Interpersona | An International Journal on Personal Relationships
interpersona.psychopen.eu | 1981-6472

Articles

Measuring Romantic Competence in Young Adults: The Inventory of Romantic Relationship Competence

Anthony J. Faber*[a], Eu Gene Chin[a], Victor R. Wilburn[a], Shahrokh M. Shafaie[a]

[a] Southeast Missouri State University, Cape Girardeau, MO, USA.

Abstract

This article presents psychometric data for a 35-item self-report instrument measuring romantic relationship competence in two separate samples of young adult college students. In study 1 (N = 219), results from Parallel Analysis and Exploratory Factor Analysis (EFA) suggested the extraction of seven domains of romantic relationship competence: relationship locus of control, perspective taking, intimacy avoidance, emotion regulation, romantic appeal, conflict resolution skills, and temperament. In study 2 (N = 907), a Confirmatory Factor Analysis (CFA) provided support for the aforementioned factor structure albeit with minor revisions (i.e., correlated errors between three pairs of items). MIMIC modeling results provided support for partial measurement invariance across gender. A CFA-based method of estimating scale reliability demonstrated acceptable to good reliability indices. Bivariate correlations with other social competence and self-esteem measures provided support for convergent and divergent validity. An excel-based applet is available to readers who are interested in using the 35-item IRRC with individual respondents (e.g., practitioners). Researchers interested in using the measure within the context of structural equation modeling should model relevant non-invariant parameters before proceeding with the evaluation of structural parameters. This instrument demonstrates promise as an instrument for measuring domains of romantic relationship competence within the emerging adult population.

Keywords: relationship competence, young adults, romantic relationships, self-report assessment

Interpersona, 2019, Vol. 13(1), 72–95, https://doi.org/10.5964/ijpr.v13i1.341

Received: 2018-12-21. Accepted: 2019-05-09. Published (VoR): 2019-07-19.

*Corresponding author at: One University Plaza, Child and Family Studies Dept. MS5750, Cape Girardeau, MO, USA 63701. E-mail: afaber@semo.edu

This is an open access article distributed under the terms of the Creative Commons Attribution 4.0 International License, CC BY 4.0 (https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Emerging adulthood is a period in which the dating rituals of many young adults begin to shift from that of recreational dating to a search for a long-term committed relationship (Montgomery, 2005). For many, this period is associated with high rates of romantic relationship involvement, sexual activity, cohabitation and for some marriage while other young adults have yet to experience a romantic relationship. (Arnett, 2000; Rauer, Pettit, Lansford, Bates, & Dodge, 2013). Identifying the pre-requisite skills and traits in young adults that contribute positively to the development of healthy long-term romantic relationships has been the work of a few researchers (Bouchey, 2007; Davila et al., 2017). However, a comprehensive conceptual framework of these competencies and the best way to assess them are still in their infancy.

Social competence is a multifaceted construct that encompasses skills and attainments that tend to lead to positive social outcomes in people (Rose-Krasnor, 1997). Skills and attributes that are commonly associated with social competence include: conflict resolution skills, intimacy skills, prosocial behavior, self-control/behavior

regulation, emotion regulation, social confidence, social initiative, assertiveness, social efficacy, and empathy/sympathy (Barber & Erickson, 2001; Blair et al., 2015; McFarlane, Bellissimo, & Norman, 1995; Newcomb & Bagwell, 1995; Wentzel & Caldwell, 1997; Young & Bradley, 1998). According to Blair et al. (2015), social competence is part of a developmental sequence that starts in early childhood with basic social skills of sharing and showing empathy. These skills build in frequency and sophistication as children engage in interaction with others, both in groups and dyads.

It has been suggested by Buhrmester, Furman, Wittenberg, & Reis (1988) that social competence entails a set of broad interpersonal skills across a variety of domains and relationships (peers, close friends, romantic partners, co-workers). Several researchers have begun examining social competence specifically related to romantic relationships, referred to as romantic competence (Bouchey, 2007; Davila, Stroud, Miller, & Steinberg, 2007; Davila et al., 2017). Romantic competence is defined as a set of skills that contribute to a wide range of aspects pertaining to healthy romantic relationship functioning (Davila et al., 2009).

Davila and colleagues (Davila et al., 2009; Shulman, Davila, Shachar-Shapira, 2011) have done a lot of ground work in developing two semi structured interviews for assessing romantic competence. The Romantic Competence Interview (RCI) developed by Davila et al., (2009) is for use with adolescents, while the Romantic Competence Interview for Emerging Adults (RCI-EA) is designed to measure romantic competence in young adults (Davila et al., 2017). According to Davila and colleagues (Davila et al., 2017), the IRC-EA is designed to solicit participants' thoughts about, preferences for, and approaches to romantic activities and relationships. It asks about actual relationship experiences and reactions to hypothetical scenarios, both normative and challenging. Participants' responses are coded into four skills domains which are: (a) insight; (b) learning; (c) mutuality; and (d) emotion regulation. There is also an overall global competence score given.

The RCI-EA, as a semi-structured interview, has a few limitations such as being time consuming to administer, interviewer / coder bias, and issues related to the social desirability effect by the subjects (Creswell, 2015). A self-report instrument of romantic competence could help address some of these limitations.

Bouchey (2007) has led the preliminary work in developing a self-report measurement of romantic competence. The Romantic Self-Concept Questionnaire (RSC-Q) is a 22 item self-report instrument tapping into an adolescent's self-concept and their perceived competence pertaining to different aspects of romantic relationships. The instrument consist of five domains: (a) positive partner characteristics, the extent one feels understood and validated as a person by their partner; (b) maintaining relationships, ability to stay in a relationship; (c) communication, ability to disclose important information; (d) romantic appeal, perceived ability to attract someone else; and (e) sexual competence, perceived competence and experience in the sexual arena.

There are a few critiques of the RSC-Q. First, to address the social desirability effect, the leading stem for each item begins with "some people" with respondents rating the extent to which that statement is true for them. It may be difficult to discern if participants are responding in the personal or abstract. By phrasing questions more directly one may help ensure the assessment of the participant's perceptions of their own sense of romantic competence. In addition, the RSC-Q only focuses on the domains in which adolescents feel they are desirable, accepted, valued, and efficacious. Davila et al. (2007) highlight the need for romantic competence assessment instruments that also focus on the domains of behavioral indicators of competence and relationship skills such as conflict negotiation and emotion regulation, which the RSC-Q does not. Lastly, the wording for some of the questions in the RSC-Q reference one's romantic partner, however, young adults have a wide range of dating

PsychOpen GOLD

experience, with some having no dating experience (Rauer et al., 2013). Wording of questions is critical to achieving honest and accurate responses.

The Study's Synopses and Perspective

To address the limitations of the previous instruments, the present study has two objectives: 1. Integrate the conceptual models of Bouchey (2007) and Davila et al. (2007) to include both self-concept and behavioral indicators of romantic competence. 2. Develop a self-report assessment instrument that measures young adult's perceptions of their romantic relationship competence regardless of their amount of relationship experience.

Our conceptual framework consists of seven domains and is guided by the social-cognitive models of interpersonal problem solving, attachment theory, and models of self-regulation. The first five domains are: Perspective Taking, Emotion Regulation, Conflict Resolution Skills, Intimacy Avoidance, and Temperament. These five domains were derived from the literature and are considered necessary pre-requisite skills for being in a romantic relationship regardless of having relationship experience or not. Also, we integrated the following two domains from Bouchey's (2007) conceptual framework: the domains of "Romantic Appeal" and "Relationship Maintenance" or what we refer to as "Relationship Locus of Control." These two domains were selected in relation to the other domains of her model because we believe that relationship experience is not a prerequisite to be able to access one's perceptions in these areas. Descriptions of these seven domains and justifications for the inclusion of each are provided below.

"Perspective taking" entails having the ability to reflect on previous positive or negative interactions, gain insight, and to consider other perspectives when making decisions. The ability to take perspective has been linked to relationship quality (Schröder-Abé & Schutz, 2011).

The domain of "emotion regulation" refers to the process by which individuals influence which emotions they have, when they have them, and how they experience and express these emotions (Gross, 1998). Through this regulation process, one is able to keep the intensity of the discussion low, express oneself more clearly, and make sound decisions. Emotion regulation is associated with healthier relationship functioning (Levenson, Hasse, Bloch, Holley, & Seider, 2013).

Rothbart and Bates (2006) define temperament as individually based differences in reactivity and self-regulation to emotionally provoking situations. Conflict resolution skills involve having the ability to address and discuss issues, calmly negotiate and arrive at mutually agreed upon solutions. Olson, Olson-Sigg, and Larson (2008) found that couples who reported being happy in their relationship also reported strengths in conflict resolution.

The "intimacy avoidance" domain is included in our instrument due to its association with Attachment Theory (Bowlby, 1969; Hazan & Shaver, 1987). Individuals who seek connection and intimacy from one's partner and who is securely attached report higher levels of relationship satisfaction (Kilmann, Finch, Parness, & Downer, 2013). Associated with intimacy seeking is having the willingness to forgive. Researchers have found that forgiving and being forgiven are related to higher marital quality (Aalgaard, Bolen, & Nugent, 2016).

The domain of "romantic appeal" pertains to one's perceived ability to attract a potential dating partner. Romantic involvement is considered both a developmental and normative cultural practice for nearly all Western ado-

PsychOpen GOLD

lescents and young adults. Bouchey (2007) argues that having romantic appeal is one of the fundamental aspects of romantic functioning and is an essential factor in assessing romantic competence.

Lastly, the "relationship locus of control" domain refers to a person's belief in their ability to succeed at romantic relationships. Locus of control is one's manifestation of how past experiences shape how individuals come to perceive themselves and their capacity to have some degree of control over their environment (Bandura, 1977). Prior romantic relationship experiences or relationship experiences of one's parents or close friends may influence one's willingness to enter into new romantic relationships or influence one's level of motivation to address relationship issues. A specific volume or level of these experiences may also be instrumental in influencing the extent to which a person is confident in the ability to experience a healthy romantic relationship.

In summary, this exploratory study aims to develop an empirically validated short assessment instrument measuring young adult's perceptions of their romantic relationship competence regardless of their amount of relationship experience. It incorporates both self-concept and behavioral indicators of romantic relationship competence.

Study 1

Study 1 involved generating a large pool of items based on a thorough review of the literature on social/romantic competence and romantic relationships. Because we were in the initial process of our scale development and construct validation, this large pool of items was subjected to an Exploratory Factor Analysis (EFA) to examine the number of factors and pattern of relationships between the common factors and indicators (Brown, 2015).

Method

Item Generation

The seven dimensions hypothesized to capture young adult's perceptions of their romantic relationship competence were: (a) perspective taking; (b) emotion regulation; (c) temperament; (d) conflict resolution skills; (e) intimacy avoidance; (f) romantic appeal; (g) and relationship locus of control. These seven dimensions were hypothesized to relate to different aspects of romantic competence regardless of their amount of previous relationship experience. The instructions and the skill-based questions were worded so as not to reference previous or current relationships since there are many young adults with little to no relationship experience (Rauer et al., 2013). The fact that some young adults have little to no romantic relationship experience may signify a deficit in relationship skills and/or a poor self-concept. Consequently, it would be important to include this portion of the population in research studies to improve the generalizability of results to a broader population of young adults in the United States.

We generated a larger number of items than we intended to include in the final scale (DeVellis, 2017). In addition, administration constraints such as potential fatigue were taken into consideration when determining the general upper limit number of items to test (DeVellis, 2017). In total, forty-six items were written to capture these seven originally hypothesized dimensions of romantic competence. A five-point Likert Scale was used with descriptors of *"almost never or never true, not very often true, sometimes true, often true, and almost always or always true."*

PsychOpen GOLD

Participants and Procedure

A pilot study was conducted to begin empirically validating the instrument. The study was approved by the Institutional Review Board. Research participants were 219 undergraduate students recruited from a variety of courses at a small public American Midwestern university. The ages of participants ranged from 18 – 25 with a mean of 20.29 (*SD* = 1.70). Eighty-three percent of the sample was female with 95% identifying themselves as heterosexual. A majority of the sample was Caucasian (82%) followed by African American (10%), Asian (2.7%), Hispanic (2.3%) and Other (3.0%).

The participant's marital status was overwhelmingly single (94%) with 4% being engaged, 2% married and 0.5% divorced. The number of romantic relationships the participants reported having been in ranged from 0 to 7 with the average being 1.34 (*SD* = 1.10). The total number of months a participant dated someone ranged from 0 to 84 months, with a mean of 20.66 (*SD* = 17.87).

Exploratory Factor Analysis (EFA)

RStudio (Version 1.1456; RStudio Team, 2018) was used to conduct the Exploratory Factor Analysis. The data was subjected to EFA using Maximum Likelihood as the statistical estimator because it is the most commonly used estimation method for EFA with continuous indicators (Brown, 2015). The psych package (Revelle, 2018) contained this estimator, in addition various measures of sampling adequacy and factor selection procedures. Because the aforementioned seven factors are conceptualized to be correlated with one another, an oblimin rotation method, a form of oblique rotation, was used in order to achieve simple structure (Thurstone, 1947) and allow factors to correlate. The rotation method is available in the GPArotation package (Bernaards & Jennrich, 2005). Prior to the EFA, we examined Kaiser-Meyer-Olkin (KMO; > .90) and overall measure of sampling adequacy (MSA; > .50) values to determine if the degree of intercorrelations among the variables was appropriate for factor analysis. We also examined Bartlett's test of sphericity as a statistical test for the presence of significant correlations among the variables ($p < .05$).

We then consulted two factor selection procedures to inform the number of factors to extract: (1) the Kaiser-Guttman rule and (2) parallel analysis. The Kaiser-Gutmann rule suggests that the number of non-trivial factors to extract is to be based on the number of eigenvalues that are greater than 1.0. Although widely used in applied research, some methodologists have criticized the Kaiser-Guttman rule because of its somewhat arbitrary threshold (Brown, 2015). Parallel analysis, on the other hand, is based on a scree-plot of the eigenvalues obtained from the sample data against eigenvalues estimated from a data set of random numbers. The observed sample and random data eigenvalues are plotted and superimposed on one another, and the appropriate number of factors to extract is indicated by the point where the two lines cross. The rationale for this analysis is that any given factor should account for more variance than is expected by chance (i.e., eigenvalues estimated from a dataset of random numbers).

Results

All of the Kaiser-Meyer-Olkin (KMO) values for the individual items (> .90) were well above .5 and an overall measure of sampling adequacy (MSA) was .83 indicating that there was a sufficient degree of intercorrelations among the variables. Similarly, the Bartlett's test of sphericity suggested that probability that the correlation matrix of the variables was an identity matrix (each $r_{ij} = 0$) was $p < .001$), $\chi 2(1035, N = 219) = 4444.72$. Both indi-

PsychOpen GOLD

ces suggested that the correlation matrix contained sufficient sizable correlations, making it appropriate for Exploratory Factor Analysis.

We consulted two factor selection procedures to determine the number of factors to extract: (1) the Kaiser-Guttman rule and (2) parallel analysis. In our sample, the Kaiser-Guttman rule suggested that 5 non-trivial factors should be extracted. Parallel analysis (see Figure 1), on the other hand, suggested seven factors to extract because after the seventh factor, the eigenvalues from the randomly generated data exceed the eigenvalues obtained from our dataset. The results of the parallel analysis appear to be consistent with theory outlined in the introduction, where we expect to see seven dimensions underlying this instrument.

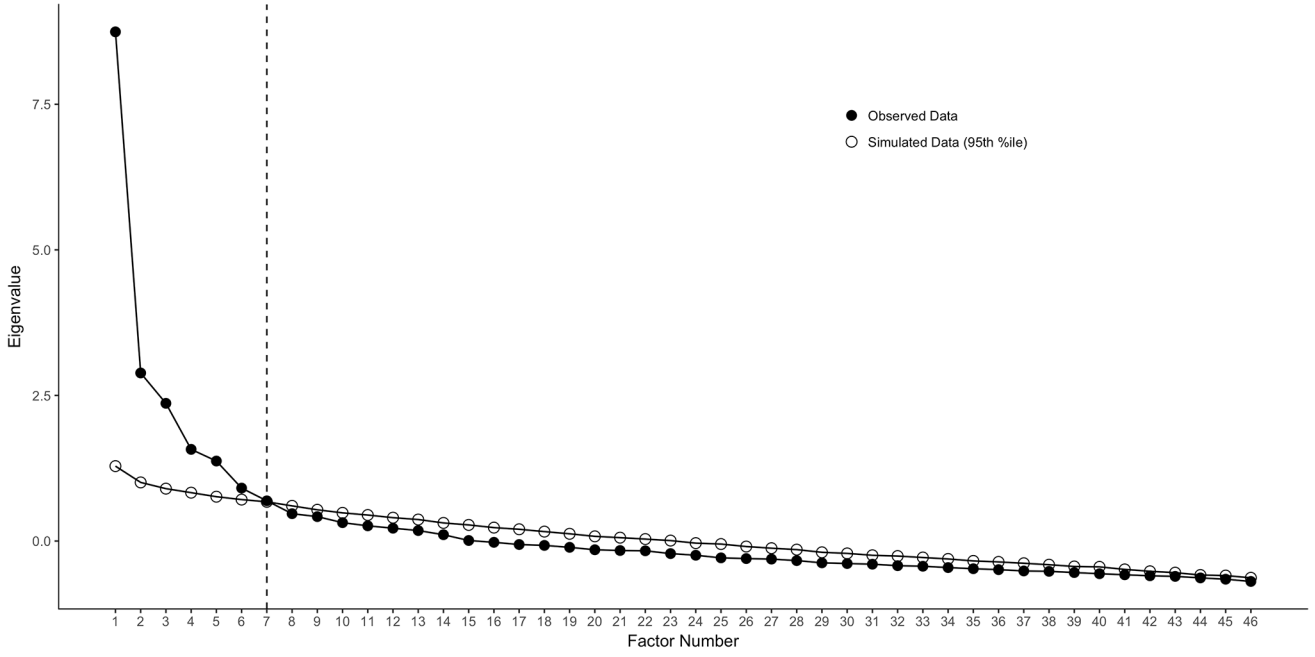


Figure 1. Parallel Analysis for the 46-items initially generated for the Inventory of Romantic Relationship Competence (IRRC).

Consequently, we extracted seven factors and examined the factor loading matrix to achieve simple structure, where (1) each factor is defined by a set of indicators that load highly on the factor (≥ .40), and (2) each indicator has a high loading on one factor and a trivial or close to zero loading on the remaining factors (Thurstone, 1947). There were 35 items that met criteria for simple structure items and loaded on the first seven factors (shown in Table 1) and 11 items that did not load on any of these factors (Appendix A). Given the negative factor loading of item 37 on the latent construct “conflict resolution skills,” item 37 was reverse coded prior to further analysis in Study 2.

PsychOpen GOLD

Table 1

Exploratory Factor Analytic Factor Loading Results for the Inventory of Romantic Relationship Competence (IRRC)

Item	Item Content	LOC	INT	PER	EMO	CON	TEM	ROM
Relationship locus of Control								
1	I believe I will be able to effectively deal with conflicts that arise in my relationships	**0.63**	-0.01	-0.04	-0.08	0.10	0.13	-0.01
2	I feel good about the prospects of making a romantic relationship last	**0.77**	-0.01	-0.06	0.02	-0.02	-0.08	-0.09
3	I feel I have the skills needed for a lasting stable romantic relationship.	**0.76**	0.06	0.04	-0.05	-0.06	0.00	-0.06
4	I am confident I can handle relationship challenges that arise.	**0.73**	0.12	0.05	-0.06	0.04	0.04	-0.13
5	I feel I am able to meet the emotional needs of my significant other.	**0.72**	-0.09	0.05	-0.02	-0.03	-0.01	0.24
6	I feel I can influence my relationship satisfaction.	**0.52**	-0.07	0.07	-0.03	-0.03	0.19	0.08
7	I feel that if I am not happy in a relationship, I can improve the relationship.	**0.43**	-0.10	0.05	0.07	0.05	0.12	0.01
8	I am confident that I will have a long term happy committed relationship.	**0.52**	-0.14	0.04	0.00	0.04	-0.10	-0.21
Perspective Taking								
39	I take into account other people's feelings when making decisions.	0.04	0.08	**0.63**	0.08	-0.10	0.12	-0.01
40	When I get into a fight with someone, I try to understand how it happened	-0.08	0.04	**0.79**	0.02	0.06	-0.03	-0.06
41	I try to understand why people are upset with me.	0.09	0.03	**0.68**	0.01	-0.03	0.03	0.09
42	I tend to put myself in another person's shoes to see their perspective.	-0.01	0.08	**0.66**	-0.13	0.01	0.04	0.02
43	I usually know why someone is upset with me.	0.08	-0.10	**0.53**	0.08	0.12	0.00	-0.09
44	I think about how my actions will affect others.	0.02	-0.02	**0.76**	-0.05	0.02	-0.05	0.00
Romantic Appeal								
12	I worry at times that I will end up alone the rest of my life.	-0.17	0.24	0.03	0.12	-0.04	0.01	**0.57**
13	I am lonely.	-0.13	0.28	-0.10	0.06	-0.06	0.09	**0.54**
45	I struggle to find someone to date.	-0.23	0.11	-0.04	-0.01	-0.08	0.21	**0.51**
Intimacy Avoidance								
19	I struggle to trust people that I am close with.	-0.03	**0.6**	-0.07	0.00	0.05	-0.16	0.11
20	I worry other people will hurt me emotionally.	0.02	**0.68**	0.14	0.07	0.02	-0.23	0.21
21	I have a hard time letting people get close to me.	-0.05	**0.82**	-0.04	-0.05	0.08	-0.04	0.07
22	I have a hard time sharing my feelings with others.	-0.01	**0.78**	0.04	0.02	-0.20	0.14	-0.06
29	When I am upset, I like to be alone.	-0.07	**0.43**	0.02	0.13	-0.05	0.12	-0.02
Emotion Regulation								
23	I lose my temper at times.	-0.12	0.19	-0.14	**0.53**	0.13	-0.06	0.03
24	I get into arguments with people.	-0.04	0.16	-0.17	**0.55**	0.17	-0.01	0.02
26	I often say things I don't mean when I am mad.	-0.01	-0.12	0.03	**0.90**	-0.08	0.02	-0.01
27	When I get mad, I do things that later I regret.	-0.06	-0.01	0.06	**0.72**	-0.06	-0.08	-0.03
Temperament								
16	People say I am easy going.	-0.08	-0.09	0.16	-0.12	0.08	**0.45**	0.06
17	I don't get too upset over things.	0.03	-0.06	-0.02	-0.08	0.01	**0.75**	0.06
18	I am pretty flexible.	0.12	0.00	0.08	-0.06	0.08	**0.58**	0.10
Conflict Resolution Skills								
35	I can receive negative feedback without getting upset.	-0.02	0.10	0.10	0.00	**0.45**	0.36	-0.24
36	I tend to address issues that are bothering me.	-0.06	0.03	0.06	-0.02	**0.77**	0.00	-0.06
37	I tend to avoid discussing issues that might upset someone.	0.13	0.06	0.10	0.13	**-0.41**	0.18	0.15
38	I feel I handle conflict well.	0.14	0.04	0.06	0.01	**0.49**	0.27	-0.14
30	I feel I can communicate my feelings well.	0.10	-0.28	0.11	-0.03	**0.54**	-0.01	0.33
31	I feel I can communicate my points / thoughts well.	0.22	-0.14	0.01	-0.03	**0.47**	0.10	0.13

Note. LOC = Locus of Control; INT = Intimacy Avoidance; PER = Perspective Taking; EMO = Emotion Regulation; CON = Conflict Resolution Skills; TEM = Temperament; ROM = Romantic Appeal. A factor loading is bolded if it is greater than 0.40. A total of 35 items met criteria for simple structure items that loaded on the first seven factors (shown here in this table) and 11 items that did not load on any of these factors (see Appendix A).

PsychOpen GOLD

Study 2

Study 2 involved recruiting a larger, separate sample of college students for examining the factorial validity, reliability, and convergent and discriminant validity of this measure. Through a confirmatory factor analytic (CFA) framework, study 2 examined the factor structure of this instrument, examined measurement invariance across gender, and estimated differences in means of latent variables after controlling for measurement error. Study 2 also utilized a CFA-based method of estimating scale reliability that addresses the limitations inherent in Cronbach's (1951) coefficient alpha. Lastly, study 2 examined the pattern of bivariate Pearson correlations between the subscales of the 35-item IRRC and four other social competence and self-esteem measures.

Methods

Participants and Procedure

To confirm the original factor structure and to establish reliability and validity for the 35-item IRRC, a larger study was conducted. This larger study focused on romantic and social competence in college students. The study was approved by the Institutional Review Board. A mass email was sent to all undergraduate students, a number consisting of approximately 10,000, who were enrolled at a small American Midwestern university during the spring semester of 2016. Students were asked to participate in the study by completing a survey posted on Survey Monkey (www.surveymonkey.com). The survey consisted of a battery of instruments assessing social competence, quality of parent children relationships, and self-esteem. A total of 907 students, between the ages of 17 and 25, completed the Inventory of Romantic Relationship Competence in its entirety.

The sample was comprised of 17 – 25-year-olds with a mean age of 20.64 (*SD* = 1.82). Eighty-one percent of the sample was female with 91% identifying themselves as heterosexual. A majority of the sample was Caucasian (84%) followed by African American (7.2%), Asian (4.1%), Hispanic (1.7%) and Other (3.4). The participants' relationship status was primarily either single (48%) or in a relationship (43%) with 4% being engaged, 4.5% married and 0.2% divorced. The number of romantic relationships the participants reported having been in within the last two years ranged from 0 to 8 with 56% reporting having been in just one.

Confirmatory Factor Analysis

We examined the CFA model suggested by the results of Study 1. Confirmatory Factor Analyses was conducted via Mplus (Version 7.3; Muthén & Muthén, 1998-2012). We used Maximum Likelihood estimation to model our data. The following fit indices were used to evaluate model fit results: Comparative Fit Index (CFI: Bentler, 1990), Tucker-Lewis Index (TLI; Tucker & Lewis, 1973), root mean square error of approximation (RMSEA; Steiger, 1990), and standardized root mean square residual (SRMR; Chen, 2007). Following published standards for interpretation of fit indices, high CFI (≥ .95) and TLI (≥ .95) values, as well as low RMSEA (≤ .06) and SRMR (≤ .08) values indicate good model fit. CFI and TLI values equal to or above .90 may be indicative of acceptable model fit. MacCallum, Browne, and Sugawara (1996) also suggested the following guidelines for RMSEA: .08 to .10 is mediocre fit, .06 to .08 adequate model fit, .06 or less would be good model fit.

If any of the aforementioned global fit indices had unacceptable values, Modification Indices (MI) and Expected Parameter Change (EPC) were examined to help identify focal areas of misfit in the CFA solution. To avoid overfitting the sample and minimize our chance of capitalizing on chance associations (i.e., Type I errors) in the sample data (Brown, 2015), focal areas of misfit were revised in a step-wise, sequential manner starting param-

PsychOpen GOLD

eter revisions with largest MI and EPC value. We considered parameter revisions when (1) MI ≥ 10.82 (critical value for χ2 at $p < .001$, $df = 1$), (2) EPC values indicated a large effect size (e.g., $r \geq .50$; Cohen, 1988), and suggested revisions have substantive rationale for doing so. Model revision stopped when all remaining suggested parameter revisions had no substantive rationale and/or did not meet the aforementioned criteria for sufficient MI and EPC change values.

MIMIC Modeling — After arriving at a finalized measurement model of the 35-item IRRC, we conducted a preliminary measurement invariance analysis to determine how gender might influence responding styles. A Multiple Groups Confirmatory Factor Analysis (MGCFA; Brown, 2015) is usually considered the most powerful method of examining measurement invariance. However, more than eighty one percent of our confirmatory sample were female. Brown (2015) noted that the interpretation of MGCFA parameters may be more complex with markedly unbalanced group sizes (Brown, 2015). Specifically, all aspects of the CFA modeling based on χ2 (e.g., change in CFI and χ2 values across more restrictive stepwise procedures of invariance analysis) are significantly influenced by unbalanced group sizes (Brown, 2015). Consequently, we employed an alternative strategy to obviate the aforementioned issues. Specifically, we employed the MIMIC modeling (Multiple Indicators, Multiple Causes; Jöreskog & Goldberger, 1975; Muthén, 1989) approach, a less powerful but more direct approach to conducting two aspects of measurement invariance analysis (Brown, 2015). MIMIC Modeling was conducted via Mplus (Version 7.3; Muthén & Muthén, 1998-2012). MIMIC modeling consists of two steps: (1) establish a viable measurement model using a full sample (e.g., collapsing across genders), and (2) regress the factors and indicators on one or more covariates (e.g., gender).

Scalar Invariance — A significant direct effect of the covariate on an indicator suggests differential item functioning, which basically means an item yields a different average response for members of different groups even though the latent true score is the same (Brown, 2015). This is analogous to the examination of scalar invariance (also known as strong factorial invariance or equality of indicator intercepts; Brown, 2015) within the context of MGCFA. Because measurement invariance is typically conducted in an exploratory fashion, all direct effects between the covariate and the indicators were fixed to zero (Brown, 2015). Examination of MI and EPC values were then examined to determine if salient direct effects may be present in the data in the form of differential item functioning. To minimize the chance of committing Type II errors in this exploratory analysis, indicators are considered to be non-invariant when (1) MI ≥ 3.84 (critical value for χ^2 at $p < .05$, $df = 1$) and (2) EPC values indicate a small effect size (e.g., $d \geq 0.20$; Cohen, 1988).

Population Heterogeneity — A significant direct effect on the factor indicates population heterogeneity; that is, the true mean score of the latent factors are truly different across the groups. This is analogous to the examination of equal latent means within the context of MGCFA. Relaxing the scalar-level constraint for items that demonstrate a lack of measurement invariance, we then examined parameter estimates for latent factors regressed on gender. Effect sizes were obtained from standardized coefficients and interpreted akin to Cohen's d (d = 0.20, 0.50, and 0.80 for small, medium, and large effects).

Reliability — To calculate internal consistency, we utilized a CFA-based method for estimating scale reliability (Raykov, 2001, 2004). In contrast with Cronbach's Alpha, Raykov's (2001, 2004) reliability index accounts for the unequal factor loadings of the items on their respective factors and correlated measurement errors between items. Reliability is calculated based on the formula below:

PsychOpen GOLD

$$\rho = (\Sigma\lambda_i)^2 / [(\Sigma\lambda_i)^2 + \Sigma\theta_{ii} + 2\Sigma\theta_{ij}]$$

where $(\Sigma\lambda_i)^2$ represents the squared sum of unstandardized factor loadings, $\Sigma\theta_{ii}$ is the sum of unstandardized measurement error variances, and $2\Sigma\theta_{ij}$ the sum of non-zero error covariances (Brown, 2015). We also used Brown's (2015) formula for calculating 95% Confidence Intervals. Parameter estimates were obtained from Mplus (Version 7.3; Muthén & Muthén, 1998-2012) and calculated using Microsoft Excel (Version 16.22). We used the following guidelines to interpret this reliability coefficient (DeVellis, 2017): below .60, unacceptable; between .60 and .65, undesirable; between .65 and .70, minimally acceptable; between .70 and .80, respectable; between .80 and .90, very good; above .90, consider shortening the scale.

Convergent/Discriminant Validity — To measure convergent and discriminant validity, bivariate Pearson correlations were calculated between the 7 factors of the IRRC and the following social competence and self-esteem measures: Personal-Interpersonal Competence Assessment (PICA; Seal et al., 2015); Self-Efficacy Scale (Sherer et al., 1982); Pearlin Mastery Scale (Pearlin and Schooler, 1978); and Rosenberg Self-Esteem Scale (Rosenberg, 1979). Analyses were conducted using SPSS (Version 24.0; IBM Corp, 2016). Results were interpreted according to Cohen's (1988) guidelines: ≥ 0.10 small effect size; ≥ 0.30 medium effect size; ≥ 0.50 large effect size.

Results

Confirmatory Factor Analysis

Table 2 shows the fit indices CFA model suggested by the results of Study 1. Global fit indices ranged from unacceptable (CFI = .88; TLI = .87) to acceptable (RMSEA = .064) and good model fit (SRMR = .053). Given the unacceptable levels of CFI and TLI indices, we examined focal areas of misfit in a step-wise, sequential manner.

Table 2

Fit Indices for the 35-Item Inventory of Romantic Relationship Competency (IRRC) Confirmatory Factor Analytic Models

Model	CFI	TLI	RMSEA	95% CI RMSEA	SRMR
7-Factor Correlated Traits Model	.88	.87	.064*	.061 - .066	.053**
7-Factor Correlated Traits Model with Correlated Errors[a]	.91*	.90*	.055**	.052 - .058	.053**
7-Factor Correlated Traits Model with Correlated Errors[a] - Gender as a Covariate	.94*	.93*	.048**	.045 - .051	.047**

Note. CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation; CI = Confidence Interval; SRMR = Standardized Root Mean Square. Fit indices that meet the cut-off criteria for acceptable fit are marked with an asterisk (*). Fit indices that meet the cut-off criteria for good fit are marked with two asterisks (**).

[a]Correlated errors were between Items 26 and 27, 40 and 41, 21 and 22.

The parameter that had the largest MI and EPC value was a correlated error between items 26 and 27 (MI = 284.29; completely standardized EPC = .71). Visual inspection suggested that this pair of items may share wording effects. Specifically, items 26 ("I often say things I don't mean when I am mad") and 27 ("When I get mad, I do things that later I regret") sounded fairly similar to each other. Given the aforementioned empirical and theoretical reasons, we re-ran the CFA model with correlated errors between items 26 and 27 to reflect wording effects. Global fit indices ranged from unacceptable (TLI = .89) to acceptable (CFI = .90; RMSEA = .059) and good model fit (SRMR = .053). Modification Indices (MI) and Expected Parameter Change

PsychOpen GOLD

(EPC) were examined again in order to help identify focal areas of misfit in the CFA solution using the aforementioned criteria for parameter revisions.

The next parameter that had the largest MI and EPC value was a correlated error between items 40 and 41 (MI = 175.72; completely standardized EPC = .56). Visual inspection suggested that this pair of items may share wording effects. Specifically, items 40 ("When I get into a fight with someone, I try to understand how it happened") and 41 ("I try to understand why people are upset with me") sounded fairly similar to each other. Given the aforementioned empirical and theoretical reasons, we re-ran the CFA model with correlated errors between items 40 and 41 to reflect wording effects. Global fit indices ranged from acceptable (TLI = .90; CFI = .91) to good model fit (RMSEA = .057; SRMR = .053). Modification Indices (MI) and Expected Parameter Change (EPC) were examined again in order to help identify focal areas of misfit in the CFA solution using the aforementioned criteria for parameter revisions.

The next parameter that had the largest MI and EPC value was a correlated error between items 21 and 22 (MI = 85.88; completely standardized EPC = .61). Visual inspection suggested that this pair of items may share wording effects. Specifically, items 21 ("I have a hard time letting people get close to me") and 22 ("I have a hard time sharing my feelings with others") sounded fairly similar to each other. Given the aforementioned empirical and theoretical reasons, we re-ran the CFA model with correlated errors between items 21 and 22 to reflect wording effects. Global fit indices ranged from acceptable (TLI = .90; CFI = .91) to good model fit (RMSEA = .055; SRMR = .053). None of the other suggested parameter revisions had substantive rationale and/or did not meet the aforementioned criteria for sufficient MI and EPC change values. Model revision ended at this point of the analysis. See Table 3 for factor loadings and Figure 2 for the finalized version of the 35-item IRRC.

Table 3

Confirmatory Factor Loadings for the Finalized Version of the 35-Item Inventory of Romantic Relationship Competency (IRRC)

Item	Latent Factor	LOC	PER	ROM	INT	EMO	TEM	CON
Relationship Locus of Control								
1	I believe I will be able to effectively deal with conflicts that arise in my relationships.	**0.74**						
2	I feel good about the prospects of making a romantic relationship last.	**0.86**						
3	I feel I have the skills needed for a lasting stable romantic relationship.	**0.86**						
4	I am confident I can handle relationship challenges that arise.	**0.87**						
5	I feel I am able to meet the emotional needs of my significant other.	**0.79**						
6	I feel I can influence my relationship satisfaction.	**0.77**						
7	I feel that if I am not happy in a relationship, I can improve the relationship.	**0.61**						
8	I am confident that I will have a long term happy committed relationship.	**0.81**						
Perspective Taking								
39	I take into account other people's feelings when making decisions.		**0.77**					
40	When I get into a fight with someone, I try to understand how it happened.		**0.72**					
41	I try to understand why people are upset with me.		**0.73**					
42	I tend to put myself in another person's shoes to see their perspective.		**0.84**					
43	I usually know why someone is upset with me.		**0.59**					
44	I think about how my actions will affect others.		**0.82**					
Romantic Appeal								
12	I worry at times that I will end up alone the rest of my life.			**0.83**				
13	I am lonely.			**0.79**				
45	I struggle to find someone to date.			**0.73**				

PsychOpen GOLD

Item	Latent Factor	LOC	PER	ROM	INT	EMO	TEM	CON
Intimacy Avoidance								
19	I struggle to trust people that I am close with.				**0.74**			
20	I worry other people will hurt me emotionally.				**0.79**			
21	I have a hard time letting people get close to me.				**0.80**			
22	I have a hard time sharing my feelings with others.				**0.60**			
29	When I am upset, I like to be alone.				0.29			
Emotion Regulation								
23	I lose my temper at times.					**0.87**		
24	I get into arguments with people.					**0.81**		
26	I often say things I don't mean when I am mad.					**0.56**		
27	When I get mad, I do things that later I regret.					**0.60**		
Temperament								
16	People say I am easy going.						**0.72**	
17	I don't get too upset over things.						**0.65**	
18	I am pretty flexible.						**0.78**	
Conflict Resolution Skills								
35	I can receive negative feedback without getting upset.							**0.72**
36	I tend to address issues that are bothering me.							**0.77**
37	I tend to avoid discussing issues that might upset someone (R).							**0.50**
38	I feel I handle conflict well.							**0.64**
30	I feel I can communicate my feelings well.							0.23
31	I feel I can communicate my points/thoughts well.							**0.58**

Note. LOC = Locus of Control; PER = Perspective Taking; ROM = Romantic Appeal; INT = Intimacy Avoidance; EMO = Emotion Regulation; TEM = Temperament; CON = Conflict Resolution Skills. A factor loading is bolded if it is greater than .40. Factor loadings are standardized factor loadings based on the variances of the latent variables and item indicators. (R) = reverse score.

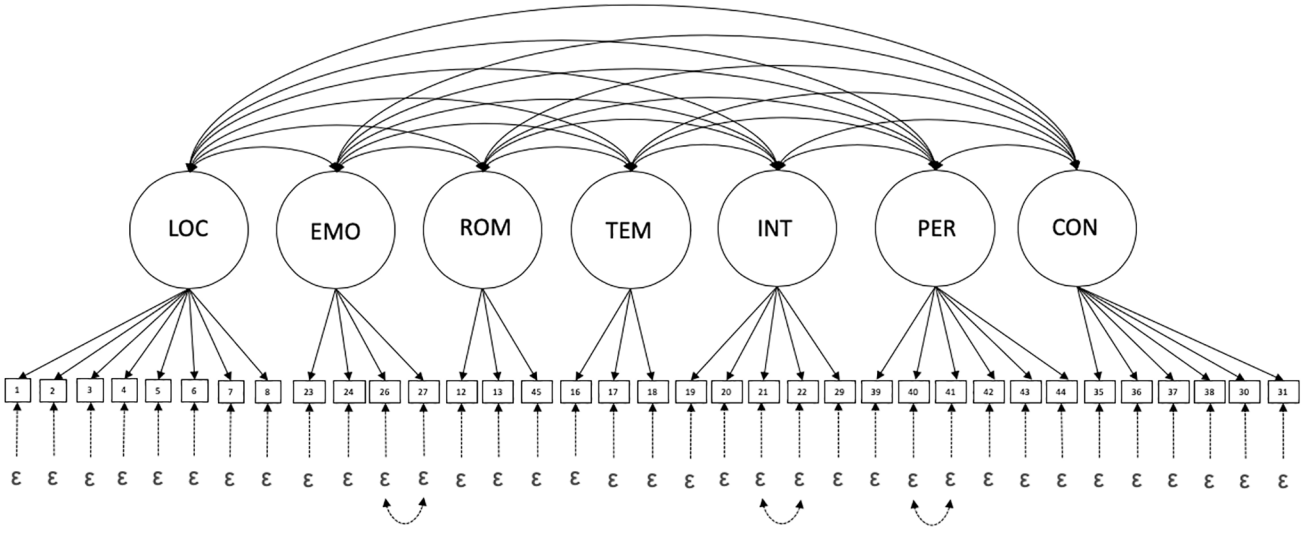


Figure 2. LOC = Locus of Control; EMO = Emotion Regulation; ROM = Romantic Appeal; TEM = Temperament; INT = Intimacy Avoidance; PER = Perspective Taking; CON = Conflict Resolution Skills. Measurement model for the 35-item Inventory of Romantic Competence (IRRC). Boxes represent items and ovals represent latent constructs. Straight arrows represent factor loadings and dotted arrows represent error.

PsychOpen GOLD

MIMIC Modeling

Scalar Invariance — The first step of establishing a viable measurement model using the confirmatory sample was already completed in the aforementioned CFA model. Thus, we proceeded to the second step of MIMIC modeling, which is to regress the factors and indicators on gender. Global fit indices for the MIMIC model ranged from acceptable (CFI = .91; TLI = .90) to good model fit (RMSEA = .055; SRMR = .052; Table 2). Even though the initial analysis suggested that eight indicators had differential item performance across gender (Table 4), item 17 was no longer salient (i.e., modification indices dropped below 3.84) after the direct effects of gender on items 35, 20, 27, 18, 12, 22, and 27 were incorporated into the model in a stepwise fashion, starting with the item with the largest MI. Thus, seven of the total 35 items evidenced differential item functioning.

Table 4

Selected Modification Indices for the 35-Item Inventory of Romantic Relationship Competence (IRRC) With Item Indicators Regressed on Gender

Parameter Revisions	MI	Standardized EPC[b]
Item 35 on Gender	18.01	-0.33
Item 20 on Gender	14.67	0.32
Item 27 on Gender	14.46	-0.26
Item 18 on Gender	11.30	-0.22
Item 17 on Gender[a]	11.10	0.27
Item 12 on Gender	10.96	0.30
Item 22 on Gender	10.31	-0.26
Item 37 on Gender	10.04	0.25

Note. Only modification indices above 3.84 (χ^2 at $p < .05$, $df = 1$) and EPC values indicating a small effect size ($d \geq 0.20$; Cohen, 1988) are included in this table.

[a]The direct effect of item 17 was longer salient (i.e., MIs dropped below 3.84) after the direct effects of gender on the other items were incorporated into the model in a stepwise fashion (starting with the item with the largest MI).

[b]Standardized EPCs are partially standardized estimates of parameter change where only the latent variable is standardized.

Holding the latent variable "conflict resolution skills" constant, men consistently score 0.30 unstandardized units lower compared to women on a 1 (almost never or never true) to 5 (almost always or always true) scale for item 35 ("I can receive negative feedback without getting upset"). All of the comparisons that follow are based on the same 1 to 5 scale.

Holding the latent variable "conflict resolution skills" constant, men consistently score 0.20 unstandardized units lower compared to women for item 37 ("I tend to avoid discussing issues that might upset someone"). Holding the latent variable "temperament" constant, men consistently score 0.22 unstandardized units lower compared to women for item 18 ("I am pretty flexible"). Holding the latent variable "emotion regulation" constant, men consistently score 0.26 unstandardized units lower compared to women for item 27 ("When I get mad I do things that later I regret"). Holding the latent variable "intimacy avoidance" constant, men consistently score 0.24 unstandardized units lower compared to women for item 22 ("I have a hard time sharing my feelings with others").

On the other hand, holding the latent variable "intimacy avoidance" constant, men consistently score 0.30 unstandardized units higher compared to women for item 20 ("I worry other people will hurt me emotionally"). Similarly, holding the latent variable "romantic appeal" constant, men consistently score 0.30 unstandardized units higher compared to women for item 12 ("I worry at times that I will end up alone the rest of my life.").

PsychOpen GOLD

Population Heterogeneity — Relaxing the scalar-level constraint for the aforementioned items, we then examined parameter estimates for latent factors regressed on gender. Males and females appeared to have different latent true mean scores on perspective taking, temperament, and conflict resolution skills but equal latent scores on locus of control, romantic appeal, intimacy avoidance, and emotion regulation (Table 5). Women scored 0.19 standardized scores (small effect size) higher than men on the latent dimension of perspective taking. On the other hand, men scored 0.51 (medium effect size) and 0.21 (small effect size) standardized scores higher compared to women on the latent dimensions temperament and conflict resolution skills. In other words, the estimated true latent mean score for being able to handle emotionally provoking situations, calmly negotiating, and arriving at mutually agreed upon solutions was higher for men compared to women. On the other hand, the estimated true latent mean score for being able to consider other perspectives was higher for women compared to men.

Table 5

Parameter Estimates for Latent Factors Regressed on Gender for the 35-Item Inventory of Romantic Relationship Competence (IRRC)

Latent Factors Regressed on Gender	Estimate	*SE*	Estimate/*SE*	*p*-value
Locus of Control	-0.14	0.09	-1.58	.11
Perspective Taking	-0.19*	0.09	-2.11	.04
Romantic Appeal	-0.07	0.10	-0.70	.48
Intimacy Avoidance	0.12	0.09	1.21	.23
Emotion Regulation	-0.08	0.09	-0.87	.39
Temperament	0.51*	0.10	4.96	< .001
Conflict Resolution Skills	0.21*	0.10	2.10	.04

Note. Estimates are standardized based on variances of the latent variables. The standardized coefficient is interpreted as the change in the standardized units of the latent mean when we compare women (women are coded "0") to men (men are coded ("1").

* $p < .05$. ** $p < .001$.

Reliability

To calculate internal consistency, we utilized a CFA-based method for estimating scale reliability (Raykov, 2001, 2004). Locus of control produced a reliability coefficient of .93, (consider shortening scale; 95% CI [.92, .94]). Perspective taking produced a reliability coefficient of .87 (very good; 95% CI [.81, .93]). Romantic appeal produced a reliability coefficient of .83 (very good; 95% CI [.79, .86]). Intimacy avoidance produced a reliability coefficient of .78 (respectable; 95% CI [.67, .88]). Emotion regulation produced a reliability coefficient of .75 (respectable; 95% CI [.60, .91]). Temperament produced a reliability coefficient of .75 (respectable; 95% CI [.70, .80]). Conflict resolution produced a reliability coefficient of .75 (respectable; 95% CI [.73, .77]). In summary, all of the factors produced reliability indices that were considered at least respectable, with three of the factors in the very good categories or above.

Convergent and Discriminant Validity

To measure convergent and discriminant validity, bivariate Pearson correlations were calculated between the 7 factors of the 35-item IRRC and the following social competence and self-esteem measures: Personal-Interpersonal Competence Assessment (PICA; Seal et al., 2015); Self-Efficacy Scale (Sherer et al., 1982); Pearlin Mastery Scale (Pearlin & Schooler, 1978); and Rosenberg Self-Esteem Scale (Rosenberg, 1979; Table 6).

PsychOpen GOLD

Table 6

Convergent and Discriminant Correlations for the 35-Item Inventory Romantic Relationship Competence (IRRC)

IRRC Subscales	Pearlin Mastery Scale	Self-Efficacy Scale	Rosenberg Self-Esteem	Personal-Interpersonal Competence Assessment
Relationship Locus of Control	.35*	.41*	.46*	.44*
Perspective Taking	.24*	.29*	.26*	.47*
Romantic Appeal	.34*	.38*	.46*	.15*
Intimacy Avoidance	.29*	.28*	.40*	.13*
Emotion Regulation Skills	.27*	.35*	.30*	.15*
Temperament	.22*	.20*	.28*	.31*
Conflict Resolution Skills	.35*	.38*	.44*	.46*

Note. Size of correlations are interpreted according to Cohen's (1988) guidelines: ≥ 0.10 small effect size; ≥ 0.30 medium effect size; ≥ 0.50 large effect size.

*$p < .01$.

The Pearlin Mastery Scales measure tenacity in working towards one's goals. This scale evidenced moderately positive correlations with constructs that relate one's tendency to be persistent, such as relationship locus of control and conflict regulation skills, and small correlations with constructs that are less related to persistence (e.g., perspective taking, temperament).

The Self Efficacy Scale measures locus of control. As expected, self-efficacy evidenced moderately positive correlations with constructs that relate to locus of control (e.g., romantic appeal, relationship locus of control) and small correlations with constructs that are less related to locus of control (e.g., temperament, perspective taking).

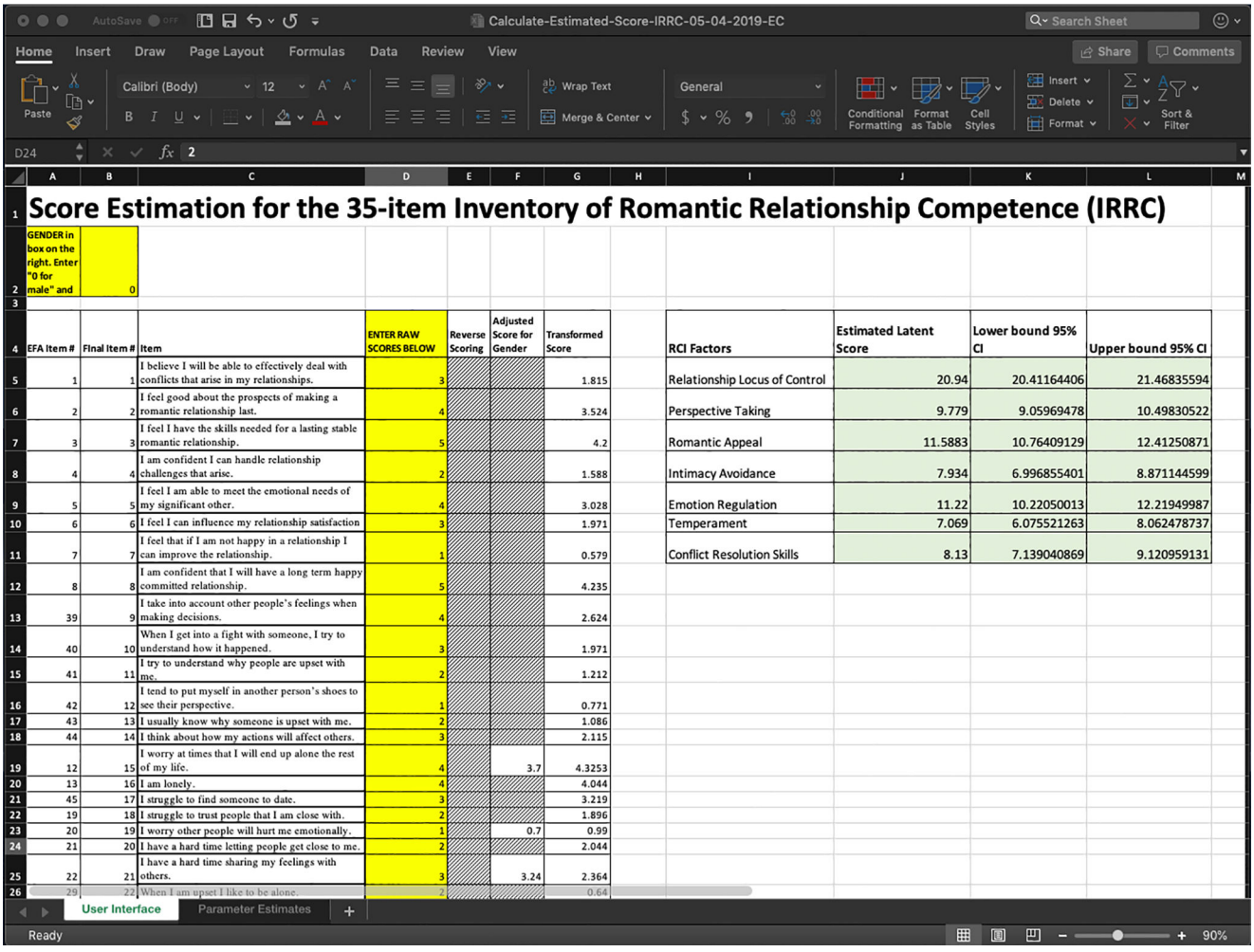
The Rosenberg Self-Esteem Scale had moderately positive correlations with all the subscales of the IRRC except perspective taking and temperament. This makes sense given that one's self-esteem should be more strongly related to IRRC self-image-related constructs such as romantic appeal and less related to IRRC non-self-image constructs such as perspective taking.

The PICA instrument measures influence on others, consideration of others and connection with others. The PICA had moderately positive correlations with the IRRC factors of relationship locus of control, perspective taking, temperament, and conflict resolution - constructs that relate to situations involving interpersonal dynamics. On the other hand, the PICA had the weakest correlations with constructs that relate to intrapersonal dynamics such as emotion regulation skills.

Discussion

The results support the 35-item Inventory of Romantic Relationship Competence (IRRC) as a reliable and valid instrument for assessing young adult's perceptions of their romantic relationship competence (see Appendix B). The data supported seven domains of romantic competence which were: relationship locus of control, perspective taking, romantic appeal, intimacy avoidance, emotion regulation, temperament, and conflict regulation skills. Reliability and convergent and discriminant validity findings appear to support the construct validity of this measure.

PsychOpen GOLD



Score Estimation for the 35-item Inventory of Romantic Relationship Competence (IRRC)

GENDER in box on the right. Enter "0 for male" and: 0

EFA Item #	Final Item #	Item	ENTER RAW SCORES BELOW	Reverse Scoring	Adjusted Score for Gender	Transformed Score
1	1	I believe I will be able to effectively deal with conflicts that arise in my relationships.	3			1.815
2	2	I feel good about the prospects of making a romantic relationship last.	4			3.524
3	3	I feel I have the skills needed for a lasting stable romantic relationship.	5			4.2
4	4	I am confident I can handle relationship challenges that arise.	2			1.588
5	5	I feel I am able to meet the emotional needs of my significant other.	4			3.028
6	6	I feel I can influence my relationship satisfaction	3			1.971
7	7	I feel that if I am not happy in a relationship I can improve the relationship.	1			0.579
8	8	I am confident that I will have a long term happy committed relationship.	5			4.235
39	9	I take into account other people's feelings when making decisions.	4			2.624
40	10	When I get into a fight with someone, I try to understand how it happened.	3			1.971
41	11	I try to understand why people are upset with me.	2			1.212
42	12	I tend to put myself in another person's shoes to see their perspective.	1			0.771
43	13	I usually know why someone is upset with me.	2			1.086
44	14	I think about how my actions will affect others.	3			2.115
12	15	I worry at times that I will end up alone the rest of my life.	4		3.7	4.3253
13	16	I am lonely.	4			4.044
45	17	I struggle to find someone to date.	3			3.219
19	18	I struggle to trust people that I am close with.	2			1.896
20	19	I worry other people will hurt me emotionally.	1		0.7	0.99
21	20	I have a hard time letting people get close to me.	2			2.044
22	21	I have a hard time sharing my feelings with others.	3		3.24	2.364
29	22	When I am upset I like to be alone.	2			0.64

RCI Factors	Estimated Latent Score	Lower bound 95% CI	Upper bound 95% CI
Relationship Locus of Control	20.94	20.41164406	21.46835594
Perspective Taking	9.779	9.05969478	10.49830522
Romantic Appeal	11.5883	10.76409129	12.41250871
Intimacy Avoidance	7.934	6.996855401	8.871144599
Emotion Regulation	11.22	10.22050013	12.21949987
Temperament	7.069	6.075521263	8.062478737
Conflict Resolution Skills	8.13	7.139040869	9.120959131

Figure 3. Supplementary Excel File for calculating latent means and 95% Confidence Intervals for the 35-item Inventory of Romantic Relationship Competence (IRRC). The first sheet, "User Interface", contains a line of columns for users to enter raw scores and obtain the estimated latent scores for each factor. The second sheet, "Parameter Estimates", contain the parameter estimates used to calculate the estimated latent scores for each factor.

One disquiet regarding this instrument is the concern with how perceptions of gender stereotypes might influence patterns of responding. A preliminary analysis of measurement invariance via MIMIC modeling suggests that seven of the 35 items (EFA items 35, 20, 27, 18, 12, 22, and 37) may produce biased responding across genders. Based on these partial invariance findings, this paper includes a supplementary excel-based applet that will enable readers to calculate the estimated latent scores for each subscale when administered with a respondent (see Figure 3). Users simply enter the gender and raw scores of the respondents in order to obtain the adjusted latent mean and 95% confidence interval estimates for the IRRC factors. This applet is based on parameters estimates from the final solution obtained in Study 2, which adjusts for reverse scoring, factor loadings, correlated errors between items, and differential item functioning across gender. To obtain the most precise estimates of latent means, we recommend that users use this applet to calculate subscale scores instead of simply summing or averaging the subscales.

PsychOpen GOLD

Future research should conduct a sensitivity/specificity analysis with external criterion relevant to the constructs measured by these non-invariant items (i.e., conflict resolution skills, temperament, emotion regulation, intimacy avoidance, and romantic appeal) to determine if scores should be corrected upwards or downwards for both genders. The mathematical formulas underlying the current applet adjusts the scores of men in reference to women, which is based on the assumption that the scores of women represent the best available estimate of latent scores. However, if an external criterion to temperament reveals that women consistently over-estimate their self-ratings on EFA item 35 (as opposed to men under-estimating their ratings), for example, the aforementioned applet should be updated to make revisions in a direction that is consistent with findings from the sensitivity/specificity analysis (e.g., subtract 0.30 units to the unstandardized scores for women).

When used with a group of respondents within the context of the evaluation of structural parameters (e.g., structural equation model involving several latent variables), researchers could simply model these non-invariant parameters (e.g., let EFA item 35's intercept be freely estimated across gender) before proceeding with the evaluation of structural parameters of the model through partial measurement invariance (Brown, 2015). Notwithstanding these non-invariant items, it should be noted that 28 of the 35 items, including two of seven constructs measured by this instrument (Locus of Control and Perspective Taking), evidenced measurement invariance across genders.

Taking into account the aforementioned partial invariance findings, males and females appear to have true differences in latent mean scores on perspective taking, temperament, and conflict resolution skills but equal latent scores on locus of control, romantic appeal, intimacy avoidance, and emotion regulation. Specifically, women appeared to do better in terms of perspective-taking and men appear to do better in terms of temperament and conflict resolution skills. Nonetheless, further examination pertaining to gender differences in romantic competence domains is needed to replicate such results before conclusions can be drawn in regard to possible causes for these group differences, how it might impact the development of long-term, healthy romantic relationships, and interventions that could facilitate growth in these areas.

Although our study lends support for the factorial validity of this instrument and provides tangible recommendations for scoring and interpretation, we were not able to conduct a more in-depth measurement invariance analysis across genders via MGCFA. Due to the imbalanced gender ratio in our study, we used MIMIC modeling instead to examine scalar invariance and population heterogeneity (Brown, 2015). Although MIMIC modeling may be more flexible in accommodating various samples sizes (Brown, 2015), MIMIC modeling is not preceded by tests of configural invariance (i.e., number of factors and pattern of indicator-factor loadings identical across genders) and metric invariance (i.e., equal factor loadings across genders), which are less restrictive types of invariance analysis typically examined prior to conducting a strong factorial invariance analysis in MGCFA. The MIMIC modeling assumes invariance at these measurement levels. Future research should obtain a more balanced sample of men and women and conduct a more thorough measurement invariance analysis. If measurement invariance is found with MGCFA at some level of measurement invariance (e.g., configural invariance, metric invariance), researchers should examine theoretical reasons that could explain the lack of invariance and revise the factor analytic model to better inform scoring and interpretation of this measure.

From a broader theoretical point of view, the conceptualization of romantic competence not only entails successfully navigating the challenges of a relationship but also initiating romantic relationships which for many may be anxiety provoking. The 35-item IRRC focuses solely on assessing one's perceptions of their ability to

PsychOpen GOLD

navigate the challenges and doesn't contain questions about one's anxiety levels around initiating new romantic relationships. La Greca and Mackey (2007) suggests the experience of anxiety in dating might present a critical challenge for adolescents and thus, could be an important domain of romantic competence that should be further investigated. Future studies could examine additional items that could measure this construct.

In addition, extant literature suggests that the ability to forgive and make sacrifices are important factors that contribute to marital happiness and stability (Fincham, Hall, & Beach, 2006). Although there were some scale items in the IRRC pertaining to being able to forgive and not hold grudges (i.e., items 34 and 46 in Appendix A), they did not load on any one factor. Further investigations could determine if a set of better worded items added to the IRRC would load as a factor pertaining to forgiveness and sacrifice, as well as be a valuable addition to the construct of romantic competence.

To summarize, the 35-item IRRC demonstrates promise as an instrument for measuring young adult's perceptions of romantic relationship competence. Subscales embedded in the 35-item IRRC produced acceptable to excellent reliability indices and excellent overall global fit indices. The majority of items (28 of the 35 items), including two of seven constructs measured by this instrument (Locus of Control and Perspective Taking), evidenced measurement invariance across genders. Taking into consideration reverse scoring, factor loadings, correlated residuals, and differential item functioning across genders for a subset of items, a supplementary applet is made available to readers who intend to administer, score, and interpret the measure with individual respondents. With the 35-item IRRC's focus more on behaviors and skills, practitioners and Family Life Educators could use relevant subscales in the instrument as a baseline assessment from which to develop targeted interventions. On the other hand, researchers interested in using the measure within the context of the evaluation of structural parameters could model relevant non-invariant parameters before proceeding with the evaluation of structural parameters. As the 35-item IRRC is in its early stages of development, future studies should incorporate a multi-modal sensitivity/specificity analysis to better inform scoring and interpretation guidelines. Replication studies are also needed with heterogeneous samples consisting of more diverse gender, sexual orientation, ethnic, and socioeconomic backgrounds. Researchers will hopefully be able to use 35-item IRRC to further understand the etiology and developmental trajectories of romantic relationship competence in young adults.

Funding

The authors have no funding to report.

Competing Interests

The authors have declared that no competing interests exist.

Acknowledgments

The authors have no support to report.

Supplementary Materials

The following electronic supplementary material is available within the PsychArchives repository (Faber, Chin, Wilburn, & Shafaie, 2019; https://doi.org/10.23668/psycharchives.2514):

PsychOpen GOLD

- Score Estimation File for the Inventory of Romantic Relationship Competence (IRRC)

Index of Supplementary Materials

Faber, A. J., Chin, E. G., Wilburn, V. R., & Shafaie, S. M. (2019). *Supplementary materials to "Measuring romantic competence in young adults: The Inventory of Romantic Relationship Competence".* PsychOpen. https://doi.org/10.23668/psycharchives.2514

References

Aalgaard, R. A., Bolen, R., & Nugent, W. R. (2016). A literature review of forgiveness as a beneficial intervention to increase relationship satisfaction in couples therapy. *Journal of Human Behavior in the Social Environment, 26*, 46-55. https://doi.org/10.1080/10911359.2015.1059166

Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *The American Psychologist, 55*, 469-480. https://doi.org/10.1037/0003-066X.55.5.469

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*, 191-215. https://doi.org/10.1037/0033-295X.84.2.191

Barber, B. K., & Erickson, L. D. (2001). Adolescent social initiative: Antecedents in the ecology of social connections. *Journal of Adolescent Research, 16*, 326-354. https://doi.org/10.1177/0743558401164003

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107*(2), 238-246. https://doi.org/10.1037/0033-2909.107.2.238

Bernaards, C. A., & Jennrich, R. I. (2005). Gradient projection algorithms and software for arbitrary rotation criteria in factor analysis. *Educational and Psychological Measurement, 65*, 676-696. https://doi.org/10.1177/0013164404272507

Blair, B. L., Perry, N., O'Brien, M., Calkins, S., Keane, S., & Shanahan, L. (2015). Identifying developmental cascades among differentiated dimensions of social competence and emotion regulation. *Developmental Psychology, 51*, 1062-1073. https://doi.org/10.1037/a0039472

Bouchey, H. A. (2007). Perceived romantic competence, importance of romantic domains, and psychosocial adjustment. *Journal of Clinical Child and Adolescent Psychology, 36*, 503-514. https://doi.org/10.1080/15374410701653120

Bowlby, J. (1969). *Attachment and Loss: Vol. 1. Attachment.* New York, NY, USA: Basic Books.

Brown, T. A. (2015). *Confirmatory factor analysis for applied research* (2nd ed.). New York, NY, USA: The Guilford Press.

Buhrmester, D., Furman, W., Wittenberg, M., & Reis, H. (1988). Five domains of interpersonal competence in peer relations. *Journal of Personality and Social Psychology, 55*, 991-1008. https://doi.org/10.1037/0022-3514.55.6.991

Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modeling, 14*(3), 464-504. https://doi.org/10.1080/10705510701301834

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ, USA: Lawrence Erlbaum Associates.

PsychOpen GOLD

Creswell, J. (2015). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research.* (5th ed.). Boston, MA, USA: Pearson.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16*, 297-334. https://doi.org/10.1007/BF02310555

Davila, J., Mattanah, J., Bhatia, V., Latack, J., Feinstein, B., Eaton, N., . . . Zhou, J. (2017). Romantic competence, health relationship functioning, and well-being in emerging adults. *Personal Relationships, 24*, 162-184. https://doi.org/10.1111/pere.12175

Davila, J., Steinberg, S., Miller, M., Stroud, C., Starr, L., & Yoneda, A. (2009). Assessing romantic competence in adolescence: The Romantic Competence Interview. *Journal of Adolescence, 32*, 55-75. https://doi.org/10.1016/j.adolescence.2007.12.001

Davila, J., Stroud, C., Miller, M., & Steinberg, S. (2007). Commentary: Defining and understanding adolescent romantic competence: Progress, challenges, and implications. *Journal of Clinical Child and Adolescent Psychology, 36*, 534-540. https://doi.org/10.1080/15374410701662147

DeVellis, R. (2017). *Scale development* (4th ed.). Los Angeles, CA, USA: SAGE Publications.

Fincham, F. D., Hall, J., & Beach, S. R. (2006). Forgiveness in marriage: Current status and future directions. *Family Relations, 55*, 415-427. https://doi.org/10.1111/j.1741-3729.2005.callf.x-i1

Gross, J. J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology, 2*, 271-299. https://doi.org/10.1037/1089-2680.2.3.271

Hazan, C., & Shaver, P. (1987). Romantic love conceptualized as an attachment process. *Journal of Personality and Social Psychology, 52*(3), 511-524. https://doi.org/10.1037/0022-3514.52.3.511

Corp, I. B. M. (2016). IBM SPSS Statistics for Windows (Version 24.0) [Computer software]. Armonk, NY, USA: IBM Corp.

Jöreskog, K. G., & Goldberger, A. S. (1975). Estimation of a model with multiple indicators and multiple causes of a single latent variable. *Journal of the American Statistical Association, 70*, 631-639.

Kilmann, P. R., Finch, H., Parness, M., & Downer, J. T. (2013). Partner attachment and interpersonal characteristics. *Journal of Sex & Marital Therapy, 39*, 144-159. https://doi.org/10.1080/0092623X.2011.606878

La Greca, A. M., & Mackey, E. R. (2007). Adolescents' anxiety in dating situations: The potential role of friends and romantic partners. *Journal of Clinical Child and Adolescent Psychology, 36*, 522-533. https://doi.org/10.1080/15374410701662097

Levenson, R. W., Hasse, C. M., Bloch, L., Holley, S. R., & Seider, B. J. (2013). Emotion regulation in couples. In J. J. Gross (Ed.), *Handbook of emotion regulation* (2nd ed., pp. 267-283). New York, NY, USA: The Guilford Press.

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods, 1*, 130-149. https://doi.org/10.1037/1082-989X.1.2.130

McFarlane, A. H., Bellissimo, A., & Norman, G. R. (1995). The role of family and peers in social self-efficacy: Links to depression in adolescence. *The American Journal of Orthopsychiatry, 65*, 402-410. https://doi.org/10.1037/h0079655

PsychOpen GOLD

Montgomery, M. (2005). Psychosocial intimacy and identity: From early adolescence to emerging adulthood. *Journal of Adolescent Research, 20*, 346-374. https://doi.org/10.1177/0743558404273118

Muthén, B. (1989). Latent variable modeling in heterogeneous populations. *Psychometrika, 54*, 557-585. https://doi.org/10.1007/BF02296397

Muthén, L. K., & Muthén, B. O. (1998-2012). *Mplus user's guide* (7th ed.). Los Angeles, CA, USA: Muthén & Muthén.

Newcomb, A. F., & Bagwell, C. L. (1995). Children's friendship relations: A meta-analytic review. *Psychological Bulletin, 117*, 306-347. https://doi.org/10.1037/0033-2909.117.2.306

Olson, D. H., Olson-Sigg, A., & Larson, P. J. (2008). *The couple checkup: Finding your relationship strengths*. Nashville, TN, USA: Thomas Nelson.

Pearlin, L. I., & Schooler, C. (1978). The structure of coping. *Journal of Health and Social Behavior, 19*, 2-21. https://doi.org/10.2307/2136319

Rauer, A. J., Pettit, G., Lansford, J., Bates, J., & Dodge, K. (2013). Romantic relationship patterns in young adulthood and their developmental antecedents. *Developmental Psychology, 49*, 2159-2171. https://doi.org/10.1037/a0031845

Raykov, T. (2001). Bias of Cronbach's Alpha for fixed congeneric measures with correlated errors. *Applied Psychological Measurement, 25*, 69-76. https://doi.org/10.1177/01466216010251005

Raykov, T. (2004). Behavioral scale reliability and measurement invariance evaluation using latent variable modeling. *Behavior Therapy, 35*, 299-331. https://doi.org/10.1016/S0005-7894(04)80041-8

Revelle, W. (2018) psych: Procedures for personality and psychological research [Computer software, Version 1.8.12]. Retrieved from https://CRAN.R-project.org/package=psych

Rose-Krasnor, L. (1997). The nature of social competence: A theoretical review. *Social Development, 6*, 111-135. https://doi.org/10.1111/j.1467-9507.1997.tb00097.x

Rosenberg, M. (1979). *Conceiving the self.* New York, NY, USA: Basic Books.

Rothbart, M. K., & Bates, J. E. (2006). Temperament in children's development. In W. Damon, R. Lerner, & N. Eisenberg (Eds.), *Handbook of Child Psychology: Vol 3. Social, emotional, and personality development* (6th ed., pp. 99-166). New York, NY, USA: Wiley.

RStudio Team. (2018). RStudio: Integrated development for R [Computer software]. Retrieved from http://www.rstudio.com/

Schröder-Abé, M., & Schutz, A. (2011). Walking in each other's shoes: Perspective taking medicates effects of emotional intelligence on relationship quality. *European Journal of Personality, 25*, 155-169. https://doi.org/10.1002/per.818

Seal, C., Miguel, K., Alzamil, A., Naumann, S., Royce-Davis, J., & Drost, D. (2015). Personal-interpersonal competence assessment: A self-report instrument for student development. *Research in Higher Education, 27*, 1-10.

Sherer, M., Maddux, J. E., Mercandante, B., Prentice-Dunn, S., Jacobs, B., & Rogers, R. W. (1982). The Self-Efficacy Scale: Construction and validation. *Psychological Reports, 51*, 663-671. https://doi.org/10.2466/pr0.1982.51.2.663

Shulman, S., Davila, J., & Shachar-Shapira, L. (2011). Assessing romantic competence among older adolescents. *Journal of Adolescence, 34*, 397-406. https://doi.org/10.1016/j.adolescence.2010.08.002

PsychOpen GOLD

Steiger, J. H. (1990). Structural model evaluation and modification: An interval estimation approach. *Multivariate Behavioral Research, 25*(2), 173-180. https://doi.org/10.1207/s15327906mbr2502_4

Thurstone, L. L. (1947). *Multiple-factor analysis.* Chicago, IL, USA: University of Chicago Press.

Tucker, L. R., & Lewis, C. (1973). A reliability coefficient for maximum likelihood factor analysis. *Psychometrika, 38*(1), 1-10. https://doi.org/10.1007/BF02291170

Wentzel, K. R., & Caldwell, K. (1997). Friendships, peer acceptance, and group membership: Relations to academic achievement in middle school. *Child Development, 68*(6), 1198-1209.

Young, M. R., & Bradley, M. (1998). Social withdrawal: Self-efficacy, happiness, and popularity in introverted and extroverted adolescents. *Canadian Journal of School Psychology, 14*, 21-35. https://doi.org/10.1177/082957359801400103

Appendices

Full List of 46 Items Subjected to Exploratory Factor Analysis (EFA) in Study 1

Appendix A

Instructions: Please read each question and circle the corresponding number that most appropriately applies to you.

Almost Never or Never True	Not Very Often True	Sometimes True	Often True	Almost Always or Always True
1	2	3	4	5

1.	**I believe I will be able to effectively deal with conflicts that arise in my relationships.**	1	2	3	4	5
2.	**I feel good about the prospects of making a romantic relationship last.**	1	2	3	4	5
3.	**I feel I have the skills needed for a lasting stable romantic relationship.**	1	2	3	4	5
4.	**I am confident I can handle relationship challenges that arise.**	1	2	3	4	5
5.	**I feel I am able to meet the emotional needs of my significant other.**	1	2	3	4	5
6.	**I feel I can influence my relationship satisfaction.**	1	2	3	4	5
7.	**I feel that if I am not happy in a relationship, I can improve the relationship.**	1	2	3	4	5
8.	**I am confident that I will have a long term happy committed relationship.**	1	2	3	4	5
9.	I believe there is a high likelihood I will experience divorce in my lifetime.	1	2	3	4	5
10.	I worry that I will disappoint my significant other.	1	2	3	4	5
11.	I feel I have a lot to offer someone.	1	2	3	4	5
12.	**I worry at times that I will end up alone the rest of my life.**	1	2	3	4	5
13.	**I am lonely.**	1	2	3	4	5
14.	I get upset when things do not go my way.	1	2	3	4	5
15.	I like to be in charge.	1	2	3	4	5
16.	**People say I am easy going.**	1	2	3	4	5
17.	**I don't get too upset over things.**	1	2	3	4	5
18.	**I am pretty flexible.**	1	2	3	4	5
19.	**I struggle to trust people that I am close with.**	1	2	3	4	5
20.	**I worry other people will hurt me emotionally.**	1	2	3	4	5
21.	**I have a hard time letting people get close to me.**	1	2	3	4	5
22.	**I have a hard time sharing my feelings with others.**	1	2	3	4	5

PsychOpen GOLD

23. I lose my temper at times.	1	2	3	4	5
24. I get into arguments with people.	1	2	3	4	5
25. When I am upset, I tend to talk to someone I am close with.	1	2	3	4	5
26. I often say things I don't mean when I am mad.	1	2	3	4	5
27. When I get mad, I do things that later I regret.	1	2	3	4	5
28. I often found myself irritated by people.	1	2	3	4	5
29. When I am upset, I like to be alone.	1	2	3	4	5
30. I feel I can communicate my feelings well.	1	2	3	4	5
31. I feel I can communicate my points / thoughts well.	1	2	3	4	5
32. I tend to lie a lot.	1	2	3	4	5
33. People say I am a good listener.	1	2	3	4	5
34. I am able to forgive people.	1	2	3	4	5
35. I can receive negative feedback without getting upset.	1	2	3	4	5
36. I tend to address issues that are bothering me.	1	2	3	4	5
37. I tend to avoid discussing issues that might upset someone.	1	2	3	4	5
38. I feel I handle conflict well.	1	2	3	4	5
39. I take into account other people's feelings when making decisions.	1	2	3	4	5
40. When I get into a fight with someone, I try to understand how it happened.	1	2	3	4	5
41. I try to understand why people are upset with me.	1	2	3	4	5
42. I tend to put myself in another person's shoes to see their perspective.	1	2	3	4	5
43. I usually know why someone is upset with me.	1	2	3	4	5
44. I think about how my actions will affect others.	1	2	3	4	5
45. I struggle to find someone to date.	1	2	3	4	5
46. I tend to hold grudges.	1	2	3	4	5

Note. Bolded items were selected for further Confirmatory Factor Analytic examination (CFA) in Study 2.

Finalized Version of the 35-Item Inventory of Romantic Relationship Competence (IRRC)

Appendix B

Exploratory Factor Analysis (EFA) item numbers and the final item numbers are on the two left columns. Both item numbers can be used with the supplementary excel file that calculates latent means and 95% Confidence Intervals for 35-item IRRC.

Instructions: Please read each question and circle the corresponding number that most appropriately applies to you.

Almost Never or Never True	Not Very Often True	Sometimes True	Often True	Almost Always or Always True
1	2	3	4	5

Item #								
EFA	**Final**	**Item**			**Responses**			
1	1	I believe I will be able to effectively deal with conflicts that arise in my relationships.	1	2	3	4	5
2	2	I feel good about the prospects of making a romantic relationship last.	1	2	3	4	5
3	3	I feel I have the skills needed for a lasting stable romantic relationship.	1	2	3	4	5
4	4	I am confident I can handle relationship challenges that arise.	1	2	3	4	5
5	5	I feel I am able to meet the emotional needs of my significant other.	1	2	3	4	5
6	6	I feel I can influence my relationship satisfaction	1	2	3	4	5
7	7	I feel that if I am not happy in a relationship, I can improve the relationship.	1	2	3	4	5
8	8	I am confident that I will have a long term happy committed relationship.	1	2	3	4	5
39	9	I take into account other people's feelings when making decisions.	1	2	3	4	5
40	10	When I get into a fight with someone, I try to understand how it happened.	1	2	3	4	5

PsychOpen GOLD

Item #							
EFA	Final	Item	Responses				
41	11	I try to understand why people are upset with me.	1	2	3	4	5
42	12	I tend to put myself in another person's shoes to see their perspective.	1	2	3	4	5
43	13	I usually know why someone is upset with me.	1	2	3	4	5
44	14	I think about how my actions will affect others.	1	2	3	4	5
12	15	I worry at times that I will end up alone the rest of my life.	1	2	3	4	5
13	16	I am lonely.	1	2	3	4	5
45	17	I struggle to find someone to date.	1	2	3	4	5
19	18	I struggle to trust people that I am close with.	1	2	3	4	5
20	19	I worry other people will hurt me emotionally.	1	2	3	4	5
21	20	I have a hard time letting people get close to me.	1	2	3	4	5
22	21	I have a hard time sharing my feelings with others.	1	2	3	4	5
29	22	When I am upset, I like to be alone.	1	2	3	4	5
23	23	I lose my temper at times.	1	2	3	4	5
24	24	I get into arguments with people.	1	2	3	4	5
26	25	I often say things I don't mean when I am mad.	1	2	3	4	5
27	26	When I get mad, I do things that later I regret.	1	2	3	4	5
16	27	People say I am easy going.	1	2	3	4	5
17	28	I don't get too upset over things.	1	2	3	4	5
18	29	I am pretty flexible.	1	2	3	4	5
35	30	I can receive negative feedback without getting upset	1	2	3	4	5
36	31	I tend to address issues that are bothering me	1	2	3	4	5
37	32	I tend to avoid discussing issues that might upset someone	1	2	3	4	5
38	33	I feel I handle conflict well	1	2	3	4	5
30	34	I feel I can communicate my feelings well	1	2	3	4	5
31	35	I feel I can communicate my points/thoughts well	1	2	3	4	5

PsychOpen GOLD is a publishing service by
Leibniz Institute for Psychology Information (ZPID),
Trier, Germany. www.leibniz-psychology.org

PsychOpen GOLD