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# Interpersonal Competence Development of University Students -Exploring a Social Problem-Solving Measurement Approach

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## Abstract

*Interpersonal competence is currently regarded as an important aim in higher education. Nevertheless, traditional measurements looking at interpersonal competence have been based on self-ratings which do not cover recent developments in assessment methods. With these advancements, interpersonal competence is conceptualized as an integrative-holistic, problem-solving-based, and developmental-model-related skill. Following these principles, a theoretical model of interpersonal competence development was used in this study to develop a problem-solving measurement such as a questionnaire. The measurement consisted of social problem-solving tasks related to five interpersonal competence levels concerning awareness, acceptance, care, trust, and love. In addition to each of the competence levels, three stimulating learning conditions were also postulated and measured. The questionnaire was presented to a sample of 168 university students from different social research study programs. On the one hand, results showed acceptable indications of the reliability and validity of the interpersonal competence measurement. On the other hand, it was not possible to find conclusive and supporting evidence concerning sources and mechanisms of interpersonal competence development. The implications of this for future studies on interpersonal competence are that the differences between self-rating- and problem-solving-based measurements as well as the social goals and related strategies of university students should be considered.*

**Keywords:** college students, relationship education, social skills assessment, problem-solving ability, LISREL

For more than two decades, concepts such as “key competences”, “21st-century skills”, or “soft skills” have been used to refer to important aims for instructional activities in higher education (e.g., Savickas et al., 2009). Such cognitive-affective skills are not only essential for university students when studying and doing research, but also in their professional and personal life (e.g., Zumbach & Astleitner, 2016). Among these skills, the most prominent concept is about “interpersonal competence” which covers a broad range of abilities involved in positive and effective interactions with other people. Such a competence concerns aims such as “social sensitivity, relationship building, working with others, listening and communication” (Lievens & Sackett, 2012, p. 460). When comparing such competences of university students in their first year of study with them again in their final year at university, it is often observed that only small improvements (about half of a *standard deviation*) have been made (e.g., Saavedra & Saavedra, 2011).

Such findings are not surprising, because these and other similar competences are not an explicit and compulsory element in curricula and related competence development plans in many subject areas, except within social studies.

For example, Abraham (2006) has stressed the need for the integration of emotional intelligence competences in business education and others have just started to focus on negotiation and conflict management competences in the field of engineering (Lozano & Lozano, 2014).

Also, researchers in the field of higher education have pointed out that traditional curricula-based testing has not adequately recorded interpersonal competences (Heckman & Kautz, 2012), or the fact that students differed significantly regarding such competences, even after having finished the same curricula (Kosti, Feldt, & Angelis, 2014). Extra-curricular activities to improve interpersonal competences have repeatedly been found to be successful, but require long-term and comprehensive efforts which higher education institutions are not always willing to finance (e.g., Lopes, Gerolamo, Del Prette, Musetti, & Del Prette, 2015). Sometimes, institutions have offered well-designed interpersonal competence courses for students of all study programs, but were faced with the problem that students did not take up the offer of these courses (Roulin & Bangerter, 2013).With these and similar problems in the field of interpersonal competences in higher education, it is necessary to take a closer look at the construct and related scientific principles in measurement and development.

## Principles of Interpersonal Competence Measurement and Development

A major area of research in higher education which is at the center of all the aforementioned problems is concerned with the measurement of interpersonal competences of university students. Here, some significant problems have been identified in recent research activities: Often, the same instruments have been used for all ages or developmental stages of university students, although "one might expect emotional and social competencies to change over the course of a student´s postsecondary career" (Parker, Summerfeldt, Hogan, & Majeski, 2004, p. 171). In addition, research has neglected that in different subject areas or fields of research there are different "institutional cultures" which might require specific interpersonal competences (Kezar & Eckel, 2002). For example, measurement-related competence models for public health students (Calhoun, McElligott, Weist, & Raczynski, 2012) differ considerably from those in the field of bioinformatics (Welch et al., 2014). On the contrary, others have argued that interpersonal competences are general, trait-like, and extensive in nature and therefore measurements do not have to be adapted to different subject areas or study programs (e.g., Pertegal-Felices, Castejón-Costa, & Jimeno-Morenilla, 2014). Finally, it should not go unnoticed that research has shown that the accuracy of predicting daily social behavior varies strongly across personality types (e.g., Vazire & Mehl, 2008). Also, that the widely used rating scales for evaluating social interactions in university contexts are affected by multiple validity problems (e.g., Spooren, Brockx, & Mortelmans, 2013). For example, *method variance* resp. *measurement error* in education has been estimated, on average, of about 30 % (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003, p. 880). Others have, for example, found dramatic changes in average *correlations* (of about more than 230 percent) when method bias was controlled (Podsakoff, MacKenzie, & Podsakoff, 2012, p. 547).

These and other similar problems are closely related to the traditionally widespread phenomenon that most of the existing measurements in the field of interpersonal competences concern easy-to-use but biased self-ratings as part of self-report personality-based or informant measurement approaches (e.g., Mikolajczak, Brasseur, & Fantini-Hauwel, 2014). However, this type of measurement in particular, does not correspond with recent principles in ability- or competence-based measurement approaches (e.g., Conte, 2005; Kaslow et al., 2007; Van Merriënboer& Kirschner, 2013). According to these principles, measurement approaches are integrative-holistic, based on problem-solving activities or behaviors and consist of a hierarchically organized developmental and a related support model:

- Integrative-holistic: Many existing measurements of interpersonal competences are not integrative-holistic, but deal with important, though isolated and sometimes highly specific elements of relationship building. For example, "communication" (e.g., Rubin & Martin, 1994), "emotional intelligence" (e.g., Mayer, Salovey, & Caruso, 2008), "teamwork" (Hughes & Jones, 2011), or even "loving" or "liking" (e.g., Graham, 2011). On the contrary, for example, Buhrmester, Furman, Wittenberg, and Reis (1988) have suggested five domains of an integrative interpersonal competence in (peer) relationships: Initiation, negative assertion, disclosure, emotional support, and conflict management. In another example, Kia-Keating, Dowdy, Morgan, and Noam (2011) have presented an integrative conceptual model for the healthy development of adolescents in which many interpersonal competences (in relation to social support, bonding, and sense of belonging) have been included. One other approach from Wyatt and Bloemker (2013) has focused on several core components of social and emotional competence: Knowledge about emotions in self and others, or self-management, relationship, and

tolerance skills, as well as behavioral and perceptual flexibility. Such an integrative-holistic perspective has the advantage of a) taking into consideration a wider variety of developmental sources (independent variables) which could result in additional as well as additive effects (higher level of effectiveness), b) being able to reduce redundant elements and related efforts (higher level of efficiency), and c) allowing the handling of interaction or side effects towards a common conclusive basis (higher level of control).

- Problem-solving task approach: Interpersonal competence can be seen as "the ability to achieve personal goals in social interactions while simultaneously maintaining positive relationships with others over time and across situations" (Rubin & Rose-Krasnor, 1992, p. 285). In order to achieve goals in social interactions, a problem-solving activity is necessary: Interpersonal problems have to be identified and problem-solving strategies have to be designed, applied, evaluated, and calibrated. D´Zurilla and Sheedy (1991) have developed and tested a social problem-solving inventory for university students, (with four subscales regarding problem definition, generation of alternative solutions, decision making, as well as solution implementation and verification). However, this instrument is a self-report rating measure and is not a behavior-orientated competence measurement with real or fictitious social problem-solving tasks. Such tasks would require, for example, finding and applying strategies for solving problems in different real-world social contexts (e.g., when making friends), writing down social problem situations, or recording a diary on interpersonal problems and solutions (Anderson, Goddard, & Powell, 2009). A problem-solving-task-approach has the advantage of having the potential to achieve higher ecological validity with fewer biases in comparison to self-report ratings: It focuses on everyday real-world tasks and related behavior instead of subjective assumptions about personal abilities.
- Hierarchically organized developmental and support model: In the field of education and psychology, models which describe and explain the step-by-step acquisition of competences are widespread. For example, there are many theories and related measurements of cognitive, moral, motivational, or social development (e.g., Kail & Cavanaugh, 2016). The basic assumption behind these models is that competences are developed (or learned) step-by-step in hierarchically organized levels. From an educational point of view, having different levels makes it necessary for different learning conditions (e.g., instructional strategies) to be applied in order to support learning. Learning conditions must be adapted to the different levels of learners' development. This assumption is part of a modern "learner-centered paradigm" of education and is essential within instructional approaches dealing with such examples as "individualization", "personalization", "adaptive learning", or "aptitude-treatment-interaction" (e.g., Reigeluth, Beatty, & Myers, 2017). However, using both a hierarchically organized developmental and a related support model, is not yet established in the field of interpersonal competences. For example, Houghton and Neck (2002) have tested a hierarchical factor structure for particular interpersonal competences (i.e., self-leadership) but without considering any support model. Beauchamp and Anderson (2010) have presented an integrative framework for the development of social competences and have also considered internal and external conditions (e.g., culture). However, they have not provided learning conditions to systematically support the development of different competences. Approaches to hierarchically organized developmental and related support models have the advantage of a) expanding given measurement-based competence models with a developmental or teaching-learning focus, and b) optimizing the development of competences by increasing the appropriateness and adaptability of supportive learning conditions.

It should be noted that the most prominent approach for measuring the interpersonal competence of university students with its long and remarkable history is the "Interpersonal Competence Questionnaire (ICQ)" by Buhrmester, Furman, Wittenberg, and Reis (1988), which is also available in different language versions (e.g., Kanning, 2006) as well as in a shortened form (Coroiu, Meyer, Gomez-Garibello, Brähler, Hessel, & Körner, 2015). However, the ICQ is based on self-ratings, not on problem-solving tasks and it has no developmental or related support model. This illustrates that establishing integrative-holistic, problem-solving-based, and combined developmental and support models in the field of research on interpersonal competence in higher education is no simple task. It requires construct validation and the establishment of a research program with a focus on theoretical modeling, including situational and personal influences and identifying underlying mechanisms.

## An Alternative Research Program on Interpersonal Competence Measurement and Development

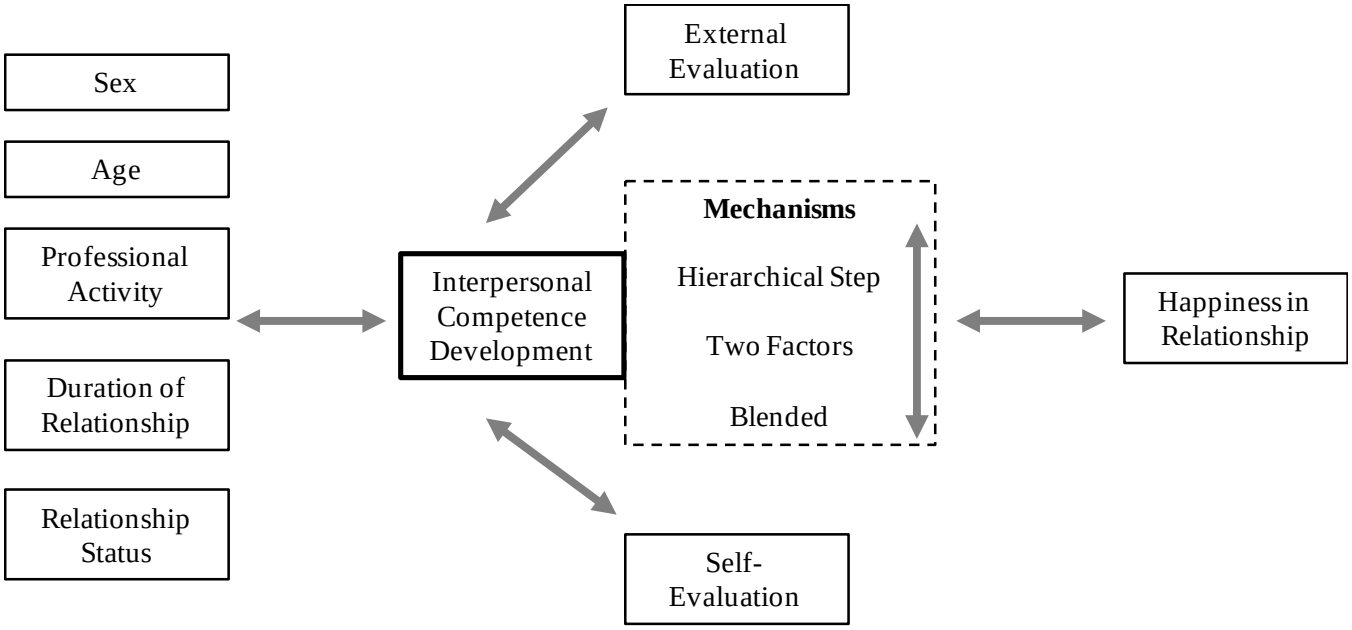
A theoretical model of interpersonal competence with a developmental and a support perspective has already been developed by the first author of this study. This theoretical model was based on a comprehensive review of literature in the field of social psychology and relationship education as well as on explorative and qualitative

empirical studies (see Astleitner, 2014; Astleitner & Baumgartner, 2015). When using this model for interpersonal competence development, five hierarchically organized competences were distinguished (see also Figure 2):

Awareness-competence (i.e., the ability to perceive somebody in a comprehensive way), acceptance-competence (i.e., the ability to respect somebody based on an evaluational activity), care-competence (i.e., the ability to support a person's welfare), trust-competence (i.e., the ability to rely on somebody), and love-competence (i.e., the ability to experience a strong positive feeling towards a person). Within this model, different stimulating learning conditions were postulated for each of the interpersonal competences. Awareness-competence was assumed to be affected by the learning conditions of establishing knowledge-based interactions (e.g., exchanging biographies), acquiring emotional intelligence (e.g., improving empathic behavior), and allowing positive bias (e.g., seeing somebody in a positive light). Acceptance-competence was related to the learning conditions of expressing deeper meaning (e.g., rewarding somebody), searching for similarities and complementarities (e.g., finding common goals), and promoting tolerance (e.g., showing the interdependence of problems). Care-competence was assumed to be affected by supporting others (e.g., assisting somebody in problem-solving), achieving compassionate goals (e.g., conducting joint projects), and perspective taking (e.g., changing roles). Trust-competence was related to the learning conditions of being positive and open (e.g., reducing insecurities about oneself), negotiating identities (e.g., finding solutions without harming somebody) and maintaining balance (e.g., by coordinating personal activities). Finally, for the love-competence, it was assumed that it could be affected by realizing togetherness, passionate emotions, and defending relationships (e.g., by spending time together), communicating love (e.g., expressing strong feelings), and maintaining novelty (e.g., exploring new experiences).

Based on this theoretical model, a validation approach was conceptualized for this study (see Figure 1). The steps in validating an interpersonal competence measurement of a university student's interpersonal competence development could be related to self- and external evaluations of social competences or happiness in relationships (e.g., Spitzberg, 2003). Situational and personal influences, especially, sex, age, the quality of relationships, or out-of-relationship activities have been identified (e.g., Donovan & MacIntyre, 2004). Approaches to discover underlying mechanisms in interpersonal competence development, concern hierarchical step modeling, two general factor modeling, or blended modeling. Hierarchical step modeling is based on the assumption that interpersonal competence levels are related to each other and that each level is influenced by different learning conditions (e.g., Michou, Vansteenkiste, Mouratidis, & Lens, 2014; see also Figure 2). With two factors modeling, one general (dependent) factor of interpersonal competence is assumed to be influenced by one general (independent) factor of a learning condition (e.g., McKenzie, Gow, & Schweitzer, 2004; see also Figure 3). Blended modeling is concerned with the assumption that developmental steps and learning conditions cannot be distinguished properly and that they together represent a unidimensional construct (e.g., MacCann, Joseph, Newman, & Roberts, 2014; see also Figure 4).

**Figure 1. Validation approach.**




With this background, it is the major objective of this study to use an integrative-holistic and developmental-support model of interpersonal competence for validating a problem-solving-task-based measurement for university students. Having this model represents a starting point for research on interpersonal competence of university students as part of a long-term relationship education program (e.g., Halford & Bodenmann, 2013). The first goal of this study as well as the initial step is the development of a competence measurement that has to be tested for its reliability and validity. Having a measurement enables the next step and the second goal of this study, which is to explore situational and personal sources of competence development in higher education scenarios. Factors such as sex, age, relationship status, the duration of a relationship, and professional activities have been considered. It is expected that women would show a higher level of interpersonal competence than men (e.g., Burleson, Kunkel, Samter, & Working, 1996). Interpersonal competence should also be correlated with age and professional activities (e.g., Shipley, Jackson, & Segrest, 2010). In addition, it is expected that the status and the duration of a relationship is related to interpersonal competence (e.g., Smith, Heaven, & Ciarrochi, 2008). Finally and as a third goal of this study, insights into mechanisms of interpersonal competence development have to be obtained by testing hierarchical step, two general factors, and blended models.

## *Method*

### Design and Participants

This study is based on data from a sample of 168 university students from different social research Bachelor and Master programs (in the fields of Education, Psychology, Communication Studies, Teacher Education, and so on). Of the participants 54 percent were single and 46 percent were in a partnership or were married; 7 percent of the participants had at least one child. 143 female and 25 male participants with an average age of 23.51 years have attended a lecture on “love and education” held by the first author of this study. During one unit of the lecture and at the start of the semester, participants had about 40 minutes to complete the interpersonal competence measurement in the form of a questionnaire. By taking part in the survey, participants had the possibility to find out their individual score on the interpersonal competence measurement.

### Measurement Development

The process of measurement development began with definitions and examples of the five competences and of the 15 learning conditions. For each of these 20 variables, one task with several sub-tasks on social relationship building was formulated for young adults as target group. Most of the tasks were to do with solving fictitious but highly personal relevant relationship problems, while other tasks were about evaluating or predicting social behavior. Task formats used multiple-choice-tasks, open tasks, or behavior-orientated ratings.

For each activity, the answer alternatives that best fitted the model specifications were used as the correct answer. A first version of the measurement was developed by the second author of this study. This first version was calibrated using results from interviews with university students focusing on the intelligibility and coherency of the tasks. The resulting second version was re-evaluated and calibrated by the first author within an expert validation approach based on the estimated difficulty, exclusiveness, and exhaustiveness of the tasks.

**Measurements**

*Interpersonal Competence Measurement:* All answers to the tasks on the interpersonal competence measurement were transformed into percentages of correct answers, ranging from 0 to 100 percent. Answers to the sub-tasks were summed up and divided by the number of tasks. Here are some examples of the measurement tasks (after excluding items which did not fit *reliability* standards): *Awareness-competence* was measured with the following task: "Imagine you are alone in a pub when you see someone who you find very attractive. You decide to start a conversation in order to get to know this person better. The conversation gets going and you talk animatedly. What do you do?" Participants solved this task entirely correctly, when they selected all of the following three options: (1) "I want to get to know this person better and ask questions about their hobbies and their profession". (2) "I suggest meeting up again, for example, I invite them for a meal". (3) "I take notice of how this person expresses their feelings and try to interpret these". The first learning condition of *knowledge-based interactions* was measured with the task: "Imagine you want to get to know an interesting person better". Again, participants solved this task entirely correctly, when they selected all of the following five options: (1) "I observe how this person reacts to my questions". (2) "I encourage the person to talk openly about what they are thinking and feeling". (3) "I research this person on the internet". (4) "I make contact with their friends and ask them questions about this person". (5) "I steer conversations in a certain direction in order to gain information which is important to me". *Acceptance-competence* was measured with the task: "Please read the following case history: Sabrina and Thomas have recently started a relationship. Sabrina often shows Thomas how much he means to her and tries to encourage their common ground by ensuring that they do a lot of things together. However, when she wants to do something that only she is interested in, Thomas doesn't accompany her. Thomas accepts Sabrina just the way she is although she has characteristics that Thomas sees as weaknesses. Sabrina on the other hand is critical of Thomas and doesn't want to simply accept his negative characteristics". This task was evaluated as correct when participants selected the second option (2) out of four: "In Thomas's position I would" (1) "be more critical of Sabrina and not accept everything", (2) "do things with Sabrina that only she is interested in because then she will see that I accept these activities as being a part of her", (3) "say clearly to Sabrina that these activities don't interest me and I would prefer to do something else" and (4) "point out to Sabrina her weaknesses and insist that we work on them". The first related learning condition of *deeper meaning* was measured with: "Imagine you are at the beginning of a relationship or recall your own relationship. How do you express that your partner is important to you?" For answering, participants had to rate the following items based on a 4-point Likert-scale (from "often" to "never"): "I say that my partner is important to me and give reasons why", "I make compliments about looks, clothes, and behaviour", "I praise them", "I show others how proud I am that this person is my partner", and "I buy small or large gifts for this person". Answers were evaluated as correct when participants selected the "often" or "sometimes" scale options.

The *care-competence* was measured with the task: "Imagine that you are living in a good relationship with a lovely person. What do you do to improve the other's well-being?" Here participants had to rate the following points based on a 4-point Likert-scale (from "often" to "never"): "I put my own needs on hold in favour of those of the other person", "I listen to this person and I am empathic", "If this person has a problem, I am there with help and advice", and "I do everything so that this person feels good". For measuring the first learning condition of *supporting others* the following task was used: "Read the following case history: Alexandra and Michael have been together for five months. They get on well and enjoy the time with each other. Both are considerate towards each other and want to support the relationship. Recently, the two have planned a trip to celebrate their first six months together. Alexandra has taken time off from work especially. However, Michael cancels at short notice to cover for a colleague who has fallen ill. Michael apologises but Alexandra is still very disappointed. How would you react in Alexandra's position?" This task was solved correctly when participants selected the following option: "I would spend the day with friends to show Michael that I am important to other people too" with the option of "no" and "I would be disappointed but I would forgive Michael because he did apologise" with the option of "yes".

*Trust-competence* was measured with the task: "Imagine you have been in a loving relationship with your partner for some time. How do you react in the following situation?" 1. "Your partner is out and about with friends but without you. He or she stays out for the whole night and returns home early in the morning". For a correct answer, participants had to select the alternative "I trust my partner implicitly", but not the alternative "I don't really trust my partner". 2. "You have to sign an important contract involving a lot of money. Your partner offers you a significant amount of financial support". For a correct answer, participants had to choose "I rely completely on my partner" but not, "I don't rely on my partner". The learning condition of *being positive and open* was measured with the following task: "Read the following case history: Lena and Philip have been together as a couple for more than six months. The two of them have a fundamentally loving solid relationship and give each other mutual support. For some time, however there have been recurring arguments and differences between them. The reason for this is mostly that Lena doesn't have enough time or they are both stressed. Philip is therefore very uncertain if the relationship with Lena still makes any sense. Somehow, he had imagined having a relationship would be easier and different to this. How would you react in Philip's situation?" For an entirely correctly evaluated answer, participants had to select the options "In Philip's position I would" (1) "see the future more positively since conflicts in a relationship are normal", and (2) "say to Lena openly and honestly how I feel about this situation".

Finally, the *love-competence* was measured with the question: "The aim of a loving relationship is to obtain love. In your opinion, what makes up complete love?" Participants had an entirely correct answer, when they selected all of the following alternatives of "belonging", "connection", "bonding", "romance", "physical attraction", "long-term commitment", and "responsibility". For measuring the learning condition of *closeness, passion, and defending*, participants had to answer the following question: "Imagine you have been having a loving and serious relationship with your partner for some time. You love each other very much and want to stay happy for a long time. What do you do to promote this relationship?" For answering, participants had to rate five items based on a 4-point Likert-scale (from "often" to "never"). Answers were evaluated as correct when participants selected the "often" or "sometimes" scale options with the following items: "I give my partner the feeling that I totally belong to them", "I defend our relationship if anybody wants to destroy it", "I spend my free-time with my partner", and "I try to spend intimate time and do romantic things with my partner". Only the "often" scale option was evaluated as correct with the following item: "I am faithful to my partner".

**Validity Indicators**

Self-evaluation of interpersonal competence was measured with the item: "How do you rate your ability to build relationships with other people (from very good to very poor)?"; external evaluation with the item: "If you were to ask friends how capable you are with relationships what would the answer be (from very capable to incapable)?"; and happiness in relationships with the item: "How happy are you in your current relationship (from very happy to unhappy)?".

**Sources of Competence Development**

Participants were asked about their sex and age. The duration of a relationship was measured with the item: "How long have you been in this relationship (in years and months)?", relationship status with the item on family status ("single or divorced" vs. "living with a partner or married"), and professional activity with the question: "To what extent are you employed (from unemployed to full-time employment)?"

## *Data analysis*

Traditional item- and correlation-analyses were calculated by using IBM SPSS STATISTICS 24. Model testing was done by structural equation modeling with LISREL 8.8 (Jöreskog & Sörbom, 1993; Schumacker & Lomax, 2010).

## *Results*

**Reliability and Validity**

**Reliability**

The original measurement had 20 tasks with an overall number of 97items. In a first reliability test, 17 items were eliminated because they had zero *variance*. The remaining 80 items showed a *Cronbachs Alpha* of 0.62. In the second step, items with a negative *item-scale-correlation* were excluded which resulted in 66 items with an acceptable *Cronbach's Alpha* of 0.72.

This is about equal with traditional personality trait measurements like, for example, the Big-Five (e.g., Gosling, Rentfrow, & Swann, 2003). 13 Items were used to measure the awareness-competence and the related learning conditions, 14 items for the acceptance-competence, 11 items for the care-competence, 8 items for the trust-competence, and 20 items for the love-competence. Difficulty levels for the overall 66-item-measurement had an acceptable *range* from 31 to 83 percent with a *mean* difficulty of 62 percent (*SD*=9.19).

**Validity**

In Table 1, *correlations* between all interpersonal competences and related learning conditions are depicted. On the one hand, all 20 elements of the developmental model showed significant positive correlations with the overall competence value (CV as sum score) ($.53 > r > .20$, $p < .05$). All measurement items related significantly to the construct of interpersonal competence. On the other hand, most of the learning conditions within and between competences were weakly correlated which indicates that they represented, as hypothetically intended, more or less independent parameters: 153 of 190 (more than 80 percent of) possible *correlations* are non-significant ($r < .16$, $p > .05$). Other indicators of validity concerned significant and hypothetically expected positive *correlations* between the measured interpersonal competence (CV) and self-evaluation ($r = .18$) and external evaluation ($r = .29$) of interpersonal competence as well as happiness in close relationships ($r = .30$; only $n = 81$ out of 167 participants had a close partnership) (see Table 2). Overall, all the *correlations* found indicated acceptable convergent and predictive validity (Mitchell & Jolley, 2010) of the interpersonal competence measurement, comparable to, for example, *correlations* of Big-Five personality traits and academic achievement (e.g., Komarraju, Karau, & Schmeck, 2009).

**Table 1. Measuring Interpersonal Competence Development - Correlations and Descriptive Statistics (Diagonal: M/SD of Percentages of Correct Answers)**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 48/26 | | | | | | | | | | | | | | | | | | | |
| 2 | .05 | 51/20 | | | | | | | | | | | | | | | | | | |
| 3 | .04 | -.06 | 84/22 | | | | | | | | | | | | | | | | | |
| 4 | .10 | .12 | .22 | 40/31 | | | | | | | | | | | | | | | | |
| 5 | .06 | .09 | .06 | .05 | 62/49 | | | | | | | | | | | | | | | |
| 6 | .01 | .10 | .06 | .24 | .02 | 40/23 | | | | | | | | | | | | | | |
| 7 | .13 | .13 | .06 | .18 | .03 | .40 | 47/25 | | | | | | | | | | | | | |
| 8 | .15 | -.14 | .19 | .12 | .10 | -.02 | -.09 | 87/25 | | | | | | | | | | | | |
| 9 | .00 | .15 | .16 | .24 | .08 | .30 | .20 | .07 | 68/18 | | | | | | | | | | | |
| 10 | .02 | -.09 | .10 | .18 | -.06 | .09 | .05 | .04 | .08 | 75/26 | | | | | | | | | | |
| 11 | -.06 | -.03 | .01 | .11 | -.09 | .07 | .02 | -.01 | -.04 | .15 | 15/36 | | | | | | | | | |
| 12 | -.05 | -.01 | .02 | .09 | .01 | .17 | .06 | -.07 | .03 | .00 | .03 | 55/22 | | | | | | | | |
| 13 | .03 | -.07 | .05 | -.02 | .00 | .17 | -.01 | .04 | .07 | -.01 | .06 | .15 | 76/30 | | | | | | | |
| 14 | -.01 | .08 | .12 | .13 | -.01 | .17 | .06 | .07 | .22 | .18 | -.03 | .07 | .12 | 82/25 | | | | | | |
| 15 | .08 | .14 | .02 | .05 | .04 | .08 | .04 | -.02 | .09 | -.16 | .06 | .10 | .06 | .09 | 70/30 | | | | | |
| 16 | .08 | .01 | .08 | .09 | .07 | .01 | .09 | -.04 | -.09 | -.13 | .04 | .09 | -.10 | .09 | .16 | 80/40 | | | | |
| 17 | .18 | .15 | .01 | .19 | .09 | .13 | .25 | .01 | .26 | .00 | .00 | -.07 | .06 | .11 | .11 | .10 | 71/18 | | | |
| 18 | .15 | -.03 | .06 | .19 | .00 | .38 | .36 | .12 | .36 | .13 | .07 | .01 | .04 | .21 | .11 | .02 | .32 | 68/22 | | |
| 19 | .11 | .09 | .13 | .26 | -.05 | .54 | .33 | -.05 | .34 | .02 | .03 | .20 | .02 | .21 | .07 | .06 | .22 | .42 | 46/24 | |
| 20 | .05 | .09 | .11 | .07 | .21 | .01 | .10 | .00 | .06 | -.06 | -.09 | .06 | .04 | .09 | .17 | .11 | .04 | .14 | -.07 | 76/20 |
| CV | .30 | .22 | .33 | .51 | .35 | .51 | .44 | .21 | .43 | .20 | .24 | .25 | .25 | .39 | .34 | .33 | .40 | .52 | .49 | .29 |

*Note.* $N = 168$ ($r > .15$: $p < .05$; *two-tailed*); *mean* percentages of correct answers (M) ranging from 15 (achieving compassionate goals) to 87 (promoting tolerance); variables: 1=Awareness-competence, 2=Knowledge-based interactions, 3=Acquiring positive bias, 4=Allowing positive bias; 5=Acceptance-competence, 6=Expressing deeper meaning, 7=Searching similarities, 8=Promoting tolerance, 9=Care-competence, 10=Supporting others, 11=Achieving compassionate goals, 12=Perspective taking, 13=Trust-competence, 14=Being positive and open, 15=Negotiating identities, 16=Keeping (power-)balance, 17=Love-competence, 18=Closeness, passion, defending, 19=Communicating love, 20=Maintaining novelty, CV = Competence Value

**Table 2. Interpersonal Competence and Validity Indicators: Correlations and Descriptive Statistics (M, SD)**

| Variables | 1 (*n*=167) | 2 (*n*=167) | 3 (*n*=167) | 4 (*n*=81) |
|---|---|---|---|---|
| 1. Interpersonal competence | 62.42<br>9.27 | | | |
| 2. Self-evaluation of interpersonal competence | .18<br>* | 1.97<br>0.55 | | |
| 3. External evaluation of interpersonal competence | .29<br>** | .39<br>** | 2.51<br>.064 | |
| 4. Happiness in close relationship | .30<br>** | .19 | .25<br>* | 2.53<br>0.72 |

*Note*. * $p < .05$, ** $p < .01$ (*two-tailed*).

**Possible Sources of Competence Development**

Further steps in construct validation of the interpersonal competence measurements were about testing hypotheses which were related to possible sources (independent variables) and underlying mechanisms (mediating variables) of competence development (e.g., Benson, 1998). In respect to personal and contextual sources of interpersonal competence development, it was expected that female students would show higher competences than male students. Furthermore, it was expected that older students showed higher competence than younger students and that interpersonal competence was related to the relationship status. Finally, it was assumed that interpersonal competence was positively related to the duration of a relationship and to the amount of professional activities. However, all these assumptions were not supported by the given data (see Table 3).

**Table 3. Correlations Between Interpersonal Competence with Possible Sources of Competence Development and Descriptive Statistics (M, SD)**

| Variables | 1 (*n*=168) | 2 (*n*=168) | 3 (*n*=167) | 4 (*n*=168) | 5 (*n*=81) | 6 (*n*=167) |
|---|---|---|---|---|---|---|
| 1. Interpersonal competence | 62.42<br>9.27 | | | | | |
| 2. Sex | .00 | .85<br>.36 | | | | |
| 3. Age | -.15<br>* | -.16<br>* | 23.51<br>7.32 | | | |
| 4. Relationship status | .01 | .01 | .21<br>** | .52<br>.61 | | |
| 5. Duration of relationship | -.11 | -.03 | .76<br>** | .11 | 4.00<br>6.87 | |
| 6. Professional activity | -.01 | .02 | .15<br>* | .00 | .15 | .65<br>.73 |

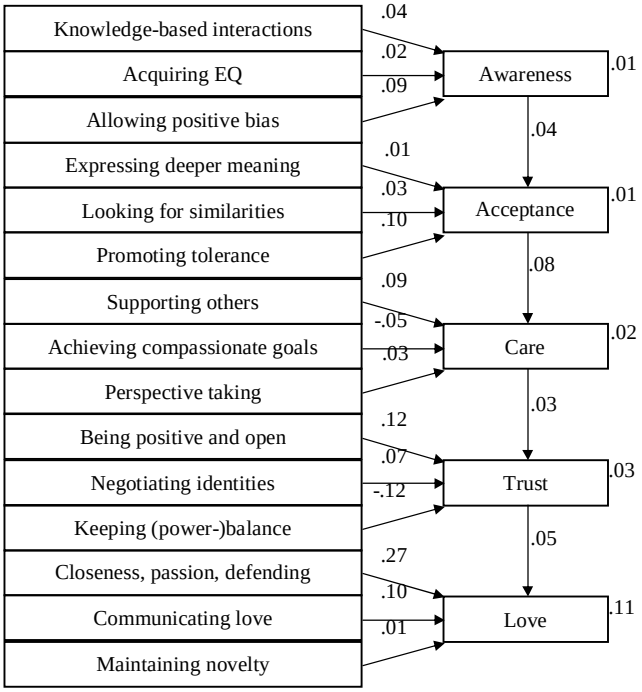
*Note*. * $p < .05$, ** $p < .01$ (*two-tailed*).

Sex, relationship status, and professional activities were not significantly correlated with interpersonal competence ($.01 \geq r \geq -.01$). The duration of a relationship correlated unexpectedly negatively with interpersonal competence ($r = -.11$), indicating that students with higher interpersonal competence had less long-lasting relationships. Probably, higher interpersonal competence could lead to a more critical and less optimistic evaluation of relationship partners and consequently to an earlier breakup of the partnership (e.g., Srivastava, McGonigal, Richards, Butler, & Gross, 2006). Another unexpected result concerned the significant negative correlation of age and interpersonal competence ($r = -.15$). One might expect that a higher age would correspond with more social experiences and opportunities for learning which should increase interpersonal competence. However, there are often inaccuracies and biases in perceptions and decisions within close relationships which could explain why a higher age and more experiences did not correspond with higher competence (e.g., Gagné & Lydon, 2004).

### *Model Testing on Mechanisms of Competence Development*

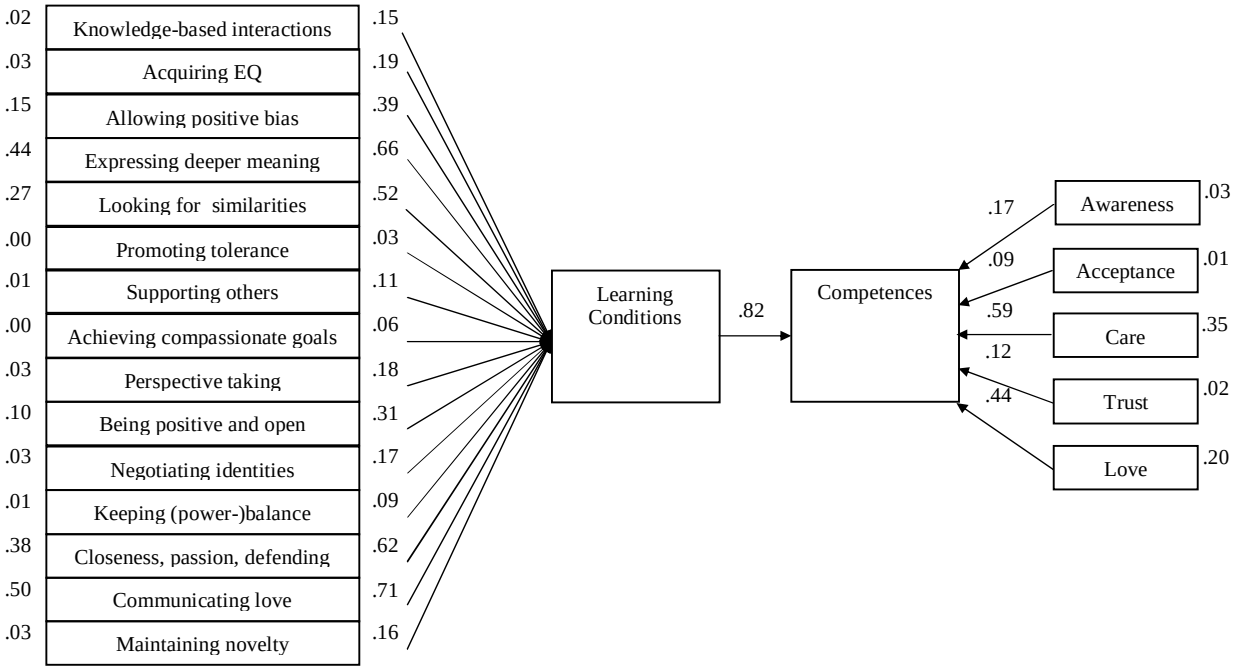
Within Figures 2 to 4, three different structural equation models on interpersonal competence development are depicted.

**Figure 2. Hierarchical step model on interpersonal competence development.**




*Chi-Q*=99.87; *df*=66; *p*=.005; *RMSEA*=.06; *GFI*=.94

***Figure 3*. Two factors model on interpersonal competence development.**

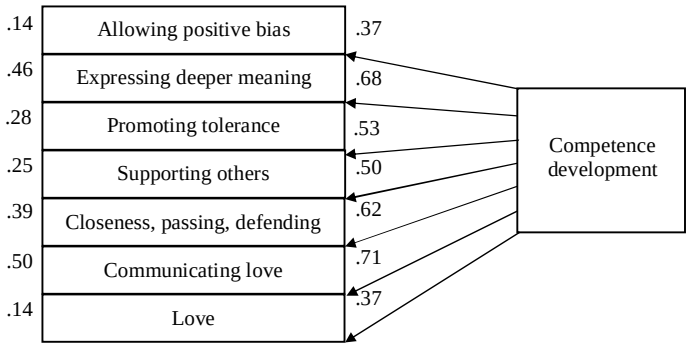



*Chi-Q*=185.83; *df*=168; *p*=.165; *RMSEA*=.03; *GFI*=.90

The first model represents the hierarchical step model with five competences and three related learning conditions (see Figure 2). A standard *path analysis* (Jöreskog & Sörbom, 1993, p. 11) for testing the effects of learning conditions on competences and from lower level competences on higher level competences showed a poor model fit (*Chi-Q* = 99.87; *p* = .005; *RMSEA* = .06; *GFI* = .94). In addition, there were indications of five additional relationships from *modification indices* which were all related to the care-competence. All *path coefficients* and *explained variances* did not reach statistical significance ($t < 1.49$; $p > .05$), except the relationship between the learning condition of closeness, passion, and defending on the competence level of love ($t = 3.19$, $p < .05$). Overall, data did not confirm a hierarchically organized developmental and support model for interpersonal competence development of university students.

Regarding the second two-factor model, it was assumed that there are combined effects of all learning conditions on all competence levels (see Figure 3). Learning conditions and competence levels were treated as two latent variables. A standard *regression analysis* with latent variables showed a non-significant combined effect of learning conditions on competence levels ($b = .82$, $t = 1.72$, $p > .05$) with an acceptable model fit (*Chi-Q* = 185.83; *df* = 168; *p* = .165, *RMSEA* = .03; *GFI* = .90; no *modification indices;* one allowed *error covariance* between communicating love and maintaining novelty). However, the reliability and validity of measurements varied strongly. The validity of measurements and related *factor loadings* concerning the learning conditions ranged from .03 (promoting tolerance) to .71 (communicating love), for the competence levels from .09 (acceptance-competence) to .59 (care-competence). Reliability coefficients (as *explained variances* (1 minus *error variance*)) for learning conditions ranged from .00 (promoting tolerance, achieving compassionate goals) to .50 (communicating love). Reliability coefficients for competence levels ranged from .01 (acceptance-competence) to .35 (care-competence). Overall, the two-factor model showed an improved model fit in comparison with the hierarchical step model, but both models were far from optimal. In particular, strongly varying validity and reliability coefficients indicated little congruency with theoretical or central assumptions about the construct of interpersonal competence.

**Figure 4. Reduced blended model on interpersonal competence development.**




*Chi-Q*=20.84; *df*=14; *p*=.106; *RMSEA*=.05; *GFI*= .97

Finally, the third reduced blended model represents a downsized model in which learning conditions and competence levels are mixed (see Figure 4). A *confirmatory factor analysis* showed a good model fit (*Chi-Q* = 20.84; *df* = 14; *p* = .106; *RMSEA* = .05; *GFI* = .97; no *modification indices*). However, only one competence level (love) and only six learning conditions (from three different competence levels) were found of adding significantly to the model fit. *Validity coefficients* ranged from .37 (allowing positive bias) to .71 (communicating love); all of them are statistically significant ($t > 4.35$). *Reliability coefficients* ranged from low .14 (allowing positive bias, love) to .46 (expressing deeper meaning), all *error variances* were also statistically significant ($t > 6.43$). Overall, among the tested models, the reduced blended model delivered the best fit between theory and data, but again there is a lack of measurement quality.

## *Discussion*

The purpose of this study was to focus on the interpersonal problem-solving abilities of university students as well as to develop and test a non-traditional competence-based measurement. Additionally, it was intended to find evidence regarding personal and situational sources and to learn about mechanisms of competence development. After calibration, an interpersonal competence measurement revealed not optimal, but acceptable indicators of reliability (scale consistency and difficulty) and validity (*correlations* of subscales and with internal/external evaluations of relationship skills). However, finding possible sources and mechanisms of interpersonal competence development was less successful: Interpersonal competence measurement results did not correlate as expected with sex, age, relationship status, duration of relationships, or professional activities. Also, attempts to find internal mechanisms for interpersonal competence development showed different problems. A theoretically well-founded hierarchical step model failed to confirm the indication that interpersonal competence development might not have distinguishable levels each with different learning conditions. Results of testing more holistic (two factors and reduced blended) models showed a better fit to the data, but also had deficits in reliability and validity. There are two main reasons for these findings in interpersonal competence development of university students.

Firstly, as a general argument, many social or interpersonal competence tests have been based on ratings of attitudes, or other subjective assessments which does not correspond with our behavior- or problem-oriented measurement. In many cases, attitude-based rating scales produced good reliability and validity. However, some researchers argued that such results could depend on the semantic similarity of items more than on variations in real behavior (e.g., Cadwell & Jenkins, 1985), or that performance judgements are influenced not only by reality, but also by implicit standards of effective behavior (e.g., Kishor, 1995). Additionally, in social research, some researchers found evidence for an "attitude-behavior gap" which means that sometimes or even often people do not behave according to their attitudes, values, or intentions (e.g., Greve, 2001). Others argued that there were significant differences between attitudes, behavior-based attitudes, and real behavior (Kaiser, Oerke, & Bogner, 2007). For assessment purposes, this means that measurements of attitudes and behavior might not correlate as highly as expected and above all, results that are based on attitude-related ratings might not be similar for behavior-oriented and problem solving-based tests. This issue might hypothetically explain why our personal and situational sources of competence development were not found to be as effective as in other studies which have been based on (self-)ratings of interpersonal competence (e.g., Ajzen & Fishbein, 2005).

A second explanation might be that there is sufficient knowledge about interpersonal competences or behavior, but not on how to change such competences (Heimlich & Ardoin, 2008). In our study, we tried to test two different types of change mechanisms: A hierarchically step-model and a more holistic (two factors and reduced blended) approach. Within the first step-by-step approach, it is generally assumed that people acquire social competences level after level and in a certain sequence which is based on perception (awareness), evaluation (acceptance), support (care), strengthening relationships (trust), and finally fulfillment (love) with respect to a partner. This process seems to consist of evaluating and adjusting to other people in combination with different types of information processing. Social information processing was found to be an important mediating variable in relationships (e.g., Fite, Bates, Holtzworth-Monroe, Dodge, Nay, & Pettit, 2008). It might be "cognitive" (based on rational problem-solving), "fuzzy" (with ill-defined goals, methods, and solutions), "emotional" (based on changes in mood or feelings), or "unconscious" (beyond the borderline of consciousness) (Astleitner, 2014). In addition, competence development is also mediated by special learning experiences: The acquisition of competences is stimulated by activation (of prior knowledge), demonstration (of problem-solving strategies), application (of strategies in new situations), and integration (of strategies in daily experiences) (Astleitner, 2014, p. 49). Within the second holistic approach, interpersonal competence development is hypothetically about accumulating social experiences and relationship building strategies in a more general and less analytic way (e.g., Peterson & Rhodes, 2003). In this case, competence development is achieved by the outcome of self- and relationship-management activities (e.g., planning, self-control, or networking; Boyatzis, Stubbs, & Taylor, 2002). Within the given study, no clear and consistent evidence was found for either the step-by-step or the holistic approach. Further theoretical clarification on mechanisms of interpersonal competence development, especially for adults and/or university students is needed (e.g., Spence, 2003).

## Limitations

The small sample size, the focus on students of social study programs, and the dominance of females within the sample do not allow the generalization of the results of this study. Another shortcoming concerns the fact that for assessment and related statistical purposes, modern test theory models could be used (e.g., multidimensional Item Response Theory models; Hartig & Höhler, 2009). However, the competence model in this study differs from traditional assessment modeling as it uses hierarchically organized levels together with learning conditions on each level. Models, like the one in this study, would require complex hierarchical modeling with multilevel, regression, and explanatory capacities. However, such models and related practical applications are "notoriously complicated" and "largely nonexistent" (Vandekerckhove, Tuerlinckx, & Lee, 2011, p. 44).

## Implications

This study was a first exploratory attempt to develop a behavior-orientated social problem-solving measurement for university students. At first sight, the developed interpersonal competence measurement showed acceptable quality concerning reliability and validity. However, a deeper model-based analysis was unsuccessful when trying to identify conclusive situational and personal conditions and developmental mechanisms. Before the measurement of this study can be made available in daily higher education, additional research activities are necessary. Future research should compare self-ratings of interpersonal competence, for example the ICQ from Buhrmester, Furman, Wittenberg, and Reis (1998) with measurements that are based on problem-solving tasks. Such research might collect further information about conceptual differences or bias, for example in relation to the attitude-behavior-gap. In addition, it might be helpful to know more about strategies of the interpersonal competence development of university students. Little is known about whether interpersonal competence development is an important, explicit, and systematically pursued goal of university students. If such an aim is important for university students, then it is an open question how they should acquire and be assisted in achieving this complex goal? What kind of learning contexts, (e.g., integration into existing courses, special course offerings, case-based reasoning, or coaching programs), realize effective and efficient instructional scenarios for supporting university students in interpersonal competence development? Although support strategies are a major component of our model, there is no instructional theory or plan about how such strategies could be integrated into training programs (e.g., Astleitner, 2000; Astleitner & Leutner, 2000). Such an instructional theory as the core element of an effective intervention program would be necessary for our assessment approach, especially because existing relationship programs suffer from small effects. Hawkins, Blanchard, Baldwin, and Fawcett (2008) found within their meta-analysis small *effect sizes* ($d$ = .30 to .36) of such programs on relationship quality.

Another problem is that given interventions on interpersonal competence development are only integrated within marriage and relationship education for adults. But a preventive and a university student's perspective are missing. Only a few researchers (e.g., Hawkins, Braithwaite, Lambert, Fincham, & Pasley, 2010) have tried to integrate interventions on interpersonal competence into existing courses in higher education. However, they only focused on romantic relationships and extradyadic involvement. Others like Cottle, Thompson, Burr, and Hubler (2014) focused on university students' relationship knowledge, attitudes, and communication competences that were closely related to interpersonal competence, but had only realized self-ratings without a problem-solving perspective. In order to expand our interpersonal assessment to a training program, a "design-based approach" (e.g., Plomp & Nieveen, 2007) would be necessary. Such an approach integrates a theory, analysis of problems, goal-based course development, formative assessments, test of prototypes, and so on. For example, Long and Hall (2015) showed how to use design-based research in the field of teacher education in which interpersonal competence development plays an important role.

A further possibility for future research in the field of interpersonal competence of university students, might be to distinguish between individual differences and/or different objectives and related strategies in relationship building: Some students might try to achieve higher levels of interpersonal competence (e.g., trust or love) with partners, others might prefer to stop at lower levels (e.g., awareness). These differences are often linked to different types of relationships (professional partnerships, friendships, close or romantic relationships, etc.). Goals, strategies and types of relationships might strongly influence interpersonal competence (e.g., Canevello & Crocker, 2010). Overall, in the field of higher education, this study should stimulate not only attempts for research on interpersonal competence and its importance for students' assessments, but also for course design.

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