometric characteristics of the Love Attitudes Scale: Short Form (LAS-SF), and the relationship between love style and other romantic relationships constructs in a Portuguese population. The LAS-SF measures six love styles: Eros, Ludus, Storge, Pragma, Mania and Agape, which are grounded on Lee's theory. This tool is one of the most utilized assessments of love in the literature. There were 1153 Portuguese participants (554 women, mean age=38 years). Confirmatory factor analyses evidenced that the six latent dimensions of the LAS-SF confirmed an acceptable fit to the data. The internal consistency of the Portuguese form of the LAS-SF was evaluated utilizing Cronbach's Alpha (for subscales 0.71 to 0.78) and McDonald's Omega (for subscales 0.71 to 0.79). Eros was positively related to satisfaction with love life, satisfaction with sex life, sexual desire, commitment, and negatively associated with romantic loneliness. Ludic orientation was positively correlated with romantic loneliness and negatively correlated with commitment. Storgic orientation was positively related to commitment. Pragma was positively related to romantic loneliness. Mania was positively related to commitment. Agape was positively correlated with satisfaction with love life and commitment, and negatively correlated with romantic loneliness. Notably, commitment mediated the relationship of the agapic love style and romantic loneliness.

Keywords Love attitudes scale · Measurement · Romantic relationships · Short form

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Introduction

Love is among the most ubiquitous human features from birth to death (Hatfield et al., 2020). It is a universal phenomenon (Feybesse & Hatfield, 2019; Hendrick & Hendrick, 2020). Therefore, it is not surprising that in recent decades love has been a key topic in social psychology (Aron & Westbay, 1996; Fehr & Russell, 1991; Hatfield et al., 2007; Hazan & Shaver, 1987; Hendrick & Hendrik, 1986; Rubin, 1970; Sternberg, 1986; Sternberg & Sternberg, 2019). One of the most fertile theories was the colors of love or the love styles provided by Lee (1973, 1977, 1988). Lee (1973) defines love as an attitude, meaning a predisposition to think, feel, and behave toward a partner. Love styles are grounded on the idea that “romantic love could be changeable across persons, across time, and across partners” (Hendrick & Hendrick, 2019a, p. 223).

In this study we evaluate the psychometric properties of the Love Attitudes Scale: Short Form (LAS-SF; Hendrick et al., 1998) in a Portuguese population. Additionally, we envisage to scrutinize the associations of love styles with other romantic relationship constructs, including satisfaction with love life (SWLL), satisfaction with sex life (SWSL), sexual desire, commitment, and romantic loneliness.

Love Styles

Sociologist Lee (1973) proposed one of the earliest and most influential conceptions of love, adopting the metaphor of “a color wheel”. In this conception, there are 3 “primary colors” of love (Eros, Ludus and Storge) and 3 “secondary colors” of love (Pragma, Mania, and Agape). Lee developed these styles of love from extensive research utilizing diverse methods.

Eros is intense, passionate love. The erotic lover is involved in strong physical attraction, emotional intensity, and commitment to a loved one. It is self-confident and can be “love at first sight”.

Ludus style of love refers to game-playing love, frequently played with several partners at a time without commitment. People who endorse a ludic style tend to believe that lies and deception are acceptable. Ludic lover avoids emotional intensity. Although people often report disagreement with this love style, it reflects a suitable reality for many individuals (Lee, 1973).

Storge love style is a friendship and companionship-driven love. It is quiet and companionate. Storgic lover does not experience intense emotions in relation to the partner. People who endorse a storgic style have strong commitment in relation to the romantic partner. Storgic lover desires a secure, and comfortable relationship with the partner. This love style has been described as love by “evolution” rather than love by revolution” (Hendrick & Hendrick, 2019a).

Pragma, a combination of Ludus and Storge, goes shopping for a compatible mate in terms of desired attributes (e.g., work, level of education, family background, religion). Pragmatic lovers have a “shopping list of qualities” sought in a partner and are not very emotional. Pragmatic lover desires to make a good match. “Computer matching is a good contemporary way for pragma lovers to proceed” (Hendrick & Hendrick, 2019a, p. 224).

Mania love style, a combination of Eros and Ludus, is an anxious, obsessive, insecure, and dependent experience of love. It is a “symptom love” (Hendrick & Hendrick, 2019a). Manic lovers are very emotional, intense, and jealous. People who endorse a manic style often feel unhappy in their relationships.

Agape, a combination of Eros and Storge, is an altruistic and selfless style of love. People who endorse an agapic style are committed and affectionate. Individuals with this attitude are concerned for the partner’s welfare. Agapic lover tends to have satisfying and long-lasting relationships.

All these love styles are valid kinds of romantic love. They provide an ensemble of viable options for conceptualizing romantic love, and they have implications for stability and relationship satisfaction (e.g., Davis & Latty-Mann, 1987; Hendrick et al., 1988). Individual, interpersonal and social structural factors are important to attitudes about romantic love (Hendrick & Hendrick, 2019a),

Measurement

Various scales have been created to assess love (Hatfield et al., 2012; Hendrick & Hendrick, 2019b). A tool named SAMPLE (called by utilizing the initial letter of each of Lee’s love styles) was created to assess a person’s love profile (Lasswell & Lasswell, 1976). SAMPLE was later revised and adapted into the original Love Attitudes Scale (LAS) (Hendrick & Hendrick, 1986). Nowadays, the LAS represents one of the most utilized instruments to measure love. The LAS was developed from Lee’s (1988) typology of love for assessing six love types (Eros, Ludus, Storge, Pragma, Mania, Agape). The LAS includes 42 items with 7 items for each subscale. The psychometric analysis indicated consistent results that go along with the original theory. The factorial solution indicated six distinct and reliable factors (one for each love type).

The LAS has been adapted in several cultural contexts such as Chinese (Yang & Liu, 2007), Italian (Agus et al., 2018), Japanese (Kanemasa et al., 2004), Malaysian (Wan Shahrazad et al., 2012), Portuguese (Neto, 1993), and Turkish (Bugay & Tezer, 2008). The results of these works in general found the 6 factors of love as indicated by Lee (1973). Confirmatory factor analyses (CFA) supported that the structure suggested by Hendrick and Hendrick (1986) could be used across several cultural contexts in Africa, Asia, South America, and Europe (Neto et al., 2000; Neto & Pinto, 2007).

Hendrick et al. (1998) created a shorter form of the LAS (LAS-SF) that included 24 items from the original measure. The psychometrics of the four-item subscales were excellent, in some cases superior to the seven-item subscales. Coefficient alphas ranged from 0.75 for Mania to 0.88 for Agape. In this same study, the authors also provided an 18-item version (three items for each love style) that proved to be psychometrically viable as well. The LAS 24-item short form has also been adapted in several cultural contexts including Italian (Agus et al., 2018), and Polish (Janeczek, 2023; Meskó et al., 2021). Results of these works found also the six factors of love as indicated by Lee (1973).

The Present Study

This Study has Three Goals

(1) The first goal aims to give a new empirical demonstration of the psychometric features of the LAS 24-item short form in an adult Portuguese population, assessing the factorial structure, and the reliability. We select to use the LAS 24-item short form as Hendrick et al. (1998) concluded that “in terms of psychometric properties, the new 4-item version of the LAS is at least equal to and possibly superior to the longer scale” (p. 159). While the 3-item version of the LAS may also be viable, the 4-item version of the LAS presented more satisfactory psychometric properties (Hendrick et al., 1998). To reach our first goal, assorted tests were conducted. CFA was conducted to estimate the factorial structure of the LAS-SF. The expectation was that the LAS-SF scores would evidence a six-factor structure, in line with the original form and previous adaptations (Agus et al., 2018; Hendrick et al., 1998; Meskó et al., 2021). The reliability of the LAS-Short form was tested via Cronbach’s alpha, and McDonald’s omega. The expectation was that high reliability of the diverse subscales would appear (Hendrick et al., 1998; White et al., 2004).

(2) The second goal of this research is to analyze the links of styles of love with other romantic constructs, including SWLL, SWSL, sexual desire, commitment, and romantic loneliness.

Satisfactions with Love Life and with Sex Life

SWLL, and SWSL constitute two specific domains of satisfaction with life. SWLL was defined as “a global cognitive evaluation by the person of his or her love life in which the criteria for the judgment are up the individual” (Neto & Pinto, 2015, p. 290). Previous studies showed that several love styles were more strongly connected with SWLL than others (Nazzari et al., 2021; Neto, 2005; Soares et al., 2020). For instance, Soares and colleagues (2020) examined the relationships between love styles and SWLL in the Portuguese autonomous region of Madeira. They found that the strongest love styles connected with SWLL were Eros and Agape. Hence, we expect that greater SWLL will be related to greater erotic and agapic love styles.

SWSL concerns “a global evaluation by the person of his or her sex life” (Neto, 2012, p. 19). It is “a barometer for the quality of a relationship” (Sprecher & Cate, 2004, p. 24). SWSL represents a relevant correlate of well-being (Hatfield et al., 2020). Previous research also showed that some attitudes toward love were more strongly connected with satisfaction with sex life than others (Neto, 2012). This study found that Eros was positively connected with satisfaction with sex life, and Agape was unrelated to SWSL. Ludus, Storge, Pragma, and Mania were negatively linked to SWSL, however, some of these correlations (Ludus, Storge, and Mania) were marginal. In another study it was found that Eros was positively related to SWSL across the adult life span (Neto & Pinto, 2013). Hence, it is expected that greater SWSL will be related to greater Eros.

Sexual Desire

Regan and Atkins (2006) considered that sexual desire is the most universal sexual response experienced by both males and females. Indeed, feelings of sexual desire play a relevant role in close relationships (Regan & Berscheid, 1999). Sexual desire refers to “the sum of the forces that lean us toward and push us away from sexual behavior” (Levine, 2003, p. 285). Regan (1998, p. 145) found that “sexual desire, rather than sexual intercourse, is viewed as an index to overall relationship quality”. Sexual desire is associated with romantic love (Hatfield & Rapson, 2014; Regan, 1998). Sexual desire represents an intense emotional experience (Regan & Berscheid, 1999). So, it can be expected that higher sexual desire will be related to higher Eros, the most emotional love style.

Commitment

The relationship between love styles and commitment has not been tested extensively. Commitment concerns the purpose of persisting in a relationship, comprising long-term orientation toward the involvement, and it is a central ingredient of relationships quality (Rusbult et al., 2006). Commitment appeared linked to mate’s satisfaction (Hendrick et al., 1998), and SWLL (Neto & Pinto, 2015). All love styles were positively associated with commitment, except Ludus which was negatively associated with a preference for commitment (Frey & Hojjat, 1998). Indeed, the focus of ludic lover is on having fun in the moment and thus living in a relationship in an uncommitted way. We expect that commitment will be positively related to Eros, Storge, Pragma, Mania, and Agape, and negatively related to Ludus.

Romantic Loneliness

The relationship of love styles with loneliness has been neglected (Damsteegt, 1992; Neto & Pinto, 2003; Rotenberg & Korol, 1995). It is important as there is work showing that love styles tend to be emotionally impregnated (Hendrick & Hendrick, 1986), and loneliness is a painful emotion. Loneliness is “the cognitive awareness of a deficiency in one’s social and personal relationships and ensuing affective reactions of sadness, emptiness or longing” (Asher & Paquette, 2003, p. 75). DiTommaso et al. (2004) distinguished from social loneliness, family loneliness, and romantic loneliness. These scholars found that romantic involvement is connected with lower romantic loneliness. In accordance with Lee (1988) erotic and agapic lovers seek open, truthful, and intense relationships, whereas ludic lovers avoid intimacy and engage in deceptive game-playing. Individuals adopting the Pragma love style generally present a preference for being distant from a partner (high avoidance) (Karan-dashev, 2022).

There is research showing that loneliness was related to love styles (Neto & Pinto, 2003; Rotenberg & Korol, 1995), but there is research which has not shown any relationship between loneliness and styles of love (Damsteegt, 1992). Rotenberg and Korol (1995) evidenced a negative link between loneliness and Eros, and a positive correlation between loneliness and Ludus. In another study loneliness was negatively

related to Eros and positively related to Ludus for men, and negatively linked to Eros and positively linked to Pragma for women (Neto & Pinto, 2003). Prior studies have not found an association between Agape and global loneliness (Damsteegt, 1992; Nazzari et al., 2021; Neto & Pinto, 2003; Rotenberg & Korol, 1995). However, there is research showing that the agapic love style predicted negatively the romantic loneliness (Neto & Neto, 2022). In the present research we expect that romantic loneliness will be negatively related to Eros and Agape and positively related to Pragma and Ludus.

(3) The third goal of this research is to analyze whether the relation between the Agape love style and romantic loneliness would be mediated by commitment. This set of psychosocial variables was chosen as they are relevant for well-being (e.g., Mitchell et al., 2015; Neto & Neto, 2024; Rafagnino & Puddu, 2018). There is a research gap in the domain of love styles in that studies have mostly examined direct effects of various predictors and disregarded indirect processes underlying the relations between factors (Fricker & Moore, 2002; Jonason & Kavanagh, 2010; Le, 2005; White et al., 2004). For example, Jonason and Kavanagh (2010) found that the Dark Triad composite (machivellianism, narcissism, and psychopathy) partially mediated the gender in the adoption of the ludic love. White et al. (2004) examined potential mediation effects of love attitudes between personality factors and satisfaction and intimacy. These scholars found that mania mediated the relationship between neuroticism and relationship satisfaction.

A selfless love style has relevant implications for the quality of close romantic relationships (Regan, 2016). For example, people who score high on agapic love provide more satisfaction in their dating and marital satisfaction than those who score lower (e.g., Hammock & Richardson, 2011; Lin & Huddleston-Casas, 2005). The present research seeks to clarify the relationships between Agape and romantic loneliness by testing the potential mediating effect of love commitment. In this research the mediating role of commitment was tested via path analysis.

The idea of commitment as a mediator is based on three lines of reasoning that (1) agapic love style was positively related to commitment (Neto & Neto, 2022); (2) lower levels of commitment have been found to be associated with non-rewarding or under-benefiting couple relationships (Sprecher, 2001), and higher romantic loneliness (Neto & Neto, 2022); and (3) commitment has previously been researched as a mediator (Lawrence et al., 2021; Mitchell et al., 2015). For instance, Mitchell et al. (2015) found that commitment mediated the relationship between religiousness and marital quality (Mitchell et al., 2015). The present study may give new insights to existing research and provide empirical support that could be used to enhance relationship quality.

Method

Participants

The sample included 1153 participants (599 males and 554 females). The average age of the sample was 38 years ($SD_{age} = 17.3$; range=18 to 90). The average age of

the sample by gender did not differ significantly, $F(1, 1134)=2.84, p=.09$. Regarding the educational level 534 had completed secondary education or less, 564 attended higher education, and 55 did not answer. Respondents presently single made up 650, married or cohabiting 372, divorced or widowed 92, and 39 did not answer. All participants were Portuguese.

Measures

Love Attitudes Scale, Short Form (LAS-SF; Hendrick et al., 1998). The LAS-SF includes 24 items, which measure 6 subscales: Eros, Ludus, Storge, Pragma, Mania, and Agape. Each subscale has 4 items, selected from the original measure (Hendrick & Hendrick, 1986; Neto, 1993). Examples of items for each dimension are: “My partner and I have the right physical ‘chemistry’ between us” (Eros); “I enjoy playing the ‘game of love’ with my partner and a number of other partners” (Ludus); “Our love is really a deep friendship, not a mysterious, mystical emotion” (Storge); “One consideration in choosing my partner was how he/she would reflect on my career” (Pragma); “When my partner doesn’t pay attention to me, I feel sick all over” (Mania); “I would rather suffer myself than let my partner suffer” (Agape). Ratings ranged from 1 (“*Strongly disagree*”) to 5 (“*Strongly agree*”). Therefore, greater values indicate greater preference for the specific love style.

Satisfaction with Love Life Scale (SWLLS; Neto, 2005). The SWLLS includes 5 items (e.g., “The conditions of my love life are excellent”). Ratings ranged from 1 (“*strongly disagree*”) to 7 (“*strongly agree*”). Higher scores denote higher SWLL. The SWLLS demonstrated adequate psychometric features (Neto, 2005; Neto & Pinto, 2015). In this study the α was 0.93 and ω was 0.92.

The *Satisfaction with Sex Life Scale* (SWSLS; Neto, 2012). This tool comprises 5 items (e.g., “So far I have gotten the important things I want in sex life.”). Ratings ranged from 1 (“*strongly disagree*”) to 7 (“*strongly agree*”). Higher values denote higher SWSL. Prior work has reported adequate reliability and validity of this tool for a Portuguese population (Neto, 2012). In this study the α and ω values were 0.90.

Sexual desire was assessed with one item (Neto, 2015; Regan & Berscheid, 1995). Respondents indicated the amount of sexual desire they currently felt in relation to their partner. Ratings ranged from 1 (“*none/very little*”) to 7 (“*very high amount*”).

Commitment. Commitment was evaluated with four items (Neto & Pinto, 2015; Sprecher & Regan, 1998) (e.g., “How committed are you to your partner?”). Ratings ranged from 1 (“*none*”) to 7 (“*very much*”). Higher values reflect higher commitment. In this study the α was 0.79 and ω was 0.86.

Romantic loneliness. We used the five statements of the SELSA-S to measure romantic loneliness (DiTommaso et al., 2004; Fernandes & Neto, 2009) (e.g., “I have a romantic partner to whose happiness I contribute”). Ratings ranged from 1 (“*Strongly disagree*”) to 7 (“*Strongly agree*”). In this research the α was 0.76 and ω was 0.72.

Demographic information. Respondents indicated their gender, age, educational level, marital status, and nationality.

Procedure

The sampling strategy was non-probabilistic. Participants were recruited in the Lisbon area by research assistants in various locations (e.g., workplaces, shopping centres, and community organizations). The study was conducted by using a paper and pencil questionnaire. The work was carried out following the Declaration of Helsinki and the current legal and ethical norms in the country. Anonymity was assured. Respondents gave informed consent.

Data Analysis

Descriptive statistics, confirmatory factor analyses (CFA), reliabilities, Pearson's correlations, and one sample *t*-test were conducted. Finally, path analysis was carried out for examining mediation impact of love commitment on the relationships between Agape and romantic loneliness. Data analyses were conducted using IBM SPSS AMOS (version 26). Significance levels were set at 0.05.

Results

Item-Level Analyses

Descriptive statistics for items of the LAS-SF were calculated. Skewness (between -0.70 and 0.62) and kurtosis (between -1.23 and -0.17) coefficients for the LAS-SF items indicated that the univariate normality was met (Field, 2017). Mardia's multivariate kurtosis for the items was 88.17. These values indicate no strong deviation from normal distribution (Bollen, 1989; Kline, 2005), and do not compromise CFA results.

Dimensionality

A CFA was conducted on the raw data of the LAS-SF (correlation matrix, maximum likelihood estimation). The model tested was the six-dimensional factor found in previous research (Hendrick et al., 1998). No correlation between error terms was allowed. The model of six latent factors of the LAS-SF fit the data well: $\chi^2=967.39$, $df=237$, $\chi^2/df=4.08$, $CFI=0.91$, $GFI=0.93$, $SRMR=0.057$, $RMSEA=0.052$ [%90 CI: 0.048–0.055] (Hu & Bentler, 1999). All factor standardized loadings (λ) of the items were significant at $p<.001$ and ranged between 0.50 and 0.79, with an average of 0.66 (see Fig. 1).

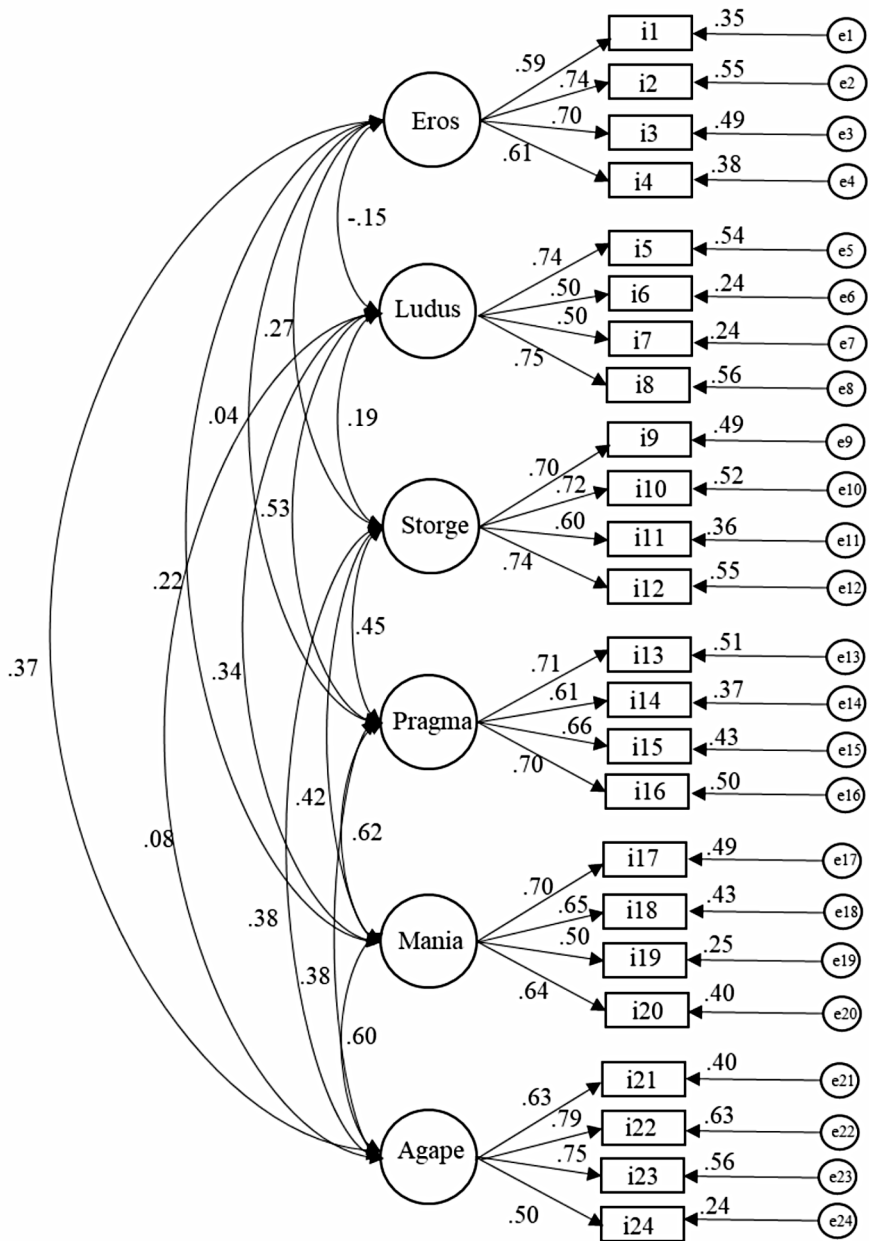


Fig. 1 Standardized six-factor structure of the Short Love Attitude Scale (LAS-SF) model

Table 1 Alphas and omegas coefficients, means and standard deviations, and correlations between love styles

		α	ω	M	SD	1	2	3	4	5	6
1	Eros	0.78	0.79	3.75	0.83	-	-0.05	0.21***	0.04	0.19***	0.32***
2	Ludus	0.76	0.77	2.69	1.02		-	0.18***	0.44***	0.27***	0.07*
3	Storge	0.77	0.77	3.38	0.96			-	0.36***	0.32***	0.30***
4	Pragma	0.76	0.76	2.93	1.01				-	0.45***	0.27***
5	Mania	0.71	0.71	3.21	0.93					-	0.43***
6	Agape	0.72	0.72	3.43	0.90						-

Note. * $p < .05$; ** $p < .01$; *** $p < .001$

Table 2 Correlations between love styles and other romantic measures

Romantic measures	Eros	Ludus	Storge	Pragma	Mania	Agape
Satisfaction with love life	0.33***	0.05	0.08*	0.06*	0.03	0.14***
Satisfaction with sex life	0.29***	0.01	-0.01	-0.03	-0.01	0.07*
Sexual desire	0.24***	-0.05	-0.04	-0.01	0.09**	0.09**
Commitment	0.33***	-11***	0.14***	0.09	0.12***	0.26***
Romantic loneliness	-0.32***	0.22***	-0.04	0.14***	0.01	-0.14***

* $P < .05$; ** $P < .01$; *** $P < .001$

Reliability

Table 1 presents the correlation between the love styles and their reliabilities. All six subscales displayed satisfactory internal consistency. Cronbach's alpha value was 0.78 for Eros, 0.76 for Ludus, 0.77 for Storge, 0.76 for Pragma, 0.71 for Mania and 0.72 for Agape. McDonald's Omega was 0.79 for Eros, 0.77 for Ludus, 0.77 for Storge, 0.76 for Pragma, 0.71 for Mania, and 0.72 for Agape.

Correlations between Love Styles and Other Romantic Measures

Table 2 presents the zero-order correlations between the love styles and other romantic measures. Bonferroni corrections were computed for all measures inserted in Table 2. Hence, only correlations significant at $p < .001$ were considered. Eros correlated significantly with all the romantic measures used: positively with SWLL, SWSL, sexual desire, and commitment; and negatively with romantic loneliness. Ludus correlated negatively with commitment, and positively with romantic loneliness. Storge and Mania correlated positively with commitment. Pragma correlated positively with romantic loneliness. Agape correlated positively with SWLL and commitment, and negatively with romantic loneliness.

Mediating Effect Test

Path analysis was utilized for examining mediation effects of commitment on the relationship between Agape love style and romantic loneliness. Descriptive statistics and regression analysis results indicated no serious violations of normality and linearity assumptions (e.g., skewness from -0.43 to 0.08, kurtosis from -1.04 to -0.20,

the VIF values were all below 10 and the tolerance statistics above 0.20) (Field, 2017). These data checks provide support for reliance on path analysis. All pairwise correlations were significant.

The results of regression analyses examining the mediation effect of commitment on the relation between Agape and romantic loneliness are shown in Fig. 2. Findings indicate that Agape was indirectly linked to romantic loneliness through its relationship with commitment. Agape significantly predicted commitment, $b=0.25$, $p<.001$, and commitment significantly predicted romantic loneliness, $b=-0.45$, $p<.001$. These findings confirm mediational hypothesis. Agapic love style did not significantly predict romantic loneliness after controlling for the mediator, commitment, $b=-0.03$, $p=.31$, supporting full mediation. Around 21% of the variance in romantic loneliness was accounted for by the independent variables. The indirect effect was examined through a percentile bootstrap estimation approach with 1000 samples, established with IBM SPSS Amos. The findings showed that the indirect coefficient was significant, $b=-0.21$, 90% CI= -0.14 , -0.09 .

Discussion

The current study aimed to test the psychometric characteristics of the LAS-SF in a new cultural context, and their relationships with other romantic measures. Assessment of the psychometric features was performed by means of various steps. The first step concerned CFA. The CFA of the Portuguese adaptation of the LAS-SF confirmed six love styles factors: Eros, Ludus, Storge, Pragma, Mania, Agape. This six-factor structure is consistent with findings of the original study (Hendrick et al., 1998).

The next step was to scrutinize the reliability of the LAS-SF through Cronbach's Alpha and McDonald's Omega. The internal consistency of the six love styles measured by the LAS-SF was evidenced. The Portuguese version of the LAS-SF is a reliable instrument that can be utilized in scientific investigation.

This study also showed that love styles have important and significant associations with other romantic measures. This data supports and extends previous literature in this field. As expected, with regard to satisfaction with love life we found positive correlations with Eros and Agape. Therefore, persons who have an attitude to love described as a powerful physical and emotional attraction (Eros), and by altruism

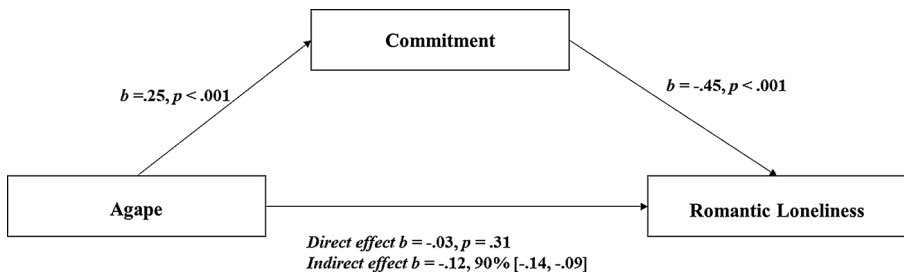


Fig. 2 Model of mediating role of commitment in the relationship between agape and romantic loneliness

and selflessness (Agape) also express good love satisfaction. These findings are consistent with prior investigation among university students (Nazzari et al., 2021; Neto, 2005; Soares et al., 2020). In profiling the typical erotic lovers, Lee (1988) writes that they “seek to express their delight in the beloved frequently in verbal and tactile ways” (p. 50). For an agapic lover to set their partner’s welfare above their own is also fostering his or her own love satisfaction.

As expected, with regard to satisfaction with sex life we found a positive correlation with Eros. The positive correlation of this love style with satisfaction with sex life is consistent with previous results (Neto, 2012; Neto & Pinto, 2013) and with qualities of reciprocal love and sexual idealism to promote sexual satisfaction (Haavio-Mannila & Kontula, 1997). An erotic lover wants “an intense focus on the partner and a desire to become sexually intimate” (Hendrick & Hendrick, 1992, p. 64).

In addition, sexual desire positively correlated with Eros, as expected. Sexual desire is an intense emotional experience (Regan & Berscheid, 1999) and we found that sexual desire was related to a strong emotional love style. This finding is consistent with prior investigation evidencing that the erotic lover has the desire for intimate closeness to the partner (Goodboy & Booth-Butterfield, 2009). Past research also showed that falling in love was strongly related to erotic love style (Neto & Pinto, 2003). Indeed, in profiling the typical erotic lover, Lee (1988) writes that he or she is “eager to get to know the beloved quickly, intensively – and undressed” (p. 50).

Erotic, storgic, manic, and agapic love styles positively correlated with commitment. Eros entails a close affective and sexual intimacy that has been established between the lovers; storge involves a close friendship created between the lovers; mania implies desiring to be only with one’s lover; and agape displays selflessness that does not occur in casual short-term relationships. These four love styles involve commitment with one’s partner. It is worth noting that Eros and Agape displayed stronger positive correlations with commitment than Storge. Contrary to our expectation Pragma did not correlate significantly with commitment; although, this correlation was in the expected direction. As expected, Ludus negatively correlated with commitment. This indicates that people who display a playful attitude with regard to love, also seem to display an uncommitted relationship with a partner. For ludic lovers “sex is for fun, not for expressing commitment” (Lee, 1988, p. 50).

A further observation regards the correlations between love styles and romantic loneliness. As expected, Eros and Agape negatively correlated with romantic loneliness, while Ludus and Pragma positively correlated with romantic loneliness. Hence, these results evidenced that erotic and agapic lovers revealed satisfactory love experiences. One possible explanation for the results concerning Ludus and Pragma may be linked to aversive issues of personality related to love styles. Past research has shown that high Dark Triad individuals seem to have ludic (game playing) and pragmatic (cerebral) love styles (Jonason & Kavanagh, 2010). According to these scholars, if ludic lovers keep others at an emotional distance, loving with heads and not hearts may be an expression of the limited empathy/emotional systems. For ludic and pragmatic lovers the breakdown of emotional relationships may increase the perception of romantic loneliness. This issue deserves future research.

In this study, we considered the association between Agape and romantic loneliness, and also the mediating effect of commitment. Prior investigation of the mediation model indicated that Agape, romantic loneliness, and commitment were all significantly associated. The findings of the regression analysis indicated the significant impact of Agape on romantic loneliness. As expected, Agape significantly predicted romantic loneliness. This finding is in line with previous research showing that compassionate love was an antecedent of romantic loneliness (Neto & Neto, 2022). Compassionate love and agapic love are other-oriented and altruistic constructs (Regan, 2016).

Additionally, the findings of the path analysis revealed that Agape affected romantic loneliness indirectly via commitment. It can be assumed that Agape indirectly influences romantic loneliness via the mediating effect of commitment. These results provide support to our expectation. One reason why persons who are high in Agape express less romantic loneliness is that they are more likely to experience high partnership commitment.

Finally, the present results give an insight into the mechanism underlying the relationship of Agape with romantic loneliness. Participants experiencing higher agapic love style tended to feel more partnership commitment and in turn felt lower romantic loneliness. Moreover, this work contributes to the intimate relationships field by evidencing the core role of love commitment to explain the relation between Agape and romantic loneliness, which indicates that targeting interventions to improve commitment may provide support to reduce the lovers' loneliness.

This research presents various limitations. First, its correlational nature precludes causal inferences. Second, this study was implemented using a convenience sample which might restrict the generalizability of the present results. Future studies should test the validity of the present results with more representative samples of participants. Third, although the LAS-SF has attested adequate reliability and validity, it is a self-report device which may generate social desirability.

Despite these limitations, the current work scrutinized the validity of the Portuguese LAS-SF and supported the 6 hypothesized styles of love; it also evidenced satisfactory convergent validity between styles of love and various romantic constructs. This study supports the evidence for using the LAS-SF for both scientific research as well as clinical purposes in the Portuguese cultural context. The findings demonstrated the strength of the theoretical assumptions on the scale development of the short form of LAS. Currently, shorter measures are to a growing extent used to assess psychological constructs, and the main reasons for using them is the reduction of measurement time and related costs (Kemper et al., 2019; Neto & Neto, 2022). Short scales are desirable to be utilized in "large-scale surveys, pre-screening packets, longitudinal studies, and experience-sampling studies" (Gosling et al., 2003, p. 505). The results of this study can be useful for clinical purposes providing a better understanding of people in relationships. In particular, the mediation by commitment of the association between Agape and romantic loneliness is new.

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Declarations

Competing Interests The authors have no competing interests to declare that are relevant to the content of this article.

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References

- Agus, M., Puddu, L., Gonnelli, C., & Rafagnino, R. (2018). Love attitudes Scale Short Form: The preliminary assessment of the factor structure of its Italian version. *Applied Psychology Bulletin*, 66, 15–31. <https://doi.org/10.26387/bpa.282.2>
- Aron, A., & Westbay, L. (1996). Dimensions of the prototype of love. *Journal of Personality and Social Psychology*, 70, 535–551. <https://doi.org/10.1037/0022-3514.70.3.535>
- Asher, S. R., & Paquette, J. A. (2003). Loneliness and peer relations in childhood. *Current Directions in Psychological Science*, 12(3), 75–78. <https://doi.org/10.1111/1467-8721.01233>
- Bollen, K. A. (1989). *Structural equations with latent variables*. Wiley. <https://doi.org/10.1002/9781118619179>
- Bugay, A., & Tezer, E. (2008, March). *Attachment styles and loving attitudes among Turkish university students*. Paper presented at the 2nd Annual Global Conference: Persons, Intimacy and Love. pp. 10–13 March, Salzburg, Austria.
- Damsteegt, D. (1992). Loneliness and love attitudes. *Psychology: A Journal of Human Behavior*, 29(3–4), 62–65.
- Davis, K. E., & Latty-Mann, H. (1987). Love styles and relationship quality: A contribution to validation. *Journal of Social and Personal Relationships*, 4, 409–428. <https://doi.org/10.1177/0265407587044002>
- DiTommaso, E., Brannen, C., & Best, L. (2004). Measurement and validity characteristics of the short version of the social and emotional loneliness scale for adults. *Educational and Psychological Measurement*, 64, 99–119. <https://doi.org/10.1177/0013164403258450>
- Fehr, B., & Russell, J. A. (1991). The Concept of Love viewed from a prototype perspective. *Journal of Personality and Social Psychology*, 60, 425–438. <https://doi.org/10.1037/0022-3514.60.3.425>
- Fernandes, H., & Neto, F. (2009). Adaptação portuguesa da Escala de Solidão Social e Emocional (SELSA-S) [The Portuguese adaptation of the Short Version of the Social and Emotional Loneliness Scale (SELSA-S)]. *Psicologia, Educação e Cultura*, XIII, 7–31.
- Feybesse, C., & Hatfield, E. (2019). Passionate love. In R. J. Sternberg, & K. Sternberg (Eds.), *The new psychology of love* (pp. 183–207). Cambridge University Press. <https://doi.org/10.1017/9781108658225.010>
- Field, A. (2017). *Discovering statistics using IBM SPSS statistics* (5th ed.). Sage.
- Frey, K., & Hojjat, M. (1998). Are love styles related to sexual styles? *Journal of Sex Research*, 35(3), 265–271. <https://doi.org/10.1080/00224499809551942>
- Fricker, J., & Moore, S. (2002). Relationship satisfaction: The role of love styles and attachment styles. *Current Research in Social Psychology*, 7, 182–205.
- Goodboy, A. K., & Booth-Butterfield, M. (2009). Love styles and desire for closeness in romantic relationships. *Psychological Reports*, 105, 191–197. <https://doi.org/10.2466/PRO.105.1.191-197>

- Gosling, S. D., Rentfrow, P. J., & Swann, W. B. (2003). A very brief measure of big-five personality domains. *Journal of Research in Personality*, 37, 504–528. [https://doi.org/10.1016/S0092-6566\(03\)00046-1](https://doi.org/10.1016/S0092-6566(03)00046-1)
- Haavio-Mannila, E., & Kontula, O. (1997). Correlates of increased sexual satisfaction. *Archives of Sexual Behavior*, 26, 399–419. <https://doi.org/10.1023/A:1024591318836>
- Hammock, G., & Richardson, D. S. (2011). Love attitudes and relationship experience. *The Journal of Social Psychology*, 151, 608–624. <https://doi.org/10.1080/00224545.2010.522618>
- Hatfield, E., & Rapson, R. (2014). Love and sex after 50. In P. Whelehan, & A. Bolin (Eds.), (Eds.), *the encyclopedia of human sexuality*. Wiley-Blackwell. <https://doi.org/10.1002/9781118896877.wbiehs275>
- Hatfield, E., Rapson, R. L., & Martel, L. (2007). Passionate love and sexual desire. In S. Kitayama, & D. Cohen (Eds.), *Handbook of cultural psychology* (pp. 760–779). Guilford Press.
- Hatfield, E., Bensman, L., & Rapson, R. L. (2012). A brief history of social scientists' attempts to measure passionate love. *Journal of Social and Personal Relationships*, 29, 143–164. <https://doi.org/10.1177/0265407511431055>
- Hatfield, E., Rapson, R., & Purvis, J. (2020). *What's next in love & sex*. Oxford University Press. <https://doi.org/10.1093/oso/9780190647162.001.0001>
- Hazan, C., & Shaver, P. (1987). Romantic love conceptualized as an attachment process. *Journal of Personality and Social Psychology*, 52, 511–524. <https://doi.org/10.1037/0022-3514.52.3.511>
- Hendrick, C., & Hendrick, S. (1986). A theory and method of love. *Journal of Personality and Social Psychology*, 50(2), 392–402. <https://doi.org/10.1037/0022-3514.50.2.392>
- Hendrick, S., & Hendrick, C. (1992). *Romantic love*. Sage.
- Hendrick, C., & Hendrick, S. (2019a). Styles of romantic love. In R. J. Sternberg, & K. Sternberg (Eds.), *The new psychology of love* (pp. 223–239). Cambridge University Press. <https://doi.org/10.1017/9781108658225.010>
- Hendrick, S., & Hendrick, C. (2019b). Measuring love. In M. W. Gallagher & S. J. Lopez (Eds.), *Positive psychological assessment: A handbook of models and measures* (2nd ed., pp. 219–232). American Psychological Association. <https://doi.org/10.1037/0000138-014>
- Hendrick, S., & Hendrick, C. (2020). Romantic love in the age of COVID-19. *Journal of Loss and Trauma*, 25(6–7), 540–543. <https://doi.org/10.1080/15325024.2020.1763557>
- Hendrick, S., Hendrick, C., & Adler, N. (1988). Romantic relationships: Love, satisfaction, and staying together. *Journal of Personality and Social Psychology*, 54, 980–988. <https://doi.org/10.1037/0022-3514.54.6.980>
- Hendrick, C., Hendrick, S. S., & Dicke, A. (1998). The Love attitudes Scale: Short form. *Journal of Social and Personal Relationships*, 15(2), 147–159. <https://doi.org/10.1177/0265407598152001>
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6, 1–55. <https://doi.org/10.1080/10705519909540118>
- Janeček, P. (2023). Polish adaptation of the Love attitudes Scale: Short form. *Quarterly Journal Fides et Ratio*, 2(54), 33–43. <https://doi.org/10.34766/fetr.v54i2.1173>
- Jonason, P., & Kavanagh, P. (2010). The dark side of love: Love styles and the dark triad. *Personality and Individual Differences*, 49, 606–610. <https://doi.org/10.1016/j.paid.2010.05.030>
- Kanemasa, Y., Taniguchi, J., Daibo, I., & Ishimori, M. (2004). Love styles and romantic love experiences in Japan. *Social Behavior and Personality*, 32(3), 265–291. <https://doi.org/10.2224/sbp.2004.32.3.265>
- Karandashev, V. (2022). Adaptive and maladaptive love attitude. *Interpersona: An International Journal on Personal Relationships*, 16(2), 158–177. <https://doi.org/10.5964/ijpr.6283>
- Kemper, C. J., Trapp, S., Kathmann, N., Samuel, D., & Ziegler, M. (2019). Short versus long scales in clinical assessment: Exploring the trade-off between resources saved and psychometric quality using two measures of obsessive-compulsive symptoms. *Assessment*, 26, 767–782. <https://doi.org/10.1177/1073191118810057>
- Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd ed.). Guilford.
- Lasswell, T. E., & Lasswell, M. E. (1976). I love you but I am not in love with you. *Journal of Marriage and Family Counseling*, 38, 211–224.
- Lawrence, T., Yelderman, L., McField, A., & Allen, L. (2021). The mediating role of commitment and relationship satisfaction on socioeconomic-status and stability. *Journal of Family Strengths*, 20(1). <https://doi.org/10.58464/2168-670X.1432>
- Le, T. (2005). Narcissism and immature love as mediators of vertical individualism and ludic love. *Journal of Social and Personal Relationships*, 22(4), 543–560. <https://doi.org/10.1177/0265407505054522>
- Lee, J. A. (1973). *The colors of love: An exploration of the ways of loving*. New.

- Lee, J. A. (1977). A typology of styles of loving. *Personality and Social Psychology Bulletin*, 3, 173–182.
- Lee, J. A. (1988). Love-styles. In R. J. Stenberg, & M. L. Barnes (Eds.), *The psychology of love* (pp. 38–67). Yale University Press.
- Levine, S. B. (2003). The nature of sexual desire: A clinician's perspective. *Archives of Sexual Behavior*, 32, 279–285. <https://doi.org/10.1023/A:1025603711989>
- Lin, L., & Huddleston-Casas, C. (2005). Agape love in couple relationships. *Marriage & Family Review*, 37(4), 29–48. https://doi.org/10.1300/J002v37n04_03
- Meskö, N., Zsidó, A. N., Láng, A., & Karádi, K. (2021). Sex and relationship differences on the short love attitude scale: Insights from the Hungarian adaptation. *Sexuality & Culture*, 25, 1249–1272. <https://doi.org/10.1007/s12119-021-09830-z>
- Mitchell, J. C., Edwards, K. J., Hunt, S. B., & Poelstra, P. (2015). Relational commitment as a mediator of religiousness to marital quality. *Journal of Psychology and Theology*, 43(4), 263–270. <https://doi.org/10.1177/009164711504300404>
- Nazzari, F. I., Cruz, O., & Neto, F. (2021). Loneliness, love attitudes and satisfaction with love life among university students in Palestine: Gender differences. *Interpersona: An International Journal on Personal Relationships*, 15(1), 55–71. <https://doi.org/10.5964/ijpr.5637>
- Neto, F. (1993). Love styles and self-representations. *Personality and Individual Differences*, 14, 795–803. [https://doi.org/10.1016/0191-8869\(93\)90092-H](https://doi.org/10.1016/0191-8869(93)90092-H)
- Neto, F. (2005). The satisfaction with love life scale. *Measurement and Evaluation in Counseling and Development*, 38, 2–13. <https://doi.org/10.1080/07481756.2005.11909765>
- Neto, F. (2012). The satisfaction with Sex Life Scale. *Measurement and Evaluation in Counseling and Development*, 45, 18–31. <https://doi.org/10.1177/0748175611422898>
- Neto, F. (2015). Revisiting correlates of sociosexuality for men and women: The role of love relationships and psychological maladjustment. *Personality and Individual Differences*, 83, 106–110. <https://doi.org/10.1016/j.paid.2015.03.033>
- Neto, J., & Neto, F. (2022). The development of a short form compassionate love for a partner scale. *Sexuality & Culture*, 26, 1360–1379. <https://doi.org/10.1007/s12119-022-09947-9>
- Neto, J., & Neto, F. (2024). Measurement invariance of the short form compassionate love scale for a romantic partner (CLS-P-SF) and sexuality. *Journal of Social and Personal Relationships*, 41(6), 1439–1456. <https://doi.org/10.1177/02654075231226379>
- Neto, F., & Pinto, M. C. (2003). The role of loneliness, gender and love status in adolescents' love styles. *International Journal of Adolescence and Youth*, 11(3), 181–191. <https://doi.org/10.1080/02673843.2003.9747928>
- Neto, F., & Pinto, M. C. (2007). Love styles: A cross-cultural study of British, Indian, and Portuguese college students. *Journal of Comparative Family Studies*, 38, 2, 239–254. <https://doi.org/10.3138/jcfs.38.2.239>
- Neto, F., & Pinto, M. C. (2013). The satisfaction with sex life across the adult life span. *Social Indicators Research*, 114, 767–784. <https://doi.org/10.1007/s11205-012-0181-y>
- Neto, F., & Pinto, M. C. (2015). The satisfaction with love life across the adult life span. *Applied Research in Quality of Life*, 10, 289–304. <https://doi.org/10.1007/s11482-014-9314-6>
- Neto, F., Mullet, E., Deschamps, J., Barros, J., Benvindo, R., Camino, L., Falconi, A., Kgibanga, V., & Machado, M. (2000). Cross-cultural variations in attitudes toward love. *Journal of Cross-Cultural Psychology*, 31(5), 626–635. <https://doi.org/10.1177/0022022100031005005>
- Rafagnino, R., & Puddu, L. (2018). Love styles in couple relationships: A literature review. *Open Journal of Social Sciences*, 6(12), 307–330. <https://doi.org/10.4236/jss.2018.612027>
- Regan, P. C. (1998). Of lust and love: Beliefs about the role of sexual desire in romantic relationship. *Personal Relationships*, 5, 139–157. <https://doi.org/10.1111/j.1475-6811.1998.tb00164.x>
- Regan, P. C. (2016). Loving unconditionally: Demographic correlates of the agapic love style. *Interpersona*, 10, 28–35. <https://doi.org/10.5964/ijpr.v10i1.199>
- Regan, P., & Atkins, L. (2006). Sex differences and similarities in frequency and intensity of sexual desire. *Social Behavior and Personality*, 34(1), 95–102. <https://doi.org/10.2224/sbp.2006.34.1.95>
- Regan, P. C., & Berscheid, E. (1995). Gender differences in beliefs about the causes of male and female sexual desire. *Personal Relationships*, 2, 345–358. <https://doi.org/10.1111/j.1475-6811.1995.tb00097.x>
- Regan, P., & Berscheid, E. (1999). *Lust: What we know about human sexual desire*. Sage. <https://doi.org/10.4135/9781452233727>
- Rotenberg, K. J., & Korol, S. (1995). The role of loneliness and gender in individual's love styles. *Journal of Social Behavior and Personality*, 10(3), 537–564.

- Rubin, Z. (1970). Measurement of romantic love. *Journal of Personality and Social Psychology*, 16, 265–273. <https://doi.org/10.1037/h0029841>
- Rusbult, C. E., Colsen, M. K., Kichner, J. C., & Clarke, J. A. (2006). Commitment. In A. C. Vangelisti & D. Perlman (Eds.), *The Cambridge handbook of personal relationships* (pp. 616–635). Cambridge University Press. <https://doi.org/10.1017/CBO9780511606632.034>
- Soares, L., Cruz, O., Oliveira, F., Lucas, C. V., & Neto, F. (2020). Psychosocial predictors of love satisfaction among college students from Madeira. *Journal of Relationships Research*, 11(6), 1–8. <https://doi.org/10.1017/jrr.2020.4>
- Sprecher, S. (2001). Equity and social exchange in dating couples: Associations with satisfaction, commitment, and stability. *Journal of Marriage and Family*, 63, 599–613. <https://doi.org/10.1111/j.1741-3737.2001.00599.x>
- Sprecher, S., & Cate, R. (2004). Sexual satisfaction and sexual expression as predictors of relationship satisfaction and stability. In J. H. Harvey, A. Wenzel, & S. Sprecher (Eds.), *The handbook of sexuality in close relationships* (pp. 235–256). Lawrence Erlbaum.
- Sprecher, S., & Regan, P. (1998). Passionate and companionate love in courting and young married couples. *Sociological Inquiry*, 68, 163–185. <https://doi.org/10.1111/j.1475-682X.1998.tb00459.x>
- Sternberg, R. J. (1986). A triangular theory of love. *Psychological Review*, 93, 119–135. <https://doi.org/10.1037/0033-295X.93.2.119>
- Sternberg, R. J., & Sternberg, K. (Eds.). (2019). *The new psychology of love*. Cambridge University Press. <https://doi.org/10.1017/9781108658225.010>
- Wan Shahrazad, W. S., Hoesni, S. M., & Chong, S. T. (2012). Investigating the factor structure of the love attitude scale (LAS) with Malaysian samples. *Asian Social Science*, 8(9), 66–73. <https://doi.org/10.5539/ass.v8n9p66>
- White, J., Hendrick, S., & Hendrick, C. (2004). Big five personality variables and relationship constructs. *Personality and Individual Differences*, 37, 1519–1530. <https://doi.org/10.1016/j.paid.2004.02.019>
- Yang, Y., & Liu, A. (2007). Reliability and validity of the Chinese love attitude scale. *Asian Social Science*, 3, 41–44.

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