



Profile similarities among romantic partners' character strengths and their associations with relationship- and life satisfaction

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ABSTRACT

We studied the similarity among partners' character strengths (i.e., positively valued traits) across two studies. In Study 1, $N = 68$ couples completed the 240-item VIA Inventory of Strengths and in Study 2, $N = 143$ couples completed a 24-item brief-form and measures of life- and relationship satisfaction. We computed raw, normative, and distinctive profile similarities for the 24 strengths and found support for partners' similarity in both studies (normative: $r_s \geq 0.84$; raw: $r_s \geq 0.23$; distinctive: $r_s \geq 0.06$). Actor-Partner Interdependence Model analyses (Study 2) provided no evidence for the notion that similarity relates to couples' satisfaction. We discuss our findings regarding prior research, assortative mating preferences, and extensions to the study of partner- and ideal partner perceptions.

1. Introduction

Romantic relationships are positive institutions that contribute to well-being and positive experiences (Seligman & Csikszentmihalyi, 2014) and most adults strive to establish and maintain close relationships (Baumeister & Leary, 1995). Human mating is far from random and partner similarity relates to the formation and longevity of relationships (e.g., Buss, 1994, 2016). Common wisdom (e.g., “birds of a feather flock together”) aligns with the similarity attraction hypothesis, which assumes that people are attracted to others who are similar to themselves in a variety of variables, including personality traits (e.g., Buss, 1994; Byrne, 1971, 1997). Empirical research has provided robust support for the notion that similarity attracts and that partners are on average similar at the on-set as well as later phases of relationships (for an overview, see Luo, 2017; Montoya et al., 2008). While many studies have examined partner similarity for broad personality traits such as the big five and HEXACO traits, research on character strengths in close relationships has received comparatively little attention thus far, which is surprising given that several character strengths are among the traits most sought after in potential partners (e.g., Buss & Barnes, 1986). Particularly, we are not aware of research on partner similarity in character strengths. This is surprising as the core criterion for the

definition of character strengths (“A strength contributes to various fulfillments that comprise the good life, for the self and for others.”) implies that character strengths may be beneficial to the partner (Peterson & Seligman, 2004, p. 17). We aimed to narrow this gap in the literature by studying the similarity in romantic partners' profiles of character strengths across two studies. In addition, we used Actor-Partner Interdependence Model (APIM; Cook & Kenny, 2005) analyses to study whether profile similarities are associated with relationship satisfaction (RS) and life satisfaction (LS).

1.1. Character strengths

Character strengths are morally positively valued personality traits and Peterson and Seligman's (2004) Values-in-Action (VIA) classification of strengths and virtues covers 24 character strengths. These are assigned to six broader virtues (i.e., wisdom, courage, humanity, justice, temperance, and transcendence). Peterson and Seligman selected the strengths based on ten criteria (e.g., they must be fulfilling, morally valued, or not diminishing others when displayed, for an evaluation of these criteria, see Ruch & Stahlmann, 2019). The strengths relate differentially to outcomes such as well-being and LS (Baumann et al., 2020; Buschor et al., 2013), posttraumatic growth (Peterson et al., 2006)

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and growth after collective life events such as the COVID-19 pandemic (Gander & Wagner, 2021), health behaviors (Proyer et al., 2013), and work-related outcomes such as job performance (Harzer et al., 2021), to name but a few.

Seligman's (2012) PERMA (R indicating "Relationships") model of flourishing posits that (positive) relationships are an important foundation for well-being. Empirical findings support this notion. For example, studies showed robust associations between self-reports of engaging in positive relationships and LS and flourishing (Gander et al., 2017), and daily exercises to increase attention to relationships in day-to-day life improved well-being and alleviated depressiveness in a placebo-controlled randomized control study (Gander et al., 2016). Moreover, Seligman proposes that the use and enactment of strengths contribute to flourishing in the domain of *relationships*; particularly for those strengths that play a role in social settings and might affect how oneself but also the partner experiences the relationship (e.g., self-regulation, kindness, and gratitude). In line with the personality-relationship transaction model (Mund et al., 2016; Neyer & Asendorpf, 2001), which posits that personality traits affect how people interact with their social environment and considering that character strengths are defined as fulfilling, morally valued, and do not diminish others (Peterson & Seligman, 2004), we argue that character strengths contribute to the formation and experience of relationships and how people interact with their partner. Initial findings support this notion, as, for example, character strengths predicted being accepted by peers and experiencing friendship quality even at an early age (Wagner, 2019). However, the role of the VIA strengths is comparatively understudied in romantic life.

1.2. Character strengths in romantic life

Although theoretical and empirical research has highlighted the role of character strengths for, particularly close, relationships (e.g., Peterson & Seligman, 2004; Ruch et al., 2018; Seligman, 2012; Wagner, 2019), to the best of our knowledge, only two studies have thus far examined the VIA character strengths in romantic relationships. Using a sample of 177 opposite-sex adult couples, Boiman-Meshita and Littman-Ovadia (2022) tested the associations between the higher-order strength factors *caring* (including the character strengths of gratitude, kindness, love, teamwork, social intelligence, and leadership), *self-control* (prudence, perseverance, self-regulation, honesty, and humility), and *inquisitiveness* (curiosity, creativity, zest, bravery, love of learning, and hope) and marital satisfaction, intimacy, and burnout. APIM analyses showed positive actor effects of the strength factors for all study variables and positive associations with their *partner's* RS (i.e., partner effects). Supplementary analyses showed positive actor effects for the single strengths (except for appreciation of beauty, gratitude, and humor in men; prudence in women). Further, they found positive partner effects of creativity, curiosity, fairness, forgiveness (in women), gratitude (in women), honesty, hope, humility, judgment, prudence, self-regulation, social intelligence, teamwork, and zest on RS. Hence, character strengths relate to indicators of RS in actors and in some cases their partner's, which is in accordance with Peterson and Seligman's (2004) notion of character strengths being beneficial for oneself and the partner. In addition, they found robust similarity among partners' higher-order strength factors, with coefficients between 0.21 and 0.27. However, similarity findings for single strengths were not reported and associations between partners' similarity in strengths and RS were not tested.

Weber and Ruch (2012) examined the partner similarity of 87 adolescent couples (mean age: 16.5 years) with analyses of self- and ideal partner ratings of the 24 character strengths assessed with an age-appropriate measure, the German version of the VIA-Youth (Park & Peterson, 2006; Ruch et al., 2014). They found overall positive partner similarity correlations (≥ 0.20) for creativity, bravery, honesty, zest, fairness, perseverance, teamwork, fairness, beauty, gratitude, hope, and

spirituality. Moreover, Weber and Ruch tested whether similarity (measured as absolute differences between partners' scores in strengths, i.e., greater differences indicate higher dissimilarity) relates to LS. Multiple regression analyses, including the strengths of actors (Step 1), partners (Step 2), and the couples' dissimilarity scores (Step 3), showed mixed findings: For boys, similarity in perseverance, zest, forgiveness, and humor was associated with their LS, whereas similarity in honesty and teamwork was associated with girls' LS. Further, they found consensus in partners' desires for an ideal partner's expressions in the strengths when computing the rank-order correlation ($r = 0.89$). Weber and Ruch's study suggests that adolescents show assortative mating preferences and partner similarity concerning the VIA strengths.

Taken together, the findings of these studies support the notion that individual differences in character strengths relate to how people experience their relationship and provide preliminary support for the notion that partners are similar in their strengths. However, an analysis of the similarity in the full *profiles* of the strengths and an examination of their associations with relationship outcomes in a well-powered adult sample is thus far missing.

1.3. Partner similarity in romantic couples

The role of partner similarity has received major interest in research on romantic relationships. Studies testing the degree of partner similarity showed systematic similarity across a wide range of variables, and similarity has been argued to play a role for initial romantic attraction, satisfaction with and the longevity of relationships, and the heritability of traits (e.g., Buss, 1994, 2016; Byrne, 1971, 1997; Luo, 2017; Watson et al., 2004, 2014; Weidmann et al., 2016). Hence, the study of similarity concerns two distinct questions; namely, the *description* (i.e., "how similar are partners?") and the *effects* of similarity (i.e., "does similarity relate to outcomes such as romantic interest, relationship satisfaction, or longevity of a relationship?").

Description of similarity. The description of similarity concerns quantifying the degree of similarity among partners. Luo (2017) suggests distinguishing between assortative mating, partner similarity, and potential mechanisms for why partners match non-randomly: "Whereas A[ssortative]M[ating] specifically refers to initial partner similarity evident at the beginning of the relationship that reflects active or passive assortment, (couple) similarity refers to partner similarity at any point of the relationship, which may result from initial assortment and/or development within the relationship" (p. 1). For both assortative mating and partner similarity, there is robust evidence for the systematic similarity of partners concerning various characteristics, including psychologically relevant variables such as attitudes, values, and personality traits (see e.g., Buss, 1994, 2016; Luo, 2017; Montoya et al., 2008; Weidmann et al., 2016). Luo's literature review shows that the magnitude of partner similarity correlation coefficients depends on what variables are studied, with similarity correlation coefficients in the range of $0.70 \leq r \leq 0.90$ for age, $0.40 \leq r \leq 0.60$ for education, $0.40 \leq r \leq 0.70$ for attitudes, $0.10 \leq r \leq 0.40$ for values, and consistently positive but comparatively weaker similarities for personality traits (≤ 0.30). For the latter, findings apply to broad traits (e.g., big five; Weidmann et al., 2016) as well as narrow traits (e.g., adult playfulness, power, and dispositions toward ridicule and being laughed at; e.g., Brauer & Proyer, 2018; Körner & Schütz, 2021; Proyer et al., 2019).

Effects of similarity. The consequences of partner similarity have been discussed from genetic, social, and psychological perspectives (for overviews see e.g., Buss, 2016; Luo, 2017). Here, we focus on the psychological consequences of partner similarity in personality traits. It has been argued that similarity provides partners with shared ways of perceiving and dealing with their social environment. Thus, similar behaviors and experiences are expected to decrease the likelihood of conflict among partners, thereby contributing to greater RS and, in the long-term, a lower probability of dissolving the relationship (Rammstedt et al., 2013). Studies testing the associations between similarity and

outcomes have provided mixed findings. When controlling for main effects of both partners' personality traits, cross-sectional and longitudinal studies showed positive associations between partner similarity in broad and narrow personality traits and the outcomes of RS and LS, but effect sizes are small to negligible (e.g., Brauer & Proyer, 2018; Brauer et al., 2021; Chopik & Lucas, 2019; Decuyper et al., 2012; Dyrenforth et al., 2010; Furler et al., 2013; Humbad et al., 2013; Proyer et al., 2019; van Scheppingen et al., 2019; see also Luo, 2017; Weidmann et al., 2016). Rammstedt and colleagues (2013) used an alternative approach to study how similarity relates to break-up, as they compared the similarity of stable and separated couples' big five traits ($N_{\text{total}} = 4,809$ couples) across two assessments over a 4-year interval. Couples who dissolved their relationship at Wave 2 showed lower initial similarity and became less similar over time ($0.10 \leq \Delta r \leq 0.24$) than couples who did not break up. These "surviving" couples were characterized by higher initial similarity at Wave 1 and the absence of change in similarity over time ($\Delta r \leq 0.01$). Taking these findings together, partners' similarity in personality traits has typically shown small associations with indicators of satisfaction beyond the existence of actor and partner effects, but Rammstedt et al.'s findings suggest that similarity might relate to long-term consequences for relationships. Also, when studying similarity at the on-set of relationships, meta-analytic findings showed that similarity predicts romantic interest and attraction to a potential partner (Montoya et al., 2008).

Similarity in traits and profiles. Finally, two major approaches to assessing similarity are distinguished: *trait wise* approaches examine partner similarity concerning a single trait and allow inferences about similarity across persons in a single trait (i.e., variable-centered analysis). While this approach is informative at the fine-grained level, it only captures a fraction of the full set of personality traits, in our case strengths, that describe a person more comprehensively. To achieve a more comprehensive assessment, one is interested in testing the similarity among a set of variables, the *profile* of traits (i.e., person-centered; in dyadic studies: couple-centered analyses). Testing partners' similarity among profiles allows for the comprehensive and simultaneous analysis of the full information that characterize the partners in a couple (Furr, 2008; Rogers et al., 2018). Technically, the difference between both approaches is that the trait wise approach analyzes the similarity across all couples concerning a single attribute, whereas the profile approach analyzes a single couple concerning a set of attributes. The latter is done for each couple and then averaged across all couples to inform about the average profile similarity. We argue that testing profiles is of particular interest when studying partners' similarity in the configurations of their 24 strengths.

1.4. The present study

The VIA strengths have been theoretically and empirically linked to how people experience and maintain their relationships; for example, in friendships and couples of different age groups (Boiman-Meshita & Littman-Ovadia, 2022; Seligman, 2012; Seligman & Csikszentmihalyi, 2014; Wagner, 2019; Weber & Ruch, 2012). We aimed to extend the research on character strengths in romantic relationships by addressing partner similarity across two independent studies. The aim of Study 1 was to test the magnitude of similarity in couples' profiles of their character strengths using the full 240-item VIA-IS questionnaire. In Study 2, we aimed to replicate the findings of Study 1 using a brief form of the strengths questionnaire and additionally to test how similarity is associated with RS and LS in couples.

We expected that partners would share similar expressions of their positively valued behaviors, thinking, and views as described in the 24 strengths of the VIA classification. Our rationale for this notion is based on two assumptions. First, Boiman-Meshita and Littman-Ovadia's (2022) findings indicate the existence of partner similarity in the range reported in the literature on personality and values, with coefficients between 0.20 and 0.30 (Luo, 2017). Also, Weber and Ruch's (2012)

findings from adolescents suggest that character strengths are desired in potential partners and that adolescent couples are similar in their self-reports. Further, Wagner (2019) showed that character strengths (particularly kindness, fairness, humor, and honesty) are desired by adolescents when they describe what they seek for in a potential best friend and that similarity among friends' strengths is related to higher friendship quality. Hence, initial evidence suggests that close relationships are characterized by dyadic similarity and a desire for those character strengths in close others to be expressed similarly. Secondly, research testing partner preferences independently from a theoretical framework of personality trait classifications found that traits and attributes such as kindness, creativity, good sense of humor, and playfulness are among the most desired traits in potential partners (e.g., Buss & Barnes, 1986; Chick et al., 2020; Watson et al., 2014). One might argue that these attributes resemble Peterson and Seligman's (2004) character strengths to a certain degree, and we speculate that morally positively valued traits could be sought for in partners in similar ways. Moreover, people's preferences are related to their self-reports but also to their actual spouses' self-reports, in line with the similarity attraction hypothesis (e.g., Botwin et al., 1997; Buss & Barnes, 1986; Byrne, 1997; Chick et al., 2020; Watson et al., 2014; Weber & Ruch, 2012).

For the description of the partner similarity, we focused on studying the profile similarity in partners' full sets of the 24 strengths. We used Furr's (2008) approach to profile analysis that allows differentiating between the *raw* profile similarity and the *distinctive* profile similarity. Distinctive profile similarity adjusts for stereotype effects (normativeness) and describes the degree of similarity in partners' *deviations* from the average person. Due to controlling for normativeness, coefficients from distinctive profile analyses are typically lower than raw profile correlation estimates, but they allow for a less biased assessment of similarity (Rogers et al., 2018). Prior studies illustrated the importance of removing stereotype effects. For example, Rogers et al. (2018) reported a high raw profile similarity for the big five traits ($r = 0.39$) that was reduced to 0.02 after removing normativeness. The same has been found when studying profiles of narrower traits such as dispositions toward ridicule and being laughed at ($r_{\text{raw}} = 0.51$, $r_{\text{distinctive}} = 0.27$; Brauer & Proyer, 2018) and facets of adult playfulness ($r_{\text{raw}} = 0.55$, $r_{\text{distinctive}} = 0.12$; Proyer et al., 2019). Although distinctive profile similarities of broad and narrow personality traits are typically numerically small, they are consistently positive and robust in the sense that 95% confidence intervals exclude zero, thus suggesting the existence of configural similarity among partners' deviations from the average person. Finally, the normative profile describes the profile of the average person. In studies of opposite-sex couples, the normative profile similarity is computed separately for men and women and informs about the similarity between the stereotypical profiles of men and women. Typically, normative profiles are highly correlated (≈ 0.90 ; e.g., Rogers et al., 2018). Taking prior findings on couples' profile similarities into account, we expected to find positive profile similarities, with numerically small distinctive profile similarity coefficients above chance (i.e., their confidence intervals exceeding zero). In addition to the profile analyses, we examined the trait wise similarity of the 24 strengths in an exploratory fashion across both studies.

The second aim of Study 2 was to test whether partner similarity in strengths robustly relates to RS and LS. The literature has shown that profile similarity indices outperform single trait absolute difference scores in terms of predictive validity (e.g., Brauer & Proyer, 2018; Furler et al., 2013; for a discussion of the disadvantages of absolute difference scores as estimates of similarity see also Edwards, 2001). Thus, we examined whether couples' similarity in the profiles of strengths is associated with RS and LS over and above actor and partner effects. We used the APIM (Cook & Kenny, 2005) to account for the partners' interdependence in predictor and outcome variables and to control for actor- and partner effects of the strengths on RS and LS. In line with the literature on associations between partner similarity and indicators of satisfaction (e.g., Brauer & Proyer, 2018; Furler et al., 2013; Humbad

et al., 2013; Luo, 2017; Weidmann et al., 2016), we also expected positive associations of minor size between profile similarity and partners' satisfaction.

Taken together, the data from both studies allowed us to examine the questions of similarity in strengths among couples by using two assessment approaches (i.e., brief- and full forms), to replicate the findings across samples and methods, and to examine the associations between similarity and the outcomes of RS and LS in couples.

2. Study 1

2.1. Method

2.1.1. Sample

We collected data of 68 opposite-sex couples with men aged 23 to 76 years ($M = 49.0$, $SD = 12.5$) and women aged 21 to 84 years ($M = 46.9$, $SD = 12.5$). Most couples were married (72.1%). Close to two thirds of the sample held a degree from a university or a university of applied sciences (61.8%), 23.6% finished high school qualifying them to attend a university or a university of applied sciences, 12.5% completed vocational training, 1.5% completed secondary education, and one person did not finish secondary education. In this sample, we did not assess information on cohabitation or relationship duration.

2.1.2. Instruments

The *Values-in-Action Inventory of Strengths* (VIA-IS; Peterson et al., 2005; German version by Ruch et al., 2010) is the 240-item self-report instrument for the assessment of the 24 character strengths from the VIA classification. Each strength is assessed with 10 items. All items are answered on a 5-point Likert-style scale ranging from 1 = "very much unlike me" to 5 = "very much like me." A sample item is "I find the world a very interesting place" (*curiosity*). Ruch et al. (2010) report good internal consistency ($0.71 \leq \alpha \leq 0.90$) and retest-reliability ($r_{tr} \geq 0.65$ for 6-month intervals and ≥ 0.62 for 9-month intervals) and provide evidence for criterion validity.

2.1.3. Procedure

Data collection was carried out before the COVID-19 pandemic and participants provided informed consent. The study was approved by the local ethics committee. The data analyzed here are a subsample of 5,521 participants who took part in an online training program for character strengths that was advertised in online forums, newspaper articles, and mailing lists. Inclusion criteria were being ≥ 18 years of age, no consumption of illegal drugs, and currently not being in psychotherapeutic treatment. Participants were asked to provide the email address of their partner if they also participated in the training program. Based on this information, a total of 68 opposite-sex couples could be matched. Participants received no financial compensation, but individualized feedback on their character strengths at the end of the program. The data reported here partially overlap with those reported in Wagner et al. (2020), who investigated the relationship between character strengths and PERMA but did not examine dyadic relationships.

2.1.4. Data analysis

We used two approaches to profile similarity. First, we correlated the rank order of the strengths of the men and women. This allows to derive an estimate of how the relative rankings of the strengths are associated among men and women on average. Secondly, we used Furr's (2008) approach to examine the within-couple profile similarity (i.e., each couple is denoted by a similarity coefficient). Furr suggests analyzing three types of profiles and, accordingly, three types of similarity. First, *normative profiles* are based on the men's and women's respective sample means in the strengths, thus reflecting the expressions of strengths for the average man and average woman. The normative profile similarity describes how the average man and the average woman converge in their strengths. Next, we computed *raw profile similarities* for each couple

by correlating the couples' man's and woman's respective responses to the 240 items of the VIA-IS, which informs about the overlap of partners' raw profiles. Thirdly, we computed *distinctive profiles* by mean-centering the women's and men's scores on their respective sample means. Thus, the distinctive profiles describe deviations from the average man's and average woman's profile and the distinctive profile similarity informs about partners' similarity in deviations from the stereotypical profile. This procedure adjusts the profiles for normativeness and controls for stereotype effects (Furr, 2008; Rogers et al., 2018). After computing the raw and distinctive profile similarity correlations for each couple, we computed the mean of the similarity coefficients across all couples on basis of Fisher r -to- z transformed values. The mean value was transformed back by z -to- r transformation and informs about the average similarity in the sample (i.e., across all couples). We examined the statistical significance of the profile similarities with one-sample t -tests (test value = 0; two-tailed). As a supplementary analysis, we examined the trait wise similarities in single strengths by computing bivariate correlations between the men's and women's VIA-IS scale scores. For all correlation analyses, we computed bootstrapped ($k = 5,000$ samples) 95% confidence intervals (CI) and assumed statistical significance of a coefficient when the CI excludes zero and when $p < .05$ (two-tailed).

Sample size rationale. We determined the sample size appropriate for our research based on the rationale of our main analyses; namely, testing the profile similarity in couple-centered analyses. For each couple, we computed the profile correlation on basis of each partner's responses to the $N = 240$ items of the VIA-IS. Thus, our analyses rely on the number of items that constitute a profile (Furr, 2008; Rogers et al., 2018), and each profile correlation is computed on basis of 240 observations. Simulation studies showed that this sample size provides stable estimates of correlations, showing minor fluctuations around ρ (Schönbrodt & Perugini, 2013). After computing the profile correlations for each couple, resulting in 68 profile correlation coefficients, we tested the mean profile correlation among all couples by averaging the stable correlations using Fisher r -to- z transformation. This allowed us to derive a robust initial estimate of the average profile similarity among couples.

2.2. Results

2.2.1. Preliminary analyses

The internal consistencies of the VIA-IS scales were in line with prior findings on the German-language version (e.g., Ruch et al., 2010), with α coefficients between 0.62 (*self-regulation*) and 0.93 (*spirituality*; $\alpha_{median} = 0.76$). The mean and SD values of the VIA-IS scales were comparable to Ruch et al.'s (2010) findings. On average, men and women showed small mean differences in their strengths (Cohen's $d_s \leq 0.44$) except for a moderate effect size in *judgment* ($d = 0.62$) with men reporting greater expressions than women (see Fig. 1). All coefficients of the descriptive statistics and internal consistencies are displayed in ESM A.

As a preliminary analysis, we inspected the similarity in the single strengths. We found statistically significant partner similarity in five of the 24 strengths, namely zest, gratitude, hope, humor, and spirituality ($r_s \geq 0.24$, $p_s \leq .048$, 95% CIs not including zero; see Table 1).¹ As in Weber and Ruch (2012), we also found inclinations to similarity in creativity ($r = 0.18$), teamwork ($r = 0.21$), and appreciation of beauty ($r = 0.19$), but coefficients were not statistically significant (95% CI including zeros and $p_s \leq .092$) and should not be overinterpreted without replication. Against expectations, we found initial evidence for complementarity in the strengths of judgment ($r = -0.30$, 95% CI [-0.47, -0.12], $p = .013$) and social intelligence ($r = -0.25$, 95% CI [-0.43, -0.05], $p = .043$).

¹ We also found a statistically significant ($p = .014$) similarity coefficient of $r = 0.29$ for love, but the standard error was comparatively large (0.15) and the bootstrapped 95% CI included zero. The finding awaits replication before interpretation.

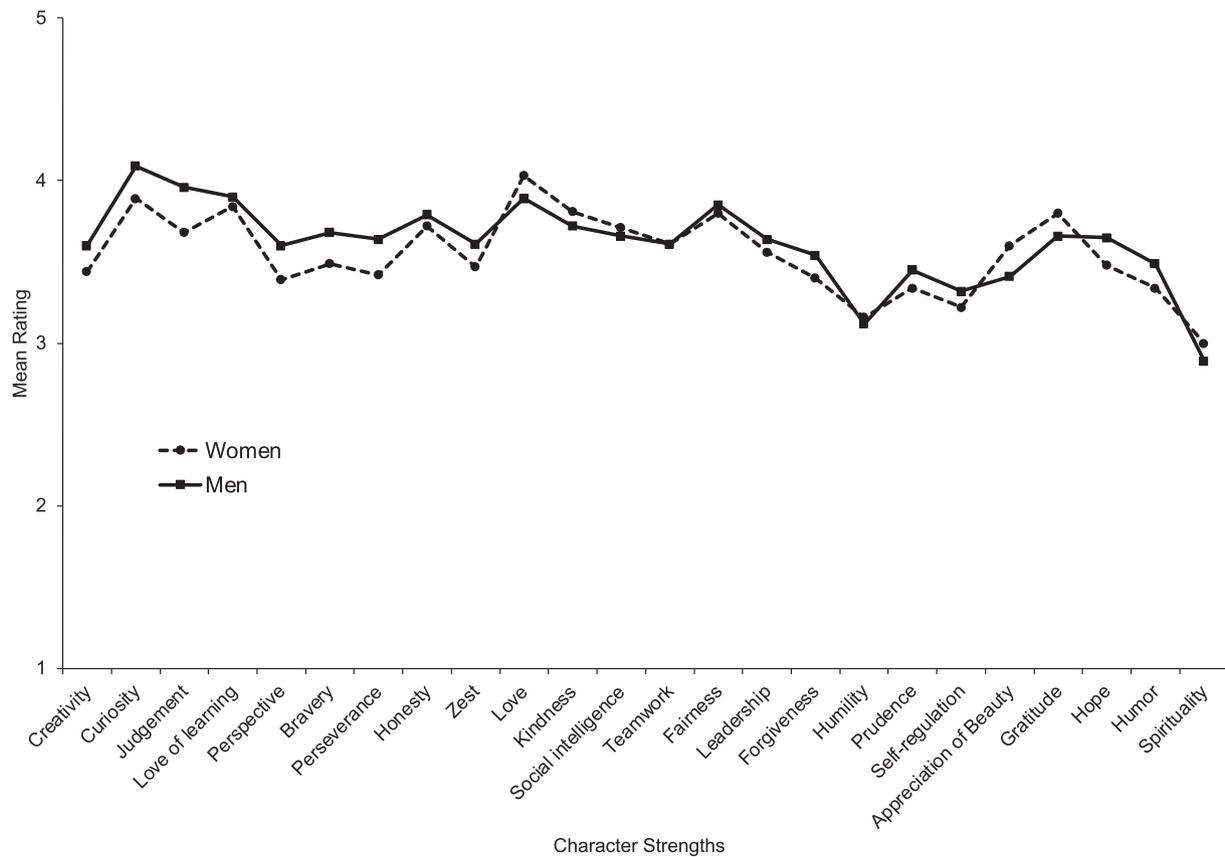


Fig. 1. Normative Profiles of Character Strengths Assessed With the 240-item VIA-IS for the Women and Men in Study 1.

Table 1
Similarity Correlation Coefficients with Bootstrapped ($k = 5,000$ Samples) 95% Confidence Intervals in Study 1 and 2 ($N = 68$ and 143).

	Study 1 (240-item VIA-IS)		Study 2 (24-item CSRF)	
<i>Profile similarity</i>				
Normative	0.87***	[0.84, 0.90]	0.84***	[0.51, 0.95]
Raw	0.23***	[0.20, 0.26]	0.27***	[0.22, 0.23]
Distinctive	0.06**	[0.02, 0.09]	0.10***	[0.05, 0.15]
<i>Trait wise similarity</i>				
Creativity	0.18	[-0.07, 0.40]	-0.06	[-0.20, 0.08]
Curiosity	-0.04	[-0.26, 0.18]	0.11	[-0.08, 0.30]
Judgement	-0.30*	[-0.47, -0.12]	0.08	[-0.09, 0.25]
Love of learning	-0.07	[-0.27, 0.13]	-0.01	[-0.17, 0.16]
Perspective	-0.08	[-0.33, 0.17]	0.10	[-0.06, 0.26]
Bravery	-0.03	[-0.21, 0.15]	0.22**	[0.04, 0.38]
Perseverance	-0.16	[-0.39, 0.08]	0.06	[-0.12, 0.23]
Honesty	-0.02	[-0.26, 0.23]	0.25**	[0.06, 0.42]
Zest	0.24*	[0.03, 0.43]	0.12	[-0.05, 0.29]
Love	0.29*	[-0.02, 0.55]	0.23**	[0.05, 0.40]
Kindness	0.24	[0.02, 0.46]	0.07	[-0.13, 0.28]
Social intelligence	-0.25*	[-0.43, -0.05]	0.10	[-0.08, 0.28]
Teamwork	0.21	[-0.02, 0.41]	0.28***	[0.13, 0.43]
Fairness	0.04	[-0.20, 0.27]	0.47***	[0.30, 0.62]
Leadership	-0.12	[-0.39, 0.17]	0.01	[-0.16, 0.18]
Forgiveness	-0.05	[-0.33, 0.22]	0.12	[-0.06, 0.29]
Humility	-0.01	[-0.30, 0.28]	0.15	[-0.05, 0.33]
Prudence	-0.13	[-0.38, 0.13]	0.14	[-0.04, 0.32]
Self-regulation	0.12	[-0.15, 0.37]	0.08	[-0.08, 0.23]
Beauty	0.19	[-0.03, 0.39]	0.14	[-0.01, 0.29]
Gratitude	0.43***	[0.25, 0.58]	0.28***	[0.12, 0.44]
Hope	0.35**	[0.19, 0.51]	0.20*	[0.05, 0.35]
Humor	0.27*	[>-0.00, 0.52]	0.09	[-0.08, 0.26]
Spirituality	0.54***	[0.34, 0.70]	0.47***	[0.30, 0.61]

Note. Coefficients in boldface indicate that 95% CIs do not include zero. * $p < .05$. ** $p < .01$. *** $p < .001$. Two-tailed.

2.2.2. Profile similarity

First, we examined the rank order similarity between men and women, which was robustly positive ($r = 0.88$, 95% CI [0.74, 0.96], $p < .001$; see ESM A for the ranks). This aligns well with the robust normative profile similarity ($r = 0.87$, 95% CI [0.84, 0.90], $p < .001$) and the visual inspection of trajectories of men’s and women’s strengths (Fig. 1). Thus, the expressions of the strengths were similar for the average man and the average woman.

Secondly, we tested the raw and distinctive profile similarity using the full set of the 240 VIA-IS items for each couple. On average, we found robustly positive raw profile similarity ($M_r = 0.23$, 95% CI [0.20, 0.26], $t_{67} = 14.97$, $p < .001$; $SD_r = 0.13$; ranging between -0.04 and 0.48). As expected, the distinctive profile similarity decreased when controlling for normativeness ($M_r = 0.06$, 95% CI [0.02, 0.09], $t_{67} = 3.36$, $p = .001$; $SD_r = 0.14$; ranging between -0.22 and 0.44).

2.3. Discussion

Our findings extended the study of character strengths in couples by providing initial evidence for partner similarity in profiles of the VIA strengths. As expected, the normative profile similarity indicated that the average man and woman show highly similar profiles of strengths, whereas the within-couple profile similarities revealed numerically low, but above chance (i.e., 95% CIs exclude zero), similarity coefficients after controlling for normativeness. The distinctive profile similarity coefficient found for the strengths exceeded those reported for the big five traits (Rogers et al., 2018), but fits well into prior findings of narrower traits such as adult playfulness and dispositions toward ridicule and being laughed at (Brauer & Proyer, 2018; Proyer et al., 2019). In conclusion, on average, couples showed positive but numerically small distinctive profile similarity. Furthermore, the range and SDs of the similarity coefficients indicated that couples vary in their similarity,

which poses the follow-up question of whether similarity relates to indicators of RS and LS (i.e., are similar couples happier than less similar couples?). When it comes to the similarities in single strengths, our findings converged well with those reported for adolescent couples (Weber & Ruch, 2012), both numerically and conceptually, regarding which strengths indicated partner similarity. Against expectations, we found dissimilarity among partners' expressions in the strengths of judgment and social intelligence, which might also have reduced the profile similarities.

While the sample size was appropriate for the profile similarity analyses, it is desirable to replicate the findings in a larger sample. Further, it must be noted that our sample was comparatively old. Since similarity is typically higher in older couples (e.g., Brauer et al., 2021; Rammstedt & Schupp, 2008), replication in a sample comprising younger couples is also desirable. Therefore, the main ambitions behind Study 2 were to replicate our findings and to extend the analyses to test associations between profile similarity and indicators of relationship- and life satisfaction.

3. Study 2

3.1. Method

3.1.1. Sample

Our sample comprised 143 opposite-sex couples with an average relationship duration of 5.0 years ($SD = 6.5$; median = 3.0; range: 1 month to 44.3 years). Most couples (78.3%) lived together and 11.9% were married. The average age was $M = 26.0$ years ($SD = 7.3$) in women and 28.9 years ($SD = 8.3$) in men. Approximately half of the sample were students (52.1%), 42.3% were employed, and the remainder (5.6%) were in vocational training, unemployed, or retired. The educational level was high, as 45.0% held an academic degree, 38.1% finished high school qualifying them to attend university, 9.1% completed vocational training, 5.2% held a regular high school diploma, and 2.1% responded with "other."

3.1.2. Instruments

The *Character Strengths Rating Form* (CSRFB) by Ruch et al. (2014) is a brief measure of Peterson and Seligman's (2014) VIA-classification. For each strength, a brief description is provided, which is then rated on a 9-point Likert-type scale (1 = *very much unlike me*; 9 = *very much like me*). A sample item is "Creativity (originality, ingenuity): Creative people have a highly developed thinking about novel and productive ways to solve problems and often have creative and original ideas. They do not content themselves with conventional solutions if there are better solutions." The CSRFB showed high convergence with the VIA-IS and relationships with external measures, and demographic variables were highly comparable to those of the VIA-IS (Ruch et al., 2014).

The *Relationship Quality Questionnaire* (RQQ; Siffert & Bodenmann, 2010) is a 26-item questionnaire that assesses six dimensions of RS: *Fascination* (3 items; i.e., being attracted to and fascinated by the partner; "I admire many things about my partner"), *Engagement* (5 items; i.e., investing into the relationship; "I invest in our relationship"), *Sexuality* (5 items; i.e., sexual satisfaction in the partnership; "Our partnership is sexually satisfying for me"), *Future* (5 items; i.e., expecting a stable relationship with the partner; "I think that our couple relationship has a future"), *Mistrust* (3 items; "Sometimes I distrust my partner"), and *Constraint* (5 items; i.e., feeling constrained in one's autonomy by the partner[ship]; "I feel restricted in our partnership"). Further, we estimated a latent global RS factor by using the scale scores as indicators. Siffert and Bodenmann (2010) reported good internal consistency coefficients (between 0.75 and 0.94), good factorial validity using confirmatory factor analyses, and convergent validity (robust correlations with alternative measures of RS). In this study, the internal consistencies were 0.84 (Future and Sexuality), 0.79 (Constraint and Mistrust), 0.77 (Fascination), and 0.70 (Engagement).

The *Satisfaction with Life Scale* (SWLS; Diener et al., 1985; German version by Glaesmer et al., 2011) is a global measure of subjective life satisfaction. The five items are answered on a 7-point Likert-like scale (1 = *strongly disagree*, 7 = *strongly agree*) and summed up to a total score. A sample item is "If I could live my life over, I would change almost nothing." The original scale has very good psychometric properties ($\alpha = 0.87$; two-months retest-correlation $r_{tt} = 0.82$) and convergent validity (e.g., strong correlations with other subjective well-being scales; Diener et al., 1985). Also, the German version is characterized by high internal consistency (0.92) and a unidimensional factor structure (Glaesmer et al., 2011). In our study, the internal consistency was 0.84.

3.1.3. Procedure

We advertised the study online on websites of the department of our university and on the website of a popular German psychology magazine (*Psychology Today*) under the title "personality traits in romantic relationships." The advertisements contained the link to the online questionnaire (hosted on <https://www.soscsurvey.de>) and the inclusion criteria, which stated that both partners of a couple should complete the questionnaire independently from each other and being ≥ 18 years of age. Participants did not receive financial compensation, but psychology students were given the opportunity to earn course credit. Partners generated a couple code on basis of their names and years of birth to match the data within dyads. Data collection was carried out before the COVID-19 pandemic.

3.1.4. Data analysis

As in Study 1, we computed the trait and profile similarity coefficients. In addition to the analyses used in Study 1, we tested whether profile similarity relates to LS and RS. We used the Actor-Partner Interdependence Model (Cook & Kenny, 2005; see Fig. 2) to control for actor and partner effects² of the 24 character strengths on RS and LS and also account for partners' interdependence in predictor and outcome variables. As in earlier studies (e.g., Brauer & Proyer, 2018; Furler et al., 2013), we used the raw and distinctive profile coefficients as predictor variables in the APIM to estimate associations with RS and LS for both partners, respectively (see Fig. 2). We computed the analyses in Mplus 8.4 (Muthén & Muthén, 2017) using the maximum-likelihood estimator and bootstrapped standard errors ($k = 1,000$ samples). In line with Cook and Kenny (2005), we report the effect parameters describing the association between similarity and RS and LS as unstandardized coefficients b . We tested whether effects of similarity differed for men and women by computing constrained (i.e., setting effect parameters equal) and saturated (i.e., estimating effects for men and women freely) models and comparing their fit with χ^2 difference tests.

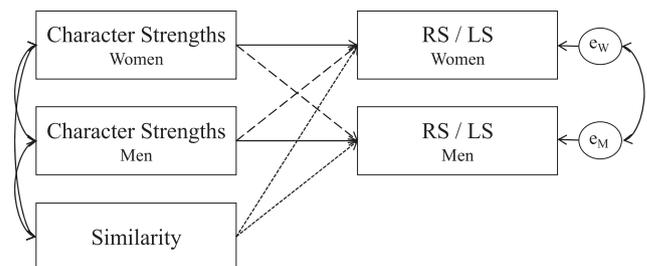


Fig. 2. Actor-Partner Interdependence Model to Examine Similarity Effects. Note. –Actor effects. –Partner effects. –Similarity effects. RS = Relationship satisfaction. LS = Life satisfaction.

² Note that we use the terms "effect" and "predictor" in accordance with the language use of the APIM literature. Because our data were cross-sectional, we cannot draw causal conclusions but only examine associations.

We accepted the parsimonious model (i.e., same effects for men and women) when the χ^2 difference test was not statistically significant ($p > .20$; see Cook & Kenny, 2005).

Sample size rationale. As in Study 1, we determined the sample size based on the requirements of our main analysis. Again, we used couple-centered analyses for the description of the profile similarity and computed the profile similarity for each couple on basis of each partner's 24 responses to the brief measure of character strengths, resulting in 143 profile correlation coefficients that we computed in accordance with Study 1. In addition to the analyses used in Study 1, we tested the associations between couples' profile similarity and outcomes (i.e., RS and LS) with the APIM, which requires the variable-centered approach. Thus, the dyad is the unit of analysis, and the number of couples is of interest for sample size considerations in this study. We aimed to meet Ledermann and Kenny's (2017) sample size recommendation of 100 to 150 couples for the APIM analyses.

3.2. Results

3.2.1. Preliminary analyses

Preliminary analyses showed that the means and SDs of the RQQ and SWLS were comparable to prior research in German-speaking samples (see ESM B; e.g., Brauer & Proyer, 2018; Glaesmer et al., 2011). In line with prior dyadic studies (Furler et al., 2013; Körner & Schütz, 2021), partners showed interdependence in the RQQ facets and SWLS ($0.32 \leq r_s \leq 0.51$) while the mean differences among men and women were negligible ($d_s \leq 0.29$; see ESM B for all coefficients). The expressions in the CSRF aligned with previous findings from German-speaking samples (e.g., Ruch et al., 2014; see ESM A).

We tested the trait wise similarity in the single strengths and found robust similarity for eight strengths ($r_s \geq 0.20$, 95% CIs not including zero, $p_s \leq .019$; Table 1), namely, bravery, honesty, love, teamwork, fairness, gratitude, hope, and spirituality.

3.2.2. Profile similarity

We examined the correlation between the ranks of men's and women's character strengths. There was a strong convergence in the relative rankings of men's and women's strengths ($r = 0.70$, 95% CI [0.47, 0.84], $p < .001$). This is also reflected in the normative profile similarity, which showed high positive associations ($r = 0.84$, 95% CI [0.51, 0.95], $p < .001$), indicating that, on average, men and women showed similar expressions of the VIA strengths. The visual inspection of the average profiles of the men and women (Fig. 3) and effect size analyses (ESM A) showed that, on average, the strengths converged well, except for men reporting greater expressions than women in judgment ($d = 0.49$), bravery ($d = 0.70$), leadership ($d = 0.46$), and self-regulation ($d = 0.62$).

When testing within-couple similarities, we found positive raw profile similarity ($M_r = 0.27$, 95% CI [0.22, 0.32], $t_{142} = 10.11$, $p < .001$; $SD_r = 0.27$, ranging between -0.42 and 0.95). As expected, the distinctive profile similarity showed numerically lower overlap among partners, but the similarity was still positive and above chance after controlling for stereotype effects ($M_r = 0.10$, 95% CI [0.05, 0.15], $t_{142} = 3.81$, $p < .001$; $SD_r = 0.28$, ranging between -0.57 and 0.85).

3.2.3. Associations between profile similarity and satisfaction

We tested the associations between raw and distinctive profile similarities and RS and LS using APIM analyses. We did not find evidence of statistically significant associations between profile similarities in character strengths and indicators of RS and LS over and above actor and partner effects (all $b_s \leq |0.55|$, $p_s \geq .176$; see ESM C for all coefficients). Thus, partner's profile similarities were unrelated to satisfaction in couples.

4. General discussion

We aimed at narrowing a gap in the literature by describing adult couples' partner similarity in the profiles of character strengths (Peterson & Seligman, 2004), and testing whether similarity relates to relationship satisfaction (RS) and life satisfaction (LS). Overall, our findings converged well across both of our studies and also with initial findings from adolescent couples (Weber & Ruch, 2012). In line with Weber and Ruch (2012), we found high rank-order and normative profile similarity correlations. Thus, the relative expressions (rank-order) and average expressions (normative profiles) are highly similar for men's and women's character strengths. This fits into the literature on the negligible gender differences in the VIA strengths (Heintz et al., 2019) and high normative profile similarity associations that also exist for broad and narrow personality traits (e.g., Brauer & Proyer, 2018; Rogers et al., 2018). More importantly, the within-couple associations showed the expected positive similarity across the raw and distinctive profiles across studies. The similarity of partners' profiles of the 24 VIA strengths was expectedly positive, irrespective of using the full 240-item VIA-IS (Study 1) or the brief 24-item form (CSRF; Study 2). Moreover, after adjusting for stereotype effects (i.e., distinctive profile similarity; Furr, 2008; Rogers et al., 2018), partners' deviations from the average person converged well above chance (i.e., 95% CIs did not contain zero), thus, indicating configural similarity in partners' profiles of strengths. Across both studies and measures, the effect sizes replicated very well. As expected, the distinctive profile similarities were numerically small. In comparison, they exceeded those reported for the broad big five personality traits (Rogers et al., 2018) and were comparable to coefficients reported for narrower traits such as adult playfulness and dispositions toward ridicule and being laughed at (Brauer & Proyer, 2018; Brauer et al., 2021; Proyer et al., 2019). Our findings could be interpreted as preliminary evidence for the notion that similarity can attract when it comes to Peterson and Seligman's (2004) set of 24 positively valued traits.

In Study 2, we tested the associations between couples' profile similarities and indicators of satisfaction in APIM analyses (Cook & Kenny, 2005). In line with the majority of studies that tested whether partner similarity in personality traits relates to outcomes beyond actor- and partner effects, we found positive but negligible effect sizes (see e.g., Brauer et al., 2021; Chopik & Lucas, 2019; Dyrenforth et al., 2010; Furler et al., 2013; Humbad et al., 2013; Proyer et al., 2019; van Scheppingen et al., 2019; Weidmann et al., 2016). Thus, although partners resemble each other in their profiles of strengths, similarity is unrelated to satisfaction (i.e., similar couples do not report greater satisfaction than less similar couples).

In addition to the profiles, we also examined partner similarity in single strengths (trait wise analysis). We found that across our studies and Weber and Ruch's (2012), three strengths emerged as robustly similar among partners, independent of the samples' age and the measure used; namely, gratitude, hope, and spirituality. Also, there was convergence across our and Weber and Ruch's (2012) studies concerning partner similarity in love (all coefficients ≥ 0.19 ; average correlation of 0.24 across studies [$n = 298$ couples]), teamwork (all coefficients ≥ 0.20 ; average similarity correlation of 0.23 across studies), and zest (all coefficients ≥ 0.12 ; average correlation of 0.23 across studies). Considering that the former strengths focus on emotional expressiveness (so-called *strengths of the heart*; Peterson, 2006), we preliminarily conclude that partners share an understanding of such heart-related strengths that contribute to interpersonal understanding and behaviors that might support the maintenance of close relationships, whereas strengths that focus on intellectual restraint (*strengths of the mind*; e.g., self-regulation, learning, and perspective) are less interdependent and more individually expressed across partners. However, integrating our findings from profile and trait wise similarity analyses, it could be argued that although no single strength of the mind yielded statistically significant trait wise similarity, partners show on average similarity in

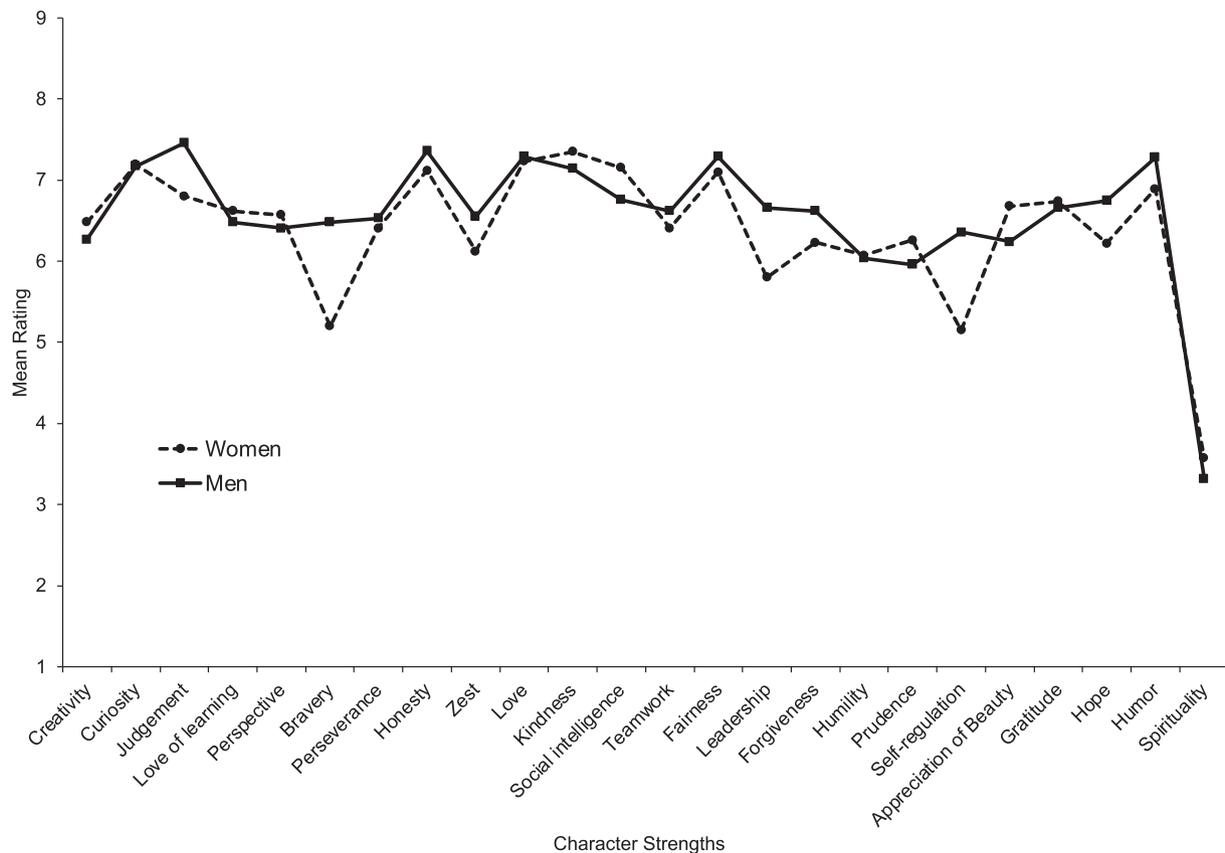


Fig. 3. Normative Profiles of Character Strengths Assessed With the 24-item CSRF for the Women and Men in Study 2.

the *configuration* across the full set of these strengths as well. Overall, the effect sizes of the discussed trait wise similarity correlations were in the expected range that is typically reported for personality traits and values (Luo, 2017). An exception was spirituality, which showed the comparatively strongest effect sizes across studies. However, this aligned well with prior findings that showed that inclinations to religion and religiousness are consistently characterized by notably high partner similarity coefficients ($r_s \approx 0.50$; Luo, 2017; Watson et al., 2004, 2014).

Because our data are of cross-sectional nature, we cannot examine the mechanisms behind the existence of partner similarity. In line with Luo (2017), at least two possible explanations could account for the existence of partner similarity: While assortative mating assumes that partners share initial similarity, convergence assumes that partners become similar over time. Meta-analytic findings (Montoya et al., 2008) and literature reviews (Luo, 2017) suggest that there is robust evidence for the notion that assortative mating explains partner similarity. Also, the literature suggests that there is little evidence for congruence, i.e., the notion that couples grow more similar over time (Luo, 2017; see also Rammstedt et al., 2013; Watson et al., 2014). It could be argued that convergence does not account for partner similarity in strengths since our similarity findings did not considerably differ across the older (Study 1) and younger (Study 2) couples. However, longitudinal data are needed to clarify the trajectories of couples' similarity across time, and our findings on this question can only be viewed as preliminary.³ Further, initial similarity contributes to providing the basis for establishing a romantic relationship as it predicts romantic attraction and interest. A mechanism that supports initial assortative preferences is the

³ One might argue that analyzing couple similarity and relationship duration with the data of Study 2 could clarify this question, but we omitted these analyses because they often produce misleading findings and conclusions (for a discussion, see Brauer et al., 2022).

notion of *active* and *passive choices* during the mating process. Prior studies addressing the VIA strengths and attributes that resemble the strengths showed that people seek for morally valued traits when describing their ideal close friend and partner, and that these preferences converge with actual expressions of the friend's or partner's strengths (Wagner, 2019; Weber & Ruch, 2012; see also Buss, 2016; Buss & Barnes, 1986; Chick et al., 2020; Watson et al., 2014). Drawing on these findings, it is feasible that people have certain preferences regarding an ideal partner's strengths; for example, they desire higher expressions of honesty, humor, love, and kindness, whereas spirituality, love of learning, perseverance, and leadership are less desired attributes in idealized partners (Weber & Ruch, 2012), and people actively seek a partner that overlaps with their ideal. Prior research has provided evidence that people can accurately perceive the strengths of others (Ruch et al., 2010), which is the prerequisite for identifying the strengths of a potential partner. However, it is unclear whether people find a partner who possesses their ideal traits, idealize their partner according to their desires, or adjust their perceptions of their partner to match their ideal partner (*Michelangelo phenomenon*; e.g., Bühler et al., 2020; see Rusbult et al., 2009 for an overview). Collecting partner- and ideal partner reports additionally would help addressing this research question in future studies as they add incremental value over and beyond self-reports (Brauer et al., 2021) and allow examining the overlap between these levels of perceptions on the intra- and interpersonal level (e.g., whether one's partner view converges with their ideal partner desires; Decuyper et al., 2012). Decuyper and colleagues (2012) showed that the assumed similarity is uniquely associated with RS and more predictive of RS than the partners' *actual* similarity. Finally, other mechanisms such as social homogamy (i.e., partners sharing social and geographical backgrounds; Luo, 2017) might also play a role. For example, those high in spirituality might visit institutions such as a church more frequently than those low in spirituality, thus finding a partner with similar expressions of

spirituality might be more likely in a shared background. Market forces might also play a role: if someone is characterized by a profile of consensually desired traits, they have more options of choosing partners than someone who is characterized by a less favorable profile of strengths and therefore has fewer options of choosing partners (Luo, 2017). Further research is needed to learn more about the mechanisms behind partner similarity and partner selection regarding character strengths.

Our findings only provide preliminary knowledge by using cross-sectional data, and we encourage follow-up studies that directly aim at uncovering the potential developmental trajectories and effects of partner similarity. We propose several future directions for the study of strengths in romantic life. For example, longitudinal studies have shown the stability of strengths over time (Gander et al., 2020), but also indicated that people change in their strengths naturally and, when being exposed to interventions, deliberately (Harzer & Ruch, 2016; Proyer et al., 2015). It can be assumed that such changes affect partner similarity depending on whether changes co-occur in partners or whether changes are limited to only one partner of the dyad. Changes in strengths go along with changes in well-being in individuals (Gander et al., 2020), but no data exist for dyadic change in strengths and its effects on satisfaction. Considering that our findings indicate interdependence of partners' single strengths and profiles, it could be speculated that the dyadic interdependence affects the individuals' change (e.g., Chopik et al., 2018; Mund et al., 2016). Thus, extension to longitudinal data on the dyadic development of the strengths is desirable to learn more about the trajectories of similarity in couples' strengths over time as well as its effects on relationship outcomes and relationship dissolution. Future research might also examine the consequences of partner similarity on the heritability of the strengths. Steger et al., 2007 found support for the existence of a genetic component to individual differences in the strengths (14 to 59% genetic effects; median = 42%). However, Steger et al.'s classical twin design did not allow for modeling effects of parental similarity on heritability and assumed random assortative mating. A replication and extension to include estimates of assortative mating is desirable to learn more about the role of partner similarity in the heritability of the strengths and its comparison to other individual difference variables (e.g., Borkenau et al., 2001; Buss, 2016; Kandler et al., 2012; Luo, 2017; Vinkhuyzen et al., 2012).

Although we did not find direct associations between partner similarity and RS and LS, similarity could affect third variables that might mediate or moderate associations. For example, strengths are robust predictors of stress coping and buffer negative effects on satisfaction (Harzer & Ruch, 2015), and it could be speculated that both partners' strengths contribute to dyadic coping with relationship-related and individual problems and stressors (e.g., Herzberg, 2013). We encourage further work on the potential practical relevance of taking profiles into account when working with clients. This may help when counseling clients, discussing their (dis-)similarity in character strengths and how they can capitalize on their strengths in their daily lives.

Limitations. Our findings should be interpreted with certain limitations. First, we only tested German-speaking opposite-sex couples with comparatively high educational status, and extension to other demographic groups (e.g., non-German-speaking and same-sex couples) would contribute to generalizability. Secondly, our data are solely based on self-reported character strengths, whereas multi-method assessment approaches (e.g., daily diary data on the enactment of strengths; Gander et al., 2021) would extend the validity of the findings. Thirdly, our data do not allow to draw causal conclusions, but only provide a cross-sectional snapshot of the partners' similarity. Fourthly, we have not examined the similarity-satisfaction associations for single strengths. We argue that an independently collected and larger sample is needed to address this aim by using Dyadic Response Surface Analyses (Schönbrodt et al., 2018) as an extension of the APIM for modeling the main effects of the strengths and dyadic trait-similarity effects on indicators of satisfaction. Fifthly, we have not controlled for partner

similarity in broader traits. For example, openness to new experiences and honesty-humility are highly preferred traits in potential partners (Liu et al., 2018), and future research should examine partner similarity (and preferences) under consideration of the relationship between the strengths and broader traits (see e.g., Harzer et al., 2021).

Despite these limitations, we think that our studies are a fruitful starting point for future research on the role of similarity in strengths of character in romantic relationships. Overall, our data suggest that (I) partners are similar regarding their character strengths profiles, (II) especially regarding strengths entailing emotional expressiveness (*strengths of the heart*), but that (III) similarity does not yield an additional robust association with relationship- or life satisfaction beyond the main effects of partners' character strengths.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Open Data

All data, syntaxes, and materials are openly available in the Open Science Framework under <https://osf.io/b4qy3/>.

Open materials

All materials of this study are openly available and links with permanent identifiers are linked in the manuscript.

Appendix A. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jrp.2022.104248>.

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