Measuring love in romantic relationships: A meta-analysis

James M. Graham
Western Washington University, USA

Abstract

The present study identifies the higher-order factors underlying the most popular measures of love in use today through meta-analytic factor analysis. Eighty-one studies representing 103 samples and 19,387 individuals provided data for the meta-analysis. The reported correlations between several commonly-used measures of love were aggregated across studies to form a meta-analytic correlation matrix, which was then subjected to principle components analysis. Factors suggesting general love, romantic obsession, and practical friendship emerged. Love was positively and obsession was negatively associated with relationship satisfaction and length. The results corroborate recent conceptualizations of love and point toward the need for measurement methods other than global self-report in the field of love research.

Keywords

The experience of love is centrally important to close relationships. Because the concept of love can mean different things across different types of relationships (e.g., friends, children, romantic relationships), researchers have worked at developing models that allow differentiation between varying experiences of love. Attempts at quantifying love have differentiated between loving and liking (Rubin, 1970), passionate and companionate love (Berscheid & Hatfield, 1978), passion, intimacy, and commitment (Sternberg, 1986), and a wide variety of love "styles" (Lee, 1973).

Corresponding author:
James M. Graham, Department of Psychology, Western Washington University, 516 high St., Bellingham, WA, 98225-9172, USA
Email: jim.graham@wwu.edu

Each of these different approaches to structuring the components of love has borne fruitful results and a number of associated measures. Universally, these measures have been global self-report measures that ask respondents to rate their relationship on a variety of questions. Despite good individual results, the lack of a shared method of measuring love has reduced the portability of findings from one line of research to another. Several previous attempts have been made at outlining the underlying structure of common measures of love, though these attempts were either based on a single sample (Fehr, 1994; Hendrick & Hendrick, 1989), or used an a priori classification without testing the fit of that classification (Masuda, 2003).

The present study uses meta-analytic factor analysis to consider the higher-order factors measured by the most popular measures of love in current use. Meta-analytic structural equation modeling (SEM) tests the relation between these factors and relationship length and satisfaction. Several predictions regarding the relation between varying components of love and relationship length are tested. It is hoped that an understanding of the higher-order factors underpinning the major measures of love will refine our current understanding love.

The present meta-analysis represents an important contribution to the study of love. When social scientists make decisions about how to measure a construct, they are deciding how that construct will be defined and which components of that construct are worthy of consideration. The present study does not begin with an a priori definition of love in romantic relationships; rather, it considers the various definitions of love represented by existing measures. At one level, the present results can be thought of as psychometric in nature, illuminating the common factors underlying existing measures of love. At another level, the present results can be thought of as theoretical, highlighting the overlap between various theories of love. The present meta-analysis draws data from 40 years of research on love in romantic relationships in an attempt to address these issues. Love is an essential component of a successful relationship (Simpson, Campbell, & Berscheid, 1986) and has been linked to life satisfaction, relationship stability, and psychological and general health (Dietch, 1978; Fehr, 2001; Kim & Hatfield, 2004). In order to further this important line of research, it is necessary to understand what we are measuring when we look at self-reported love.

Measures

Researchers have developed a wide variety of self-report measures in an attempt to quantify the experience of love in romantic relationships. Of these, several have entered into general use and endured over time.

Loving and liking. One of the earliest measures of love still in use today was developed by Rubin (1970). Rubin defined romantic love as being comprised of three components: (1) affiliative and dependent need (attachment), or the desire to be close to someone; (2) predisposition to help (caring), or love manifested by helping behavior and putting another's needs before one's own; and (3) exclusiveness and absorption (intimacy), or feelings of possessiveness and union with one's partner. In addition to measuring these constructs, Rubin attempted to measure romantic love in contrast with "liking". The final loving and liking scales consist of 13 items each, measured on a scale ranging from one to nine.

The liking and loving measures have been shown to produce scores that are relatively reliable across studies, though the reliability of these scores produced by these measures appears to be lower in non-White than White samples (Graham & Christiansen, 2008). While researchers sometimes treat loving and liking as distinct constructs (Kelley, 1983; Steck, Levitan, McLane, & Kelley, 1982), studies of love in romantic relationships often consider them together. A factor analysis of various love scales by Fehr (1994) indicated that the liking and loving scales loaded together on a companionate love factor. Furthermore, Masuda (2003) classified both loving and liking as "C-love", or companionate love. It appears likely that both the loving and liking scales are measuring similar constructs, and that both are components of love in romantic relationships.

Love Attitude Scales. The Love Attitude Scales (LASs; Hendrick & Hendrick, 1986) were designed to measure the different "love styles" laid out by Lee's (1973) color theory of love. This theory describes individuals' approaches to love along six distinct styles: Eros (intense, passionate, erotic love), Ludus (love as a game, love as a series of conquests), Storge (companionate, friendship-based love), Pragma (logical, practical shopping-list love), Mania (obsessive, possessive dependent love), and Agape (selfless love, putting the other before oneself). The final LAS consists of 36 items (six for each subscale) asking participants to respond to questions on a five-point scale.

The available information suggests that the LAS tends to produce scores with reliability in the borderline range of acceptability (Graham & Christiansen, 2008). Subsequent investigations into the validity and structure of the LAS have been generally supportive of the six-factor solution (Hendrick & Hendrick, 1989). While the LAS was originally intended to measure attitudes towards love rather than love itself, some research suggests that some subscales of the LAS may be measuring the experience of love (Davies, Kirkpatrick, Levy, & O'Hearn, 1994, Fehr, 1994; Masuda, 2003). As such, the LAS is commonly used as a measure of love, rather than as a measure of attitudes towards love.

Given the LAS's popularity, a variety of short forms have been developed (e.g., Sprecher et al., 1994; Thompson & Borrello, 1987). Hendrick, Hendrick, and Dicke (1998) developed the most commonly-used short form. This measure examines each of the six love styles with four items each. While the short-form of the LAS tends to produce scores with higher reliability than the full version in some cases, the reliability of scores produced by the short form are more susceptible to the influence of sample characteristics than the long form (Graham & Christiansen, 2008).

Passionate Love Scale. The Passionate Love Scale (PLS; Hatfield & Sprecher, 1986) was developed to measure the construct of passionate love, or " . . . intense longing for union with another, regardless of whether that longing is reciprocated . . . or is unrequited" (pp. 385–386). The PLS includes items that measure the emotional, cognitive, and behavioral manifestations of passionate love. The PLS is unidimensional, with 30 items that are responded to on a nine-point scale. A 15-item short form of the PLS was developed concurrently with the longer version.

Meta-analytic research has suggested that the reliability of scores produced by the PLS and the PLS short form tend to be high, and relatively free from the influence of sample

characteristics (Graham & Christiansen, 2008). Subsequent research has likewise supported the structure and validity of the PLS (Fehr, 1994; Hendrick & Hendrick, 1989).

Triangular Love Scale. Sternberg's (1986) triangular theory of love divides love into three components: passion (factors leading to physical attraction), intimacy (closeness, connectedness), and commitment (a rational decision to maintain one's relationship). The theory posits that different levels of each of these three components result in different experiences of love. Sternberg (1986, 1997) developed the Triangular Love Scale (TLS) to measure these three constructs. The TLS consists of 36 items (12 for each of the three components) measured on a nine-point scale.

The TLS produces scores that are highly reliable across studies, and relatively free from the influence of sample characteristics (Graham & Christiansen, 2008). Despite the reliabilities, subsequent research demonstrated that the vast majority of the items load on the wrong factor, and that there is a large degree of item overlap (Acker & Davis, 1992; Hendrick & Hendrick, 1989). While Sternberg (1997) addressed some of these issues in a psychometric study and revision of the scale, the TLS still evidences spuriously high subscale correlations, suggesting that a higher-order factor structure might be more appropriate (Hendrick & Hendrick, 2003).

Classifying love measures

Given the large number of love measures available to researchers, it is not surprising that researchers have attempted to draw similarities across measures. Perhaps the most widely accepted conceptualization of love divides love in romantic relationships into passionate and companionate love (Berscheid & Hatfield, 1978). Most of the major measures of love contain components consistent with these factors. For example, the intense, arousing attraction inherent in passionate love is reflected in the PLS, the Eros subscale of the LAS, and the passion subscale of the TLS. Conversely, the intimacy subscale of the TLS and Rubin's Liking scale capture the warm feelings of closeness and affection resulting from companionate love. Some researchers describe these different aspects of love as having separate evolutionary functions in romantic relationships, with passion serving to form relationships and initiate sex, and companionate love serving to help partners stay together to care for offspring (Buss, 1994).

Neuroimaging work has suggested that both romantic love (Aron et al., 2005; Bartels & Zeki, 2000) and maternal love (Bartels & Zeki, 2004) are associated with activation in the reward centers of the brain. Additionally, activation in the caudate nucleus, an area of the brain associated with obsessive thinking, was implicated in romantic love, but was shown to be lower in well-established relationships (Acevedo et al., 2008; Xu, et al., in press). This suggests that passionate love might be better subdivided into two components: romantic love and romantic obsession. While the concept of passionate and companionate love being distinct from one another is a well supported belief, it is not clear that existing self-report measures effectively capture this distinction.

Several previous attempts have been made at classifying the various love scales into some sort of higher-order structure. Hendrick and Hendrick (1989) collected data on a variety of love and attachment measures. Their subsequent factor analysis suggested five

underlying factors: passionate love, closeness, ambivalence, secure attachment, and practicality. While this information was invaluable in drawing attention to the common constructs tapped by several of the measures of love, it was limited in that the data was based on a single sample, albeit a large one. Furthermore, it is possible that some of the factors formed due to the inclusion of non-love measures in the factor analysis. For example, the secure attachment factor consisted solely of attachment measures. Due to the influence of the non-love measures, it is not certain which of the factors resulted from the influence of constructs other than those measured by love measures.

In an investigation of the prototype theory of love, Fehr (1994) examined the relationships between a variety of existing love measures. A factor analysis of love measures resulted in four factors: romantic beliefs, companionate love, passionate love, and pragmatic love. These results were generally supportive of companionate and passionate love being considered separate components of love. However, some overlap between factors resulted in the dropping of the Eros subscale of the LAS from the analysis, as it loaded on both the passionate and companionate love factors. The results were limited in that they relied upon a single sample comprised solely of undergraduate students.

Masuda (2003) engaged in a meta-analytic investigation of love measures. In this study, Masuda classified measures of love as measures of either companionate or erotic (passionate) love. While these results showed that erotic love was associated with relationship satisfaction, the analyses suggested that several of the measures of companionate love were sufficiently distinct from one another to warrant caution. Thus, while this study represented a good attempt at grouping measures together as similar constructs, these groupings were a priori, and the empirical evidence did not completely support the categorization.

More recent research suggests that what has previously been considered passionate love can actually be thought of as two separate components: romantic love and obsession (Acevedo & Aron, 2009). Romantic love is comprised of the intense feelings of attraction and engagement that are experienced in romantic relationships, while obsession is reflected by feelings of jealous dependence and intrusive thoughts about the partner. While Acevedo and Aron (2009) make a priori decisions about which self-report measures tap into which constructs, their meta-analytic data support the notion that romantic love and romantic obsession differ in the way they relate to the length of a relationship.

Love over time

Nearly every major conceptualization of love either provides evidence for or describes how the different components of love differ over time. For example, common belief holds that passionate love typifies early relationships, declines over time, and generally gives way to growing companionate love in successful relationships (Hatfield & Walster, 1978). Similarly, Sternberg (1986) predicts that passion peaks early in a relationship and declines, and that intimacy and commitment grow over the course of a romantic relationship. Other empirical evidence suggests that both companionate and passionate love decline over time (Hatfield et al., 2008). Alternatively, Acevedo and Aron (2009) provide evidence that it is the romantic obsession component of passion, and not romantic love that diminishes over time. Because the data available to date has been cross-sectional, it might be that relationships with a high degree of romantic obsession tend to not stand the test of time to become lasting

relationships. The dynamic nature of love is important in differentiating the different components of love; the degree to which the empirical evidence obtained from a measure agrees with the predictions of the theory in part determines the validity and utility of the measure.

Present study

Each of the attempts at examining the commonalities between love measures suggests that some sort of construct overlap exists, though no definitive categorization exists. The present study seeks to fill this gap by utilizing a meta-analytic approach. An examination of the pattern of inter-measure correlations across studies can identify the commonalities between measures. An understanding of the shared factors being measured by commonly-used measures of love can facilitate the merging of data from different theories. Prior research suggests that factors consistent with passionate and companionate love might emerge.

Furthermore, the present study will examine the relationships between the resulting components of love and relationship satisfaction and length. Given the importance of love in romantic relationships, any meaningful component of love should be positively correlated with relationship satisfaction. Regarding relationship length, most conceptualizations predict that passionate love would decline while companionate love would build over the course of a relationship. This suggests that companionate love should be positively and passionate love should be negatively correlated with relationship length. However, an alternative conceptualization by Acevedo and Aron (2009) predicts that romantic love will not be related to relationship length, while romantic obsession will decrease over time. Other evidence suggests that both passionate and companionate love decline over time (Hatfield et al., 2008).

Method

The present study investigates the relationships between Rubin's (1970) Loving and Liking Scales, the LAS (Hendrick & Hendrick, 1986), the PLS (Hatfield & Sprecher, 1986), and the TLS (Sternberg, 1997). I originally included several other measures, including The Inclusion of Other in the Self Scale (Aron et al., 1992), and Aron and Westbay's (1996) measure of the prototype theory of love, but these measures failed to provide sufficient correlations to warrant further inclusion.

The search strategy for the present meta-analysis included a variety of methods. The Social Sciences Citation Index identified articles that had referenced one or more of the measures, based on the assumption that any study using a measure would provide a citation for the original article in which the measure appeared. A PsycINFO search using "romantic love" and the names of the measures as keyword search terms and cited references in major review articles and meta-analyses provided a second source of articles. Requests for data posted on a variety of professional mailing lists, and sent directly to the authors of the measures in question identified work that was unpublished, in press, or under review. After removing duplicates, I identified a total of 1157 articles for potential inclusion in the present meta-analysis.

I then obtained all of these articles, save for the four that were unavailable through normal interlibrary loan channels. Seventy non-English language articles were discarded because

the individuals responsible for coding the articles were monolingual English speakers. The use of only English-language studies represents a necessary limitation of the present study. To be included in the present study, articles must have involved original data collection using one or more of the primary measures. A total of 815 articles failed to meet these criteria. The final sample of valid articles under consideration consisted of 225 studies.

The author or at least two trained undergraduate research assistants examined each article. The reviewers identified any bivariate correlation coefficients that reported between two or more of the subscales from the previously mentioned scales, the length of the relationships of those completing the measures, and any identifiable measure of relationship quality or satisfaction. In cases where the coders could identify such bivariate correlations, they noted the value of the correlation and the size of the sample contributing to the correlation. If the correlation included a measure of relationship satisfaction, coders also noted the specific measure. The most commonly used measures of relationship satisfaction were the Relationship Assessment Scale (Hendrick, 1988) and the Dyadic Adjustment Scale (Spanier, 1976). In this manner, the coders compiled a cross-study catalog of correlations between each of the measures.

A total of 81 articles representing 103 samples and 19,387 individuals provided 737 correlations for use in the meta-analysis. The number of studies (k) contributing to each cell in the correlation matrix ranged from 1 to 32 (Mean = 8.09), and the sample size of each cell ranged from 120 to 7335 (Mean = 1515.1). Due in part to the infrequency with which researchers use some measures together, some of the cells were estimated from a single sample. While less than ideal, these single-sample correlations still represented a sufficient number of participants to warrant their inclusion.

The coders recorded demographic information in respect to the average age and relationship length of participants, as well as the percentage of the sample that was male, white, heterosexual, married, and cohabiting with their romantic partners. Because many studies use samples of convenience recruited from undergraduate college classes, coders also noted the percentage of the sample that recruited from such a setting. Finally, coders also recorded the percentage of the participants that responded to the measures based on a current relationship, as opposed to describing a relationship in the past.[1] Studies were inconsistent in the amount of demographic information they provided, so not all studies provided information for all variables. Table 1 shows the demographic characteristics of the samples providing valid correlations. As seen in Table 1, samples of young, white, heterosexual individuals recruited from a college setting and describing their current relationships provide the majority of our information on self-report measures of love. The relatively homogenous participant pool used in research on love is not unique to this area, and is a problem in many areas of the social sciences (Peterson, 2001).

Results

I used a meta-analytic structural equation modeling (SEM) approach (Cheung & Chan, 2005; Furlow & Beretvas, 2005). I aggregated the correlations between the measures by variable pair using standard meta-analytic procedures. I transformed the correlations into a form amenable for aggregation using Fisher's r-to-Z transformation. I then weighted the correlations for each bivariate pair by their inverse variance

Table 1. Demographic characteristic of samples contributing to the meta-analysis

Variable	k	n	Min.	Max.	Mean	SD
Age	45	8736	19	46	25.74	8.37
Rel. length	30	6026	.83	18	6.00	6.20
% male	69	14317	0	100	44.59	19.83
% White	32	6796	0	99	74.65	26.62
% Heterosexual	41	7475	0	100	89.16	30.17
% Married	37	7357	0	100	32.08	39.74
% Cohabiting	16	3958	0	100	66.77	37.89
% Student	63	12481	0	100	82.52	37.45
% Current rel.	67	14838	0	100	72.87	21.68

Note. Rel. length: relationship length in years, % Current rel.: percentage of sample currently in a relationship.

weights and averaged them using a random effects method (Lipsey & Wilson, 2001). Finally, I transformed the resultant averages back into the metric of Pearson's r. This procedure resulted in a correlation matrix of all of the study variables, comprised of the average correlation between each variable pair. Table 2 shows the resulting meta-analytic correlation matrix and the number of participants (n) and samples (k) contributing to each correlation.

The subsequent analyses used the meta-analytic correlation matrix as input. Because the number of participants contributing to each cell in the correlation matrix differed widely, I used the average number of participants ($n = 1515$) to set the sample size. I standardized the mean and standard deviation of each of the variables by setting them to 0 and 1, respectively.

Exploratory factor analysis

For a preliminary investigation, principle components analysis provided an examination of the component structure of the correlation matrix. I subjected the PLS, Rubin's Loving and Liking Scales, the three TLS subscales, and the six LAS subscales to principal components analysis using an oblimin rotation. The initial matrix was not positive definite, likely due to the high amount of multicollinearity between love measures. A number of subsequent exploratory analyses identified Rubin's Loving scale as the primary source of multicollinearity. Without the loving scores included the remaining subscales converged on a solution.[2] The overall Kaiser-Meyer-Olkin measure of sampling adequacy was .641, suggesting the partial correlations between variables were adequate for factor analysis.

Three components with eigenvalues greater than one emerged, and the scree plot suggested that a three-component solution explaining 66% of the variance in scores was tenable. [3] Table 3 shows the pattern (and structure) coefficients. As seen here, the vast majority of the items loaded on the first component. The Mania subscale of the LAS solely defined the second component, while the Storge and Pragma subscales of the LAS defined the third component.

Table 2. Meta-analytic correlation matrix (below the diagonal) and cell n(k) (above the diagonal)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1)Rubin Loving	2521(22)	2521(22)	175(1)	175(1)	175(1)	175(1)	175(1)	175(1)	120(2)	505(5)	385(3)	185(2)	2845(15)	2967(19)
2) Liking	.56	–	175(1)	175(1)	175(1)	175(1)	175(1)	175(1)	120(2)	305(4)	185(2)	185(2)	1001(6)	1896(11)
3)LAS Eros	.29	.22	–	6514(30)	4010(20)	3879(20)	4345(22)	7271(32)	391(1)	432(2)	432(2)	432(2)	2803(11)	3374(17)
4) Ludus	-.21	-.27	-.22	–	4010(20)	4688(24)	4733(23)	7335(32)	391(1)	432(2)	432(2)	432(2)	2435(9)	3374(17)
5) Storge	.07	.11	.02	-.04	–	4620(23)	4257(22)	3915(20)	391(1)	432(2)	432(2)	432(2)	501(3)	2010(14)
6) Pragma	-.03	.02	.07	.11	.14	–	5064(25)	4606(23)	391(1)	432(2)	432(2)	432(2)	869(5)	2010(14)
7) Mania	-.01	-.11	.16	.04	-.01	.13	–	4689(24)	391(1)	432(2)	432(2)	432(2)	543(3)	2010(14)
8) Agape	.39	.21	.39	-.29	.13	.04	.27	–	391(1)	432(2)	432(2)	432(2)	2047(7)	2547(15)
9)PLS Passion	.83	.57	.65	-.37	.00	-.08	.33	.47	–	595(2)	863(2)	595(2)	678(5)	1257(9)
10)TLS Intimacy	.81	.64	.55	-.39	.20	-.10	.15	.52	.56	–	1497(10)	1297(9)	127(2)	1144(11)
11) Passion	.72	.58	.58	-.39	.08	-.08	.20	.51	.79	.64	–	1298(9)	127(2)	1612(13)
12) Commitment	.68						.20	.53	.63	.68	.68	–	127(2)	678(9)
13)Rel Length	.23	.19	-.05	.00	.10	-.07	-.17	.14	-.03	.16	.11	.20	–	2077(10)
14) Satisfac	.54	.56	.59	-.42	.10	-.03	.03	.39	.50	.66	.78	.70	.07	–

Note. LAS: Love Attitude Scale, PLS: Passionate Love Scale, TLS: Triangular Love Scale, Rel.: Relationship, Satisfac.: Satisfaction.

Table 3. Results of principle components analysis of love measures showing pattern (and structure) coefficients

Variable		Love	Romantic Obsession	Practical Friendship
Rubin	Liking	**.65 (.66)**	−.46 (−.45)	.15 (.15)
LAS	Eros	**.69 (.68)**	.20 (.20)	−.05 (−.02)
	Ludus	**−.52 (−.52)**	.31 (.32)	.13 (.13)
	Storge	.08 (.11)	−.24 (−.21)	**.78 (.78)**
	Pragma	−.10 (−.08)	.29 (.32)	**.70 (.71)**
	Mania	.29 (.29)	**.82 (.82)**	.02 (.07)
	Agape	**.66 (.66)**	.22 (.23)	.13 (.17)
PLS		**.86 (.86)**	.25 (.25)	−.04 (.00)
TLS	Passion	**.89 (.88)**	.13 (.12)	−.11 (−.07)
	Intimacy	**.84 (.85)**	−.19 (−.19)	.11 (.13)
	Commitment	**.86 (.86)**	−.06 (−.06)	−.01 (−.02)

LAS: Love Attitude Scale, PLS: Passionate Love Scale, TLS: Triangular Love Scale.

The first component is the one most consistent with the idea of love in romantic relationships. It is comprised of measures that tap into supposedly diverse constructs such as passionate love, companionate love, and commitment. For the purposes of the present study, I refer to this factor simply as "love". The second component, comprised solely of mania, is consistent with Hendrick and Hendrick's (1989) third factor, where the Mania subscale also loaded with a measure of Anxious-Ambivalent attachment. The appearance of Mania on a factor separate from love is also consistent with Acevedo and Aron's (2009) conceptualization of romantic obsession. In light of this information, I call this factor "romantic obsession". The final component, defined by Storge and Pragma, was consistent with Hendrick and Hendrick's (1989) fifth factor. I named this component "practical friendship", as it contains aspects of both pragmatic and friendship-based approaches to relating to others. This factor does not seem to fit precisely with Berscheid and Hatfield's (1978) conceptualization of companionate love. While practical friendship does include some aspects of companionate love (as reflected by Storge), it does not consist of other measures which one would expect, such as intimacy, liking, and commitment.[4]

The degree of cross-loading on multiple factors was relatively low, with most measures clearly loading on only a single factor. While Liking clearly loaded on the love factor, it had a moderate (−.46) pattern coefficient with romantic obsession and, despite Rubin's (1970) conceptualization of Liking as being more akin to friendship than to love, a low (.15) pattern coefficient with practical friendship. This suggests that while Liking is primarily tapping into love, it also in part measures the absence of romantic obsession. The low loading with practical friendship is consistent with research subsequent to Rubin's initial work, which has largely found that Liking is an aspect of love, and not simple friendship.

In spite of the fact that the rotation was oblique, the components were largely uncorrelated to one another. Love was correlated −.005 with romantic obsession and .032 with practical friendship. Romantic obsession and practical friendship were correlated .042. Table 4 shows the correlations between the latent factors, relationship satisfaction, and relationship length. Thus, a further higher-order structure above the present solution

Table 4. Correlations between latent variables, relationship satisfaction, and relationship length

	1	2	3	4
1) Love	–			
2) Romantic obsession	−.005	–		
3) Practical friendship	.032	.042	–	
4) Relationship satisfaction	.793	−.292	.092	–
5) Relationship length	.130	−.278	.059	.067

does not appear warranted; love, romantic obsession, and practical friendship are quite distinct from one another, and have very few shared components. Rather than supporting the classic dichotomy of companionate and passionate love, the present data suggest that most measures of love in romantic relationships (Mania, Pragma, and Storge excluded) tap into one overarching factor.

Multiple regression

In order to examine the relationship between the three factors measured by the love scales, relationship length, and relationship satisfaction, I used an SEM approach. I used the pattern coefficients derived from the exploratory principal components analysis (shown in Table 3) to identify the paths from the love measures to the latent variables. I then used the resulting latent variables to predict relationship length and satisfaction in separate analyses. The models I used were the models used to conduct multiple regression analyses in SEM (Graham, 2008b), save that latent, rather than measured variables served as the predictors. The current analyses also use maximum likelihood, rather than ordinary least squares, as the method of estimation. I conducted separate analyses for each of the two criteria, relationship satisfaction and relationship length. Table 5 shows the results of these analyses.

As seen in Table 5, the latent variables predicted 72.4% of the variance in relationship satisfaction, with more love and less romantic obsession associated with higher levels of relationship satisfaction. Practical friendship was unrelated to relationship satisfaction. Of the two statistically significant predictors, love was the most predictive of relationship satisfaction, with a nearly one-to-one relationship. The latent variables predicted approximately 9.9% of the variance in relationship length. Practical friendship was unrelated to relationship length. The two remaining predictors were relatively equal in strength, with more love and less romantic obsession being associated with longer relationships.

Romantic love and romantic obsession

The present data support the notion that love and romantic obsession are separate constructs, and that both are differentially related to relationship satisfaction and length. In distinguishing between romantic love and romantic obsession, Acevedo and Aron (2009) make several unique predictions regarding the relationship between these variables, relationship satisfaction, and relationship length. The present data offer an opportunity to test those hypotheses using an alternative meta-analytic method. Acevedo and Aron

Table 5. Results of multiple regression analyses predicting relationship length and satisfaction with latent factors

Predictors β (r_{xy})	Dependent variable	
	Satisfaction	Length
Love	.795* (.793)	.133* (.130)
Romantic obsession	−.304* (−.292)	−.281* (−.278)
Practical friendship	.049 (.092)	.053 (.059)
R^2	.724	.099

*p < .001

(2009) chose the Eros subscale of the LAS as a "pure" measure of romantic love, the Mania subscale of the LAS as a "pure" measure of romantic obsession, and the PLS as a measure of both romantic love and obsession combined. Table 2 provides support for this notion, with high correlations between the PLS and both the Eros and Mania scale (.53 and .47, respectively), and with a much weaker correlation between the Eros and Mania scales ($r = .16$).

Acevedo and Aron (2009) found that romantic obsession, and not romantic love, was negatively associated with relationship length. Again, the correlations found in Table 2 support this notion. Eros has a near-zero correlation with relationship length ($r = −.05$), while Mania has a small negative correlation with relationship length ($r = −.17$).

Acevedo and Aron (2009) also suggest that romantic obsession, but not romantic love, should become increasingly associated with poor relationship quality over time. To test this, I conducted a series of analyses using Wilson's (2005) meta-analytic regression macro for SPSS. This macro uses maximum likelihood estimation to conduct random-effects weighted regression. The relatively small k (five and three, respectively) greatly limited the power and generalizability of these analyses, but the analyses still provide rough estimates of the effects. The correlation between Eros and relationship satisfaction did not vary to a statistically significant degree by relationship length, though the correlation was large, $r = .52, p = .36$. The relation between the mania/relationship satisfaction correlation and relationship length did approach statistical significance, with an extremely large correlation, $r = −.95, p = .095$. This suggests that the longer a relationship had lasted, the more negatively related mania was to relationship satisfaction. This supports Acevedo and Aron's (2009) notion that romantic obsession grows more harmful as a relationship progresses, while relationships maintaining a high degree of romantic love are seen as highly satisfying.

Correlations with demographic variables

Research on love suggests many hypotheses which might be appropriately tested by examining how demographic characteristics of participants relate to the correlations between love measures. Unfortunately, the present data are not sufficient to answer those questions. Researchers are often inconsistent in describing their samples, and list-wise dele-tion of studies makes it impossible to study the simultaneous impact of multiple

demographic variables on the correlations between love measures. The alternative to multi-variate analyses, pair-wise comparisons, results in a large number of effects and an inordinately large experiment-wise error rate. Due to the limitations of the current data, I could not address many worthy questions about love, though I hope that this limitation serves as an impetus for researchers to be more detailed in their descriptions of their samples.

Discussion

Contrary to common conceptualizations of love, the results of the present analyses suggest that the existing measures of love fell into three distinct higher-order factors: love, romantic obsession, and pragmatic friendship. Of these, only one factor is consistent with pre-existing notions of love in romantic relationships. The other two factors, romantic obsession and pragmatic friendship, are perhaps best considered non-love factors. The present results suggest that the existing global self-report measures fail to produce the higher-order components of love described in the various theories; rather, most global self-report measures of love seem to be tapping into one general love factor.

Love

The present results suggest that the vast majority of self-report measures of love, with the exception of half of the LAS subscales, are measuring the same higher-order construct. That is, the different approaches to measuring love may actually be meeting the same ultimate goal. The TLS perhaps best exemplifies this possibility. While the triangular theory provides an elegant model for combining the different components of love (Sternberg, 1986), the correlations between the different components are consistently high, causing many to doubt whether the components as measured by the TLS are actually distinct from one another (e.g., Acker & Davis, 1992). The present results suggest that they are not, and that neither are the constructs measured by most measures of love. Given the single strong higher-order factor measured by the majority of the love measures, it is suggested here that while each of the measures may reflect distinct first-order constructs, they all hold a single unidimensional second-order factor in common.

It should be noted that the higher-order unidimensionality of love measures is not meant to imply that one measure of love (such as the PLS) is completely replaceable with another (such as the Intimacy subscale of the TLS). Individual measures can still provide unique information and play different theoretical roles. Factor analyses of the items comprising the love scales regularly obtain distinct first-order factors. The present results suggest that a single higher-order factor, and not dichotomous (e.g., passionate/companionate, loving/liking) or trichotomous (e.g., passion/intimacy/commitment) factors best describe the relations between most measures of love.

Consider this as analogous to research on intelligence, Individual components of intelligence, such as verbal reasoning, fluid intelligence, and working memory are all quite distinct from one another, and each provide useful information about people. At a higher-order level, each of these components are sometimes hypothesized as relating to one another through a single unidimensional factor referred to as g, or general intelligence (Spearman, 1904, 1923). Research has shown g to be one of the most widely

predictive variables of a variety of outcomes, including academic achievement, income, and job performance (Geary, 2005). In the same way, it is likely that each measure of love, while individually useful, ultimately taps into a single higher-order general love factor, "*l*". While the nuances of many components of *l* may be useful, focusing on general love, rather than separate components of love may prove as useful in describing relationship outcomes as measures of *g* in describing individual outcomes.

Love was positively associated with relationship satisfaction and, to a much lesser extent, relationship length. The relation between love and relationship satisfaction was quite strong. In a separate exploratory factor analysis including relationship length and satisfaction with the love measures, relationship satisfaction loaded on the romantic love component. As such, it may be that the current measures of love are confounded with global relationship satisfaction. Many subjective measures of relationship quality are confounded with global satisfaction (Norton, 1983). If people are generally happy with their relationships, they will tend to rate all aspects of their relationship positively; if they are generally unhappy, they will tend to rate all aspects of their relationship negatively. This bias is one of the major weaknesses of many global self-report measures. When asking someone to make a subjective evaluation, they tend to default to their overall subjective impression rather than carefully considering the different questions asked. It is for this reason that alternative measures of evaluating psychological constructs, such as observational methods, neuroimaging, and implicit associations are so sought after in the social sciences. Thus, while it appears that each of the measures examined is measuring the same underlying construct, it is possible that the construct being measured is not love, but rather simple relationship satisfaction.

Alternatively, the strong relation between love and relationship satisfaction may stem from the centrality of love to romantic relationships. Many individuals in Western cultures hold that love is the most important factor to consider when deciding to marry (Simpson et al., 1986). If love is so important to a satisfying relationship, it stands to reason that the two would be strongly correlated.

The present results suggest that love has a positive relation with relationship length. This stands in contrast to much prior research which suggests that love, particularly passionate love, tends to decrease over time (e.g., Acker & Davis, 1992; Tucker & Aron, 1993). Additionally, relationship length has been shown to be consistently negatively related to relationship satisfaction (Bradbury, Fincham, & Beach, 2000); given the high correlation between relationship satisfaction and love, it seems reasonable to expect a similar relation with love. However, more recent data suggests that it is romantic obsession, and not love that tends to be associated with shorter-term relationships (Acevedo & Aron, 2009). Additionally, companionate love, intimacy, and commitment are generally seen as growing over time (e.g., Hatfield & Walster, 1978). Because the current love factor consists partly of companionate and romantic love but not romantic obsession, it stands to reason that love would be positively associated with relationship length. Finally, the present meta-analytic data (though certainly not exhaustive) shows a near-zero ($r = .07$) correlation between relationship satisfaction and length. Whether this relation is an artifact of the samples used for this meta-analysis is unknown at this time. More complete meta-analytic data (rather than just the subset here dealing with love) could also consider possible confounding variables such as participant age and marital status.

The present results are limited by the cross-sectional nature of the meta-analytic correlation matrix. To study the change in love over time, a longitudinal approach must be used. Cross-sectional studies of love are confounded by the fact that if people are not satisfied with and in love with their partners, they tend to end their relationships. As such, the "oldest" relationships in a cross-sectional sample are likely those with the highest levels of love and satisfaction; that is the reason they lasted so long! Because the correlations comprising the present matrix were cross-sectional in nature, the meaning of the relation between relationship length and romantic love is not clear. The present finding also stands in contrast to other research suggesting that established couples possess less companionate and passionate love than newlyweds (Hatfield et al., 2008). Certainly, more research on the love as a dynamic process is needed.

Romantic obsession

The second component consisted solely of the Mania subscale of the LAS. The Mania content of the Mania subscale includes items such as "If my partner ignores me for a while, I sometimes do stupid things to get his/her attention back" and "I get so excited about being in love with my partner that I cannot sleep". In the original development of the LAS, Mania scores inversely related to self-esteem; as such, Hendrick and Hendrick (1986) described Mania as being an insecure, dependent experience of love. While it is difficult to draw conclusions on a component comprised of a single subscale, some parallels exist between the present results and Hendrick and Hendrick's (1989) third factor. Mania and measures of dependent and anxious attachment comprised this factor. As such, the mania subscale may tap the obsessive, possessive quality that typifies many insecure relationships. The fact that this component was negatively related to relationship length and satisfaction supports this notion. High levels of mania are more typical of early, unsatisfying relationships. In fact, when considered with relationship length and satisfaction as part of the exploratory factor analyses, relationship length loaded on the romantic obsession factor with mania. Therefore, the age of a relationship appears to be central to the construct of romantic obsession.

The negative correlation between romantic obsession and relationship length is consistent with recent neuroimaging work on romantic love (Acevedo et al., 2008; Xu et al., in press). Romantic love in young couples is associated with activation in both the reward centers of the brain and the areas associated with obsessive compulsive disorders. In contrast, romantic love in older couples is associated only with activation in the reward centers of the brain. Thus, obsessive, clinging, insecurity is associated primarily with early relationships; as relationships mature successfully, the obsessive and dependent qualities of the relationship are less apparent. This possibility is further substantiated by the previous finding that the reliability of LAS Mania scores is strongly related to the length of the relationship being measured; the more established the relationship is, the less reliable the Mania scores are (Graham & Christiansen, 2008). This suggests that while the Mania items correlate strongly with one another in early relationships, they do not measure one consistent factor in longer-lasting relationships. The present results suggest that the mania subscale of the LAS may be a useful self-report tool for investigating the differences in love between beginning and established relationships.

The negative relation between romantic obsession and relationship satisfaction also suggests a possible mechanism through which attachment might affect relationships. Individuals with insecure, dependant attachment styles tend to score highly on the Mania subscale of the LAS (Fricker & Moore, 2002). Furthermore, measures of dependant and anxious attachment styles loaded on the same factor as mania in a factor analysis of related measures (Hendrick & Hendrick, 1989). Finally, individuals with insecure attachments tend to be less satisfied with their relationships than those who are securely attached (Feeney, 1994). Given these, it may be that romantic obsession mediates the relation between attachment and relationship satisfaction. That is, anxiously attached individuals are prone to high levels of romantic obsession, and the resulting anxiety and worry resulting from romantic obsession is in turn responsible for poor relationship satisfaction.

The present results suggest that the Mania subscale of the LAS might be a suitable starting point for studying self-reports of romantic obsession. Acevedo and Aron (2009) likewise point out that some PLS items also seem to be tapping into romantic obsession. Given the relationship between the Mania subscale and anxious attachment styles, and differences in the experiences of romantic jealousy across attachment styles (Guerrero, 1998), it might be that those with high levels of romantic obsession are likely to be more negatively impacted by jealousy. Romantic obsession as measured by the Mania scale of the LAS entails one's emotional well-being being highly dependent on the status of one's relationship. If one has an anxious attachment style, one might be more likely to perceive threats to one's relationship, and to see potential rivals as more threatening. Given the wide-ranging negative consequences of jealousy on well-being (White, 1981) and its relation with partner violence (Bookwala, Frieze, Smith, & Ryan, 1992), romantic obsession might play an important role in describing how attachment influences a variety of important outcomes.

Practical friendship

The practical friendship component was comprised of the Pragma and Storge subscales of the LAS. This component was the least strongly related to relationship length and satisfaction; while the results were still statistically significant, the effects were small relative to those of the other components. The combination of Pragma and Storge is consistent with Hendrick and Hendrick's (1989) fifth factor. It may be that friendships tend to be determined in a pragmatic matter, while the selection of romantic partners is the result of more irrational, less pragmatic processes. As a result, the Pragma and Storge subscales may not be truly measuring love, rather friendship. Specifically, this style of friendship seems to be distinct from love in romantic relationships. Thus, while many romantic partners describe one another as close friends, that type of friendship seems to be different from what is being measured by the practical friendship component. Rather, practical friendship may be friendship removed from love. Given this, the Pragma and Storge subscales may be useful for studying friendship outside of the realm of romantic relationships, or in delineating different types of friendships (e.g., intimate vs. practical friendships, etc.).

Conclusion

A wide variety of research and theoretical work has suggested that love is comprised of several distinct components. For example, the different evolutionary function of passion has been used to distinguish it from other forms of love, such as companionate love (Buss, 1994). However, the present results suggest that the construct being measured by the PLS, arguably the most widely-used self-report measure of passion shares a great deal in common with the constructs measured by the TLS commitment subscale and Rubin's (1970) measure of liking. These results suggest that the majority of self-report measures of love tap into the same underlying general love factor. Alternative higher-order conceptualizations of love, such as Masuda's (2003) erotic and companionate love, Berscheid and Hatfield's (1969) passionate and companionate love, and Sternberg's (1986) passion, intimacy, and commitment were not supported by the meta-analytic data.

In order for the study of romantic love to progress, it is necessary for researchers to use existing measures differently, and to investigate new methods of measuring romantic love. Researchers wishing to continue using existing measures of love to study romantic relationships may consider using multiple existing measures, and aggregating those scores into a single romantic love score. Sternberg's (1997) TLS is a good example of this. Rather than using the scales as separate measures of passion, intimacy, and commitment, combining the subscales into a single measure of what Sternberg called *consummate love* (and I refer to here as general love, or *l*) may be preferable. In fact, any combinations of measures or subscales will likely result in a similar measure of romantic love.

In respect to the different conceptualizations of love, the present data provide the strongest support for Acevedo and Aron's (2009) assertion that romantic obsession is distinct from romantic love. The results here suggest that the mania subscale of the LAS may be the single best self-report measure of romantic obsession, and that obsession exists as largely distinct from the experience of love.

Given the high degree of overlap between the existing self-report measures of love, the development of new measures using *non-self report* methodology is essential for researchers seeking to separate the experience of love into distinct components. The experience sampling method has been used to measure momentary variations in relationship variables (Graham, 2008a). It is possible that examining love in this way may help to better distinguish the proposed components of love. Neuroimaging may be another promising avenue of measurement. If various components of love are associated with activation in different locations within the brain, they can be rendered distinct from one another. To the extent that the behavioral manifestations of different components of love can be identified, observational methods of measuring romantic love might also prove fruitful. In areas such as social support (e.g., Cutrona & Suhr, 1992), conflict (e.g., Heyman, 2001), and affect (e.g., Gottman, McCoy, Coan, & Collier, 1996), observational methods have proven to be the gold standard of measurement in couples research. Such techniques could apply equally to the study of romantic love. Other possible avenues may focus on examining love though measures of implicit associations or through an analysis of partial correlations of existing love measures. Finally, it may be that it is possible for a self-report measure to distinguish between different components of love. However, in order to do so, it is likely that such a measure would have to be

developed for that specific purpose. Special attention would need to be given to the wording of each item in order to divorce the subsequent scores from global subjective relationship satisfaction to a greater extent than in existing measures.

Romantic relationships are what many consider an important part of what it means to be human. In many Western cultures, love is seen as an essential component (if not *the most* essential component) of a successful romantic relationship (Simpson, Campbell, & Berscheid, 1986). Therefore, a well-developed understanding of love is highly important to understanding how and why relationships last, and fail. In order to study love to the level dictated by the task, it is necessary to understand the ways in which the constructs being measured differ from the components of our theories of love. The present study suggests that much of what has been studied about love reflects on a singe unidimensional general love factor, but also suggests ways in which alternative measures of love can be developed to further test our theories.

Conflict of interest statement

The author(s) declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding

Notes

1. Coders also made attempts to code the percentage of the sample recruited from the US (vs. other countries), the percentage of the sample recruited from Western (vs. non-Western) contexts, and in the case of the LAS, whether respondents were describing a specific love relationship or overall love attitudes. In each of these cases, inconsistencies in how data are reported in the literature made it impossible for coders to accurately determine this information in sufficient numbers to warrant inclusion.
2. When the Loving measure was kept, three other measures (PLS, and the Passion and Intimacy subscales of the TLS) needed to be dropped for the initial matrix to become positive definite. The resulting factor structure was sufficiently similar to that obtained without Loving to warrant the exclusion of Loving.
3. The initial six eigenvalues were, in descending order, 4.69, 1.34, 1.17, .87, .77, .70.
4. Because Ludus, Pragma, and, to a lesser extent, Storge are not commonly considered part of lay conceptualizations of love (Fehr, 1994), it is possible that their presence in the factor analysis unduly influenced the results. To test this, I conducted a series of additional factor analysis. Storge, Mania, and all other measures continued to load on separate factors with Ludus and Pragma removed. Mania and all other measures likewise loaded on separate factors with Ludus, Pragma, and Storge removed. These results all supported the three factor structure I described in the main text.

References

Acevedo, B., & Aron, A. (2009). Does a long-term relationship kill romantic love? *Review of General Psychology, 13*, 59-65.

Acevedo, B., Aron, A., Fisher, H., Tsapelas, I., Katz, S., & Brown, L. (2008). *The neural correlates of long-term romantic love*. Paper presented at the annual meeting of the International Association of Relationship Research, Providence, RI.

*Acker, M., & Davis, M. H. (1992). Intimacy, passion, and commitment in adult romantic relationships: A test of the triangular theory of love. *Journal of Social and Personal Relationships, 9*, 21-50.

*Adler, N.L., & Hendrick, S. S. (1991). Relationships between contraceptive behavior and love attitudes, sex attitudes, and self-esteem. *Journal of Counseling and Development, 70*, 302-308.

*Aloni, M., & Bernieri, F. J. (2004). Is love blind? The effects of experience and infatuation on the perception of love. *Journal of Nonverbal Behavior, 28*, 287-295.

*Amelang, M., & Pielke, M. (1992). Effects of erotica upon men's and women's loving and liking responses for their partners. *Psychological Reports, 71*, 1235-1245.

Aron, A., Aron, E. N., & Smollan, D. (1992). Inclusion of other in the self scale and the structure of interpersonal closeness. *Journal of Personality and Social Psychology, 63*, 596-612.

Aron, A., Fisher, H., Mashek, D. J., Strong, G., Li, H. & Brown, L. L. (2005). Reward, motivation, and emotion systems associated with early-stage intense romantic love. *Journal of Neurophysiology, 94*, 327-337.

*Aron, A., & Henkelmeyer, L. (1995). Marital satisfaction and passionate love. *Journal of Social and Personal Relationships, 12*, 139-146.

*Aron, A., Norman, C. C., Aron, E. N., & McKenna, C. (2000). Couples' shared participation in novel and arousing activities and experienced relationship quality. *Journal of Personality and Social Psychology, 78*, 273-284.

*Aron, A., & Westbay, L. (1996). Dimensions of the prototype of love. *Journal of Personality and Social Psychology, 70*, 535-551.

*Bailey, W. C., Hendrick, C., & Hendrick, S. S. (1987). Relation of sex and gender role to love, sexual attitudes, and self-esteem. *Sex Roles, 16*, 637-648.

Bartels, A., & Zeki, S. (2000). The neural basis of romantic love. *NeuroReport, 11*, 3829-3834.

Bartels, A., & Zeki, S. (2004). The neural correlates of maternal and romantic love. *NeuroImage, 21*, 1155-1166.

*Bell, N. J., O'Neal, K. K., Feng, D., & Schoenrock, C. J. (1999). Gender and sexual risk. *Sex Roles, 41*, 313-332.

*Berry, J. W., & Worthington, E. L. (2001). Forgivingness, relationship quality, stress while imagining relationship events, and physical and mental health. *Journal of Counseling Psychology, 48*, 447-455.

Berscheid, E., & Hatfield [Walster], E. (1978). *Interpersonal attraction* (2nd ed.). Reading, MA: Addison-Wesley.

*Bookwala, J., Frieze, I. H., & Grote, N. K. (1994). Love, aggression and satisfaction in dating relationships. *Journal of Social and Personal Relationships, 11*, 625-632.

Bookwala, J., Frieze, I. H., Smith, C., & Ryan, K. (1992). Predictors of dating violence: A multivariate analysis. *Violence and Victims, 7*, 297-311.

Bradbury, T. N., Fincham, F. D., & Beach, S. R. H. (2000). Research on the nature and determinants of marital satisfaction: A decade in review. *Journal of Marriage and the Family, 62*, 964-980.

*Bryan, L., Fitzpatrick, J., Crawford, D., & Fischer, J. (2001). The role of network support and interference in women's perception of romantic, friend, and parental relationships. *Sex Roles, 45*, 481-499.

Buss, D. M. (1994). *The evolution of desire: Strategies of human mating*. New York: Basic Books.

Cheung, M. W. L., & Chan, W. (2005). Meta-analytic structural equation modeling: A two-stage approach. *Psychological Methods, 10*, 40-64.

*Cho, W., & Cross, S. E. (1995). Taiwanese love styles and their association with self-esteem and relationship quality. *Genetic, Social, and General Psychology Monographs, 121*, 283-309.

*Chojnacki, J. T., & Walsh, W. B. (1990). Reliability and concurrent validity of the Sternberg triangular love scale. *Psychological Reports, 67*, 219-224.

*Cloven, D. H., & Roloff, M. E. (1994). A developmental model of decisions to withhold relational irritations in romantic relationships. *Personal Relationships, 1*, 143-164.

*Critelli, J. W. (1977). Romantic attraction and happiness. *Psychological Reports, 41*, 721-722.

Cutrona, C., & Suhr, J. (1992). Controlability of stressful events and satisfaction with partner support behaviors. *Communication Research, 19*, 154-174.

Davies, K. E., Kirkpatrick, L. A., Levy, M. B., & O'Hearn, R. E. (1994). Stalking the elusive love style: Attachment styles, love styles, and relationship development. In R. Erber, & R. Gilmour (Eds.), *Theoretical frameworks for personal relationships* (pp. 179-210). Hillsdale, NJ: Lawrence Erlbaum Associates.

*DeFinis, A. L. (2007). An exploratory investigation of deceptive practices within romantic relationships: How is deception related to respect and relationship satisfaction? Unpublished Masters thesis, Texas Tech University, Lubbock, Texas.

Dietch, J. (1978). Love, sex roles, and psychological health. *Journal of Personality Assessment, 42*, 626–634.

*Ellis, B. J., & Malamuth, N. M. (2000). Love and anger in romantic relationships: A discrete systems model. *Journal of Personality, 68*, 525-556.

*Engel, G., Olson, K. R., & Patrick, C. (2002). The personality of love: Fundamental motives and traits related to components of love. *Personality and Individual Differences, 32*, 839-853.

Feeney, J. A. (1994). Attachment style, communication patterns, and satisfaction across the life cycle of marriage. *Personal Relationships, 1*, 333–348.

Fehr, B. (1994). Prototype-based assessment of laypeople's views of love. *Personal Relationships, 1*, 309-331.

Fehr, B. (2001). The status of theory and research on love and commitment. In G. J. O. Fletcher, & M. S. Clark (Eds.), *Blackwell handbook of social psychology: Interpersonal processes* (pp. 331–356). Oxford, UK: Blackwell.

*Fletcher, G. J. O., Simpson, J. A., & Thomas, G. (2000). The measurement of perceived relationship quality components: A confirmatory factor analytic approach. *Personality and Social Psychology Bulletin, 26*, 340-354.

*Frazier, P. A., & Esterly, E. (1990). Correlates of relationship beliefs: Gender, relationship experience and relationship satisfaction. *Journal of Social and Personal Relationships, 7*, 331-352.

*Frei, J. R., & Shaver, P. R. (2002). Respect in close relationships: Prototype definition, self-report assessment, and initial correlates. *Personal Relationships, 9*, 121-139.

Fricker, J., & Moore, S. (2002). Relationship satisfaction: The role of love styles and attachment styles. *Current Research in Social Psychology, 7*, 182-204.

*Frisbie, S. H., Fitzpatrick, J., Feng, D., & Crawford, D. (2000). Women's personality traits, interpersonal competence and affection for dating partners: A test of the contextual model. *Social Behavior and Personality, 28*, 585-594.

Furlow, C. F., & Beretvas, S. N. (2005). Meta-analytic methods of pooling correlation matrices for structural equation modeling under different patterns of missing data. *Psychological Methods, 10*, 227-254.

Geary, D. C. (2005). *The origin of mind: Evolution of brain cognition and general intelligence*. Washington, D.C.: American Psychological Association.

Gottman, J. M., McCoy, K, Coan, J., & Collier, H. (1996). The Specific Affect Coding System (SPAFF) for observing emotional communication in marital and family interaction. In J. M. Gottman (Ed.), *What predicts divorce? The measures*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

*Graham, J. M. (2008a). Self-expansion and flow in couples' momentary experiences: An experience sampling study. *Journal of Personality and Social Psychology, 95*, 679-694.

Graham, J. M. (2008b). The general linear model as structural equation modeling. *Journal of Educational and Behavioral Statistics, 33*, 485-506.

*Graham, J. M. (2008c). *The vulnerability-stress-adaptation model in same- and different-sexed couples*. Paper presented at the annual meeting of the International Association for Relationship Research, Providence, RI.

Graham, J. M., & Christiansen, K. (2008). The reliability of romantic love: A reliability generalization meta-analysis. *Personal Relationships, 16*, 46-66.

*Grote, N. K., & Frieze, I. H. (1998). 'Remembrance of things past': Perceptions of marital love from its beginnings to the present. *Journal of Social and Personal Relationships, 15*, 91-109.

*Grote, N. K., Frieze, I. H., & Stone, C. A. (1996). Children, traditionalism in the division of family work, and marital satisfaction: ''What's love got to do with it?''. *Personal Relationships, 3*, 211-228.

Guerrero, L. K., (1998). Attachment-style differences in the experience and expression of romantic jealousy. *Personal Relationships, 5*, 273-291.

*Hahn, J., Blass, T. (1997). Dating partner preferences: A function of similarity of love styles. *Journal of Social Behavior and Personality, 12*, 595-610.

*Hall, A. G., Hendrick, S. S., & Hendrick, C. (1991). Personal construct systems and love styles. *International Journal of Personal Construct Psychology, 4*, 137-155.

Hatfield, E., Pillemar, T., O'Brien, M. U., & Le, Y. L. (2008). The endurance of love: passionate and companionate love in newlywed and long-term marriages. *Interpersona, 2*, 35-64.

*Hatfield, E., & Sprecher, S. (1986). Measuring passionate love in intimate relations. *Journal of Adolescence, 9*, 383-410.

Hatfield, E., & Walster, G. W. (1978). *A new look at love*. Lanham, MD: University Press of America.

Hendrick, C., & Hendrick S. S. (1986). A theory and method of love. *Journal of Personality and Social Psychology, 50*, 392-402.

*Hendrick, C., & Hendrick, S. S. (1989). Research on love: Does it measure up? *Journal of Personality and Social Psychology, 56*, 784-794.

*Hendrick, C., & Hendrick, S. S. (1990). A relationship-specific version of the Love Attitudes Scale. *Journal of Social and Personal Relationships, 5*, 239-254.

Hendrick, C., & Hendrick, S. S. (2003). Romantic love: Measuring Cupid's arrow. In S. J. Lopez & C. R. Snyder (Eds.), *Positive psychological assessment: A handbook of models and measures* (pp. 235-250). Washington, D.C.: American Psychological Association.

*Hendrick, C., Hendrick, S. S., & Dicke, A. (1998). The love attitudes scale: Short form. *Journal of Social and Personal Relationships, 15*, 147-159.

Hendrick, S. S. (1988). A generic measure of relationship satisfaction. *Journal of Marriage and the Family, 50*, 93–98.

*Hendrick, S. S., Hendrick, C., & Adler, N. L. (1988). Romantic relationships: Love, satisfaction, and staying together. *Journal of Personality and Social Psychology, 54*, 980-988.

Heyman, R. E. (2001). Observation of couple conflicts: Clinical assessment applications, stubborn truths, and shaky foundations. *Psychological Assessment, 13*, 5-35.

*Kaplan, D. L., & Keys, C. B. (1997). Sex and relationship variables as predictors of sexual attraction in cross-sex platonic friendships between young heterosexual adults. *Journal of Social and Personal Relationships, 14*, 191-206.

Kelley, H. H. (1983). Love and commitment. In H. H. Kelley, E. Berscheid, A. Christensen, J. H. Harvey, T. L. Huston, et al. (Eds.), *Close relationships* (pp. 265-314). New York: Freeman.

Kim, J. & Hatfield, E. (2004). Love types and subjective well-being. *Social Behavior and Personality: An International Journal, 32*, 173-182.

*Kim, H. J., & Stiff, J. B. (1991). Social networks and the development of close relationships. *Human Communication Research, 18*, 70-91.

*Knee, C. R. (1998). Implicit theories of relationships: Assessment and prediction of romantic relationship initiation, coping, and longevity. *Journal of Personality and Social Psychology, 74*, 360-370.

*Knobloch, L. K., & Donovan-Kicken, E. (2006). Perceived involvement of network members in courtships: A test of the relational turbulence model. *Personal Relationships, 13*, 281-302.

*Knobloch, L. K., Solomon, D. H., & Theiss, J. A. (2006). The role of intimacy in the production and perception of relationship talk within courtship. *Communication Research, 33*, 211-241.

*Kurdek, L. A. (2003). Differences between gay and lesbian cohabiting couples. *Journal of Social and Personal Relationships, 20*, 411-436.

*Lacey, R. S., Reifman, A., Scott, J. P., Harris, S. M., & Fitzpatrick, J. (2004). Sexual-moral attitudes, love styles, and mate selection. *Journal of Sex Research, 41*, 121-128.

*Langhinrichsen-Rohling, J., & Palarea, R. E. (2000). Breaking up is hard to do: Unwanted pursuit behaviors following the dissolution of a romantic relationship. *Violence and Victims, 15*, 73-90.

*Le, T. N. (2005). Narcissism and immature love as mediators of vertical individualism and ludic love style. *Journal of Social and Personal Relationships, 22*, 543-560.

Lee, J. A. (1973). *The colors of love: An exploration of ways of loving*. Don Mills, Ontario: New Press.

Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis*. Thousand Oaks, CA: Sage.

*Lin, L., & Huddleston-Casas, C. A. (2005). Agape love in couple relationships. *Marriage and Family Review, 37*, 29-48.

*Marston, P. J., Hecht, M. L., Manke, M. L., Mcdaniel, S., & Reeder, H. (1998). The subjective experience of intimacy, passion, and commitment in heterosexual loving relationships. *Personal Relationships, 5*, 15-30.

Masuda, M. (2003). Meta-analyses of love scales: Do various love scales measure the same psychological constructs? *Japanese Psychological Research, 45*, 25-37.

*Mathes, E. W., & Severa, N. (1981). Jealousy, romantic love, and liking: Theoretical considerations and preliminary scale development. *Psychological Reports, 49*, 23-31.

*Meeks, B. S., Hendrick, S. S., & Hendrick, C. (1998). Communication, love and relationship satisfaction. *Journal of Social and Personal Relationships, 15*, 755-773.

*Mikulincer, M., & Erv, I. (1991). Attachment style and the structure of romantic love. *British Journal of Social Psychology, 30*, 273-291.

*Miller, R. S. (1997). Inattentive and contented: Relationship commitment and attention to alternatives. *Journal of Personality and Social Psychology, 73*, 758-766.

*Montgomery, M. J., & Sorell, G. T. (1997). Differences in love attitudes across family life stages. *Family Relations, 46*, 55-61.

*Morrow, G. D., Clark, E. M., & Brock, K. F. (1995). Individual and partner love styles – Implications for the quality of romantic involvements. *Journal of Social and Personal Relationships, 12*, 363-387.

*Murstein, B. I., Merighi, J. R., & Vyse, S. A. (1991). Love styles in the United States and France – A cross-cultural comparison. *Journal of Social and Clinical Psychology, 10*, 37-46.

*Neto, F. (1993). Love styles and self-representations. *Personality and Individual Differences, 14*, 795-803.

*Neto, F. (1994). Love styles among Portuguese students. *Journal of Psychology, 128*, 613-616.

*Neto, F. (2005). The satisfaction with love life scale. *Measurement and Evaluation in Counseling and Development, 38*, 2-13.

*Niehuis, S. (2006). Organization of partner knowledge, its effects on passion, and the mediating effect of idealization. *North American Journal of Psychology, 8*, 33-45.

Norton, R. (1983). Measuring marital quality: A critical look at the dependent variable. *Journal of Marriage and the Family, 45*, 141 – 151.

*Panayiotou, G. (2005). Love, commitment, and response to conflict among Cypriot dating couples: Two models, one relationship. *International Journal of Psychology, 40*, 108-117.

*Perrone, K. M., & Worthington, E. L. (2001). Factors influencing ratings of marital quality by individuals within dual-career marriages: A conceptual model. *Journal of Counseling Psychology, 48*, 3-9.

Peterson, R. A. (2001). On the use of college students in social science research: Insights from a second-order meta-analysis. *Journal of Consumer Research, 28*, 450-461.

*Ratelle, C. F. (2002). Une nouvelle conceptualisation de la passion amoureuse. [A new conceptualization of romantic passion]. Unpublished doctoral dissertation, Université du Québec à Montréal, Montréal, Québec, Canada.

*Richardson, D. R., Medvin, N., & Hammock, G. (1988). Love styles, relationship experience, and sensation seeking: A test of validity. *Personality and Individual Differences, 9*, 645-651.

*Rubin, Z. (1970). Measurement of romantic love. *Journal of Personality and Social Psychology, 16*, 265-273.

*Rusbult, C. E., Martz, J. M., & Agnew, C. R. (1998). The Investment Model Scale: Measuring commitment level, satisfaction level, quality of alternatives, and investment size. *Personal Relationships, 5*, 357-391.

*Ryckman, R. M., Thornton, B., Gold, J. A., & Burckle, M. A. (2002). Romantic relationships of hypercompetitive individuals. *Journal of Social and Clinical Psychology, 21*, 517-530.

Simpson, J. A., Campbell, B., & Berscheid, E. (1986). The association between romantic love and marriage: Kephart (1967) twice revisited. *Personality and Social Psychology Bulletin, 12*, 363-372.

*Smith, R. B., & Brown, R. A. (1997). The impact of social support on gay male couples. *Journal of Homosexuality, 33*, 39-61.

*Solomon, D. H. (1997). A developmental model of intimacy and date request explicitness. *Communication Monographs, 64*, 99-118.

Spanier, G. B. (1976). Measuring dyadic adjustment: New scales for assessing the quality of marriage and similar dyads. *Journal of Marriage and the Family, 38*, 15 – 28.

Spearman, C. (1904). "General intelligence" objectively determined and measured. *American Journal of Psychology, 15*, 201–293.

Spearman, C. (1923). The nature of intelligence and the principles of cognition. London: Macmillan.

Sprecher, S., Aron, A., Hatfield, E., Cortese, A., Potapova, E., & Levitskaya, A. (1994). Love: American style, Russian style, and Japanese style. *Personal Relationships, 1*, 349-369.

*Sprecher, S., & Regan, P. C. (1998). Passionate and companionate love in courting and young married couples. *Sociological Inquiry, 68*, 163-185.

*Starzyk, K. B., Holden, R. R., Fabrigar, L. R., & MacDonald, T. K. (2006). The personal acquaintance measure: A tool for appraising one's acquaintance with any person. *Journal of Personality and Social Psychology, 90*, 833-847.

Steck, L., Levitan, D., McLane, D., & Kelley, H. H. (1982). Care, need, and conceptions of love. *Journal of Personality and Social Psychology, 43*, 481-491.

Sternberg, R. J. (1986). A triangular theory of love. *Psychological Review, 93*, 119-135.

*Sternberg, R. J. (1997). Construct validation of a triangular love scale. *European Journal of Social Psychology, 27*, 313-335.

*Sternberg, R. J., Hojjat, M., & Barnes, M. L. (2001). Empirical tests of aspects of a theory of love as a story. *European Journal of Personality, 15*, 199-218.

Thompson, B., & Borrello, G. M. (1987). Concurrent validity of a love relationships scale. *Educational and Psychological Measurement, 47*, 985-995.

*Thornquist, M. H., Zuckerman, M., & Exline, R. V. (1991). Loving, liking, looking and sensation seeking in unmarried college couples. *Personality and Individual Differences, 12*, 1283-1292.

Tucker, P., & Aron, A. (1983). Passionate love and marital satisfaction at key transition points in the family life cycle. *Journal of Social and Clinical Psychology, 12*, 135-147.

*Wakimoto, S., & Fujihara, T. (2004). The correlation between intimacy and objective similarity in interpersonal relationships. *Social Behavior and Personality, 32*, 95-102.

*Wan, W. W. N., Luk, C. L., & Lai, J. C. L. (2000). Personality correlates of loving styles among Chinese students in Hong Kong. *Personality and Individual Differences, 29*, 169-175.

White, G. L. (1981). Some correlates of romantic jealousy. *Journal of Personality, 49*, 129-147.

Wilson, D. B. (2005). SPSS for Windows Meta-Analysis Macros. Computer software available from http://mason.gmu.edu/∼dwilsonb/ma.html

*Wilson, S. R., & Kunkel, A. W. (2000). Identity implications of influence goals - Similarities in perceived face threats and facework across sex and close relationships. *Journal of Language and Social Psychology, 19*, 195-221.

Xu, X., Aron, A., Brown, L., Cao, G., Feng, T., & Weng, X. (in press). Reward and motivation systems: A brain mapping study of early-stage intense romantic love in Chinese participants. *Human Brain Mapping*.

*Yela, C. (2000). Predictors of and factors related to loving and sexual satisfaction for men and women. *European Review of Applied Psychology/Revue Européenne de Psychologie Appliquée, 50*, 235-243.

*Zuroff, D. C., & de Lorimier, S. (1989). Ideal and actual romantic partners of women varying in dependency and self-criticism. *Journal of Personality, 57*, 825-846.