Original Article

The Green-Eyed Monster in Social Media – Development and Validation of a Digital Jealousy Scale

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Abstract. Romantic jealousy describes a feeling when individuals suspect losing their romantic partner to a potential rival. Social media has a high potential to trigger romantic jealousy as it offers almost unlimited opportunities to build social relationships. Thus, it is unsurprising that many studies are now examining social media-induced jealousy (SoMJ). However, there has been a lack of standardized instruments that can capture SoMJ independently of a specific social media platform. In the present two studies, we developed the 9-item Digital Jealousy Scale (DJS) in German and English and examined its psychometric properties using three heterogeneous samples from Germany and the United Kingdom. The postulated one-factor structure fitted the data very well. Additionally, construct validity was established by showing the expected correlations between the DJS and personality variables such as other jealousy measures, attachment dimensions, self-esteem, and the Big Five dimensions. The DJS is thus a valuable instrument to assess SoMJ.

Keywords: social media-induced jealousy, Digital Jealousy Scale, psychometric properties, invariance analysis, construct validity

Romantic Jealousy and Social Media-Induced Jealousy

Romantic jealousy is a frequent phenomenon experienced in the context of romantic relationships due to an imagined or actual threat of losing the partner or significant other (White, 1981). Romantic jealousy is typically characterized by a mix of negative emotions such as sadness, fear, worry, anger, disgust, or resentment toward the partner and/or a potential rival (Dunn & Ward, 2020). It can thus involve behaviors such as verbal aggression, surveilling the partner and/or potential rival, questioning the partner about their activities, or trying to make the partner jealous (e.g., Wegner et al., 2018). Although romantic jealousy is associated with an aversive emotional response, it can serve as an adaptive mechanism that protects the relationship from potential rivals (Buss, 2000). However, if romantic jealousy becomes too strong, it can also lead to separation, interpersonal violence, and even homicide (Buss, 2000; Guerrero & Andersen, 1998).

As our professional and social lives shift more and more into the digital world, social media play an increasingly important role in romantic relationships (Rus & Tiemensma, 2017; Tandon et al., 2020). Social media offer almost unlimited opportunities to establish and maintain social connections (Dainton & Stokes, 2015). Due to the typical short-message communication style, ambiguous situations can quickly arise, leading to misinterpretation in the conversation with the partner concerning potential threats to the relationship (Aretz et al., 2010; Cohen et al., 2014). Furthermore, the open structure of social media facilitates access to information by other people, including the romantic partner (Muise et al., 2009; Muscanell et al., 2013). The opportunity to engage in short-term relationships and disclose activities in social networks thus has a high potential for triggering jealousy (Bevan, 2013; Tandon et al., 2020).

Based on the first study to examine romantic jealousy in the context of a social media platform (Facebook) by Muise et al. (2009), the term *Facebook jealousy* was coined (e.g., Daspe et al., 2018; Demirtaş-Madran, 2018; Hudson et al., 2015). Facebook jealousy refers to jealous feelings related to the partner's actual or hypothetical activities on Facebook (e.g., worrying that they use Facebook to reconnect to past romantic partners) and one's online reactions (e.g., adding the partner's friends to one's own friends list to monitor the partner). Muise et al. (2009)

developed a unidimensional 27-item self-report scale to measure Facebook jealousy.

Subsequently, this construct has been expanded to social media platforms more generally and has been labeled social media-induced jealousy (SoMJ) in a recent review by Tandon et al. (2020). These authors defined SoMJ as "jealousy experienced by an individual due to a potential threat (perceived or actual) of the loss or deterioration of a romantic relationship due specifically to their partner's or spouse's use of and activities undertaken on social media platforms, especially if such activities involve a potential rival for extradyadic, romantic attention" (p. 1544).

The Digital Jealousy Scale, Intended Target Population, and Item Development

Despite the burgeoning literature on SoMJ, to date, the Facebook Jealousy Scale by Muise et al. (2009) is the only standard questionnaire available to measure jealousy in the context of social media. Many studies have used custom-made questions that have not been independently validated. The Facebook Jealousy Scale has also been adapted for Snapchat (Utz et al., 2015). However, as social media platforms and the extent to which they are used change rapidly, there is an increasing need for a questionnaire that assesses SoMJ irrespective of a specific social media platform. Therefore, the goal of the present study was to develop and validate a new SoMJ questionnaire – the Digital Jealousy Scale (DJS) – that captures feelings of romantic jealousy (e.g., feeling hurt, nervous, worried) triggered by social media and online communication in general. As such, "digital jealousy" is not meant to represent a new construct that is distinct from "romantic jealousy"; rather, the DJS captures romantic jealousy in a specific setting. The DJS was designed to be applicable to any social media platform (e.g., Facebook, Snapchat, Instagram, WhatsApp, Twitter, YouTube). In line with Muise et al. (2009) and Tandon et al. (2020), the DJS was designed to measure SoMJ as a unidimensional construct that simultaneously incorporates cognitive, affective, and behavioral aspects of jealousy.

Furthermore, our aim was to create a short instrument that could easily be incorporated into longer surveys. As short length was prioritized, the DJS is intended for use as a research instrument but not for individual assessments or diagnostics. Nevertheless, we aimed to construct an internally consistent and reliable instrument. The intended target population includes adults irrespective of their gender and relationship status (single or in a relationship) to maximize the utility and generalizability of the measure.

The first item pool for the DJS was created in a deductive manner (Eid & Schmidt, 2014) based on the SoMJ

definition by Tandon et al. (2020), with a focus on cognitive and emotional reactions to partners' activities and one's own resulting behavioral intentions (e.g., feeling the urge to monitor the partner). Items were phrased as statements to which participants indicated their level of agreement. The statements and general instructions were formulated to apply to all genders and current or past romantic partners.

The Nomological Net of Romantic and Social Media-Induced Jealousy

Given that SoMJ refers to a specific context of romantic jealousy, it can be expected that social media–specific questionnaires such as the DJS or the Facebook Jealousy Scale should highly correlate with general romantic jealousy scales. To date, the most frequently used jealousy questionnaire is the Multidimensional Jealousy Scale (MJS; Pfeiffer & Wong, 1989), which captures emotional (being upset), cognitive (being worried and suspicious), and behavioral (engaging in surveillance activities) aspects of jealousy and has been translated into many different languages (Brassard et al., 2020; Elphinston & Noller, 2011; Tošić-Radev & Hedrih, 2017). The Facebook Jealousy Scale shows medium-to-high correlations with the mean MJS score (Moyano et al., 2017). As the DJS items reflect emotional, cognitive, and behavioral aspects of jealousy, we expect high correlations between the DJS and all three subscales of the MJS and the Facebook Jealousy Scale as evidence for strict convergent validity (Campbell & Fiske, 1959; Ziegler, 2020).

Jealousy has been linked to adult attachment and self-esteem as well as various personality traits such as (at least some of) the Big Five, although almost no study to date has examined SoMJ specifically in relation to these traits. Adult attachment refers to individual differences in adults' experiences, beliefs, and behaviors in romantic relationships and has been developed based on experiences in early childhood (Bowlby, 1969; Hazen & Shaver, 1987). For adults, attachment can be conceptualized as a set of categories (e.g., *secure, anxious*, and *avoidant*; Hazen & Shaver, 1987) or as a set of continuous dimensions (e.g., Collins & Read, 1990). The latter approach encompasses three dimensions – *close* (feelings about comfort with closeness to others), *depend* (dependability on others), and *anxiety* (fear of being left alone or abandoned; Collins & Read, 1990). While secure attachment (i.e., higher values on *close*) is associated with higher self-worth and confidence that one can rely on others, insecure attachment (i.e., higher values on *anxiety*) is associated with lower self-worth and fear of rejection (Bartholomew & Horowitz, 1991; Mikulincer &

Shaver, 2007). In general, individuals with low self-worth tend to be more sensitive to threats by a potential rival and may, therefore, fear more often that their partner might leave them for a superior competitor (Stieger et al., 2012). Individuals with an insecure attachment style are, therefore, more prone to jealousy (Buunk, 1997; Marshall et al., 2013), whereas securely attached individuals report a higher threshold for experiencing jealous feelings and engage less in partner surveillance behaviors (Karakurt, 2012; Marshall et al., 2013). The dimensional adult attachment approach has yielded similar findings with *close* and *depend* showing small to medium negative correlations and *anxiety* showing medium-to-strong positive correlations with romantic jealousy (e.g., Richter et al., 2022). Based on this research, we expected medium-to-high correlations between the DJS and adult attachment dimensions as evidence for convergent validity in a more lenient sense (correlations between tests capturing similar constructs; Ziegler, 2020).

As described above, lower self-worth is crucial in developing jealous feelings (e.g., Harris & Darby, 2010). Self-worth is at the heart of the psychological trait of self-esteem (e.g., Orth & Robins, 2019). Therefore, it can be expected that lower self-esteem is associated with higher jealousy. However, previous results have been mixed, some showing the expected negative correlation in both women and men, with small-effect sizes (e.g., Moyano et al., 2017), and others showing this association only in women (e.g., Buunk, 1997) or only in men (e.g., Stieger et al., 2012). One reason could be that self-esteem is a broad trait referring not only to interpersonal relationships but also to other life domains such as work or physical appearance (Orth & Robins, 2019). Here, we expect a small negative correlation between self-esteem and the DJS as evidence for the discriminant validity of the two constructs.

Finally, romantic jealousy has also been examined in relation to the Big Five personality dimensions. The strongest association with jealousy has been reported for neuroticism, as both jealousy and neuroticism are characterized by vulnerability, anxiousness, and impulsivity (Watson et al., 2000). Individuals with high neuroticism tend to report greater instability in their relationships and may be more prone to feeling threatened by a potential rival, resulting in more jealous feelings (Karakurt, 2012; Khanchandani & Durham, 2009). Previous studies found medium-effect sizes for the positive association between neuroticism and jealousy (Buunk, 1997; Dijkstra & Barelds, 2008; Gehl, 2010; Melamed, 1991; Richter et al., 2022). For the other Big Five traits, there is very little theorizing in relation to jealousy, and no consistent associations have been found across studies (Richter et al., 2022; Wade & Walsh, 2008). Therefore, we expect the DJS to show a medium positive correlation with neuroticism as

evidence for convergent validity in the lenient sense, and we expect low or close to zero correlations with the other Big Five traits as evidence for discriminant validity.

The Present Studies

In the present two studies, the development of the DJS and the evaluation of its psychometric properties in three broad adult community samples in two languages and countries are described. Study 1 was conducted in Germany, and Study 2 was conducted in the United Kingdom and in Germany. In Study 1, confirmatory factor analysis (CFA) was used to select items from a first item pool, which had high factor loadings and, concurrently, covered the breadth of the construct. This resulted in a final 9-item version that covered cognitive, affective, and behavioral aspects of jealousy while focusing on their common core and maintaining unidimensionality. This version was tested for measurement invariance with respect to gender and relationship status (single vs. in a relationship). In addition, convergent and discriminant validity of the DJS were examined via the correlational relationship between DJS and romantic jealousy, adult attachment dimensions, self-esteem, and the Big Five. In Study 2, the 9-item DJS was validated in two independent samples (one sample was German-speaking and the other one was English-speaking). The factor structure was tested using CFA and strict convergent validity was assessed by examining the correlations between the DJS, the Facebook Jealousy Scale (Muise et al., 2009), and the MJS (Pfeiffer & Wong, 1989). In addition, measurement invariance between the German and English versions of the DJS was assessed. Finally, in both studies, reliability was measured using Cronbach's α and McDonald's ω.

Study 1

Method

Participants and Procedure
Part of the recruitment took place in a bachelor seminar at the Department for Psychology and Psychotherapy at the University of Witten/Herdecke (Germany). Participants were recruited via students' social environment and social media. Psychology students of the University Witten/Herdecke gained course credits for participating. This study was approved by the local ethics committee (No. 74/2018) and was administered online through LimeSurvey.

A total of 956 persons participated in the online study. Due to incomplete data, 319 were excluded from the

analyses, resulting in 637 subjects ranging in age from 16 to 62 years with a mean age of 24.8 (± 5.7) years. Among these, 383 participants (60.1%) were women, 252 (39.6%) were men, and 2 (0.3%) were nongender specific. Of all women, 109 participants (28%) were not in a romantic relationship (single or divorced), 269 (70%) were in a committed romantic relationship (relationship with or without children/ married with or without children), and 5 (2%) stated to be in another unspecified kind of relationship. Of all men, 88 participants (35%) were not in a romantic relationship (single or divorced), 161 (64%) were in a committed romantic relationship (relationship with or without children/ married with or without children), and 3 (1%) stated to be in another unspecified kind of relationship.

Measures

Digital Jealousy Scale

For the development of the DJS, students and employees at the Department of Psychology and Psychotherapy of the University of Witten/Herdecke were asked to create statements about the manifestation of jealous feelings and associated behavioral intentions in the context of one's partner's activities on social media, irrespective of a specific platform. The resulting statements were discussed in small groups of students in an undergraduate psychology seminar and supervised by the authors. Items were then developed based on those statements that fit the definition of SoMJ by Tandon et al. (2020) and that were applicable across different social media platforms. Furthermore, the items intended to represent cognitive, affective, and behavioral aspects of jealousy. The authors reviewed the resulting 39 items. Items that were ambiguously or poorly worded, as well as items with significant content overlap, were excluded. This process resulted in 18 items which were administered to the above described sample. Participants were instructed to think about their current or last steady relationship and indicate their level of agreement with each statement. The chosen six-point Likert response scale ranged from 1 (strongly disagree) to 6 (strongly agree).

Romantic Jealousy Scale

The German self-report questionnaire by Bauer (1988; cited by Schmitt et al., 1994) was used to measure jealousy within romantic relationships in a more general way, i.e., not specific to the digital context. The 15-item scale consists of 10 items focusing on the intensity and frequency of jealous feelings and cognitive and behavioral responses resulting from these feelings. An example item is "I am bothered when I notice that my partner very much enjoys the company of others." The other five items focus on (dis)trust (e.g., "I have complete trust in my partner"). Using CFA, Schmitt et al. (1994) found that the distrust items loaded on

a different factor than the jealousy items. Therefore, the two subscales (romantic jealousy and romantic distrust) were analyzed separately in the present study. The items were rated on a six-point Likert scale ranging from 1 (does not fit at all) to 6 (fits exactly). Subjects were instructed to think about their current relationship or about past relationships.

Adult Attachment Scale

Adult attachment was measured with the German version of the Adult Attachment Scale (Schmidt et al., 2004). The 16-item scale consists of three subscales. The subscales include close (to what extent a person feels comfortable with closeness to others; five items), depend (to what extent a person trusts in others and relies on them; six items), and anxiety (to what extent a person is afraid of being left alone or abandoned; five items). Each item was rated on a five-point Likert scale from 1 (totally disagree) to 5 (totally agree).

Rosenberg Self-Esteem Scale

Self-esteem was measured with the German version of the Rosenberg Self-esteem Scale (von Collani & Herzberg, 2003), assessing global self-esteem with positive and negative statements about oneself. The 10 items (e.g., "I am able to do things as well as most other people") were rated on a four-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree).

International Personality Item Pool

The German version of the International Personality Item Pool (Ostendorf, 2003) was used to assess the personality dimensions of extraversion (e.g., "I am the life of the party"), neuroticism (e.g., "I get stressed out easily"), conscientiousness (e.g., "I am always prepared"), agreeableness (e.g., "I make people feel at ease"), and openness for experience (e.g., "I am full of ideas"). The 10 items of each scale were rated on a scale from 1 (very inaccurate) to 5 (very accurate).

Data Analysis

Statistical analyses were performed using the statistical software RStudio version 4.1.0. Negatively worded items were inverted prior to analyses, and scale scores were computed as mean scores across the respective items. To test the factor structure of the newly generated DJS, a CFA was conducted using the package lavaan (Rosseel, 2012). Analyses were based on diagonally weighted least squares estimations (DWLS) as recommended for categorical data and in the case of violations of the assumption of multivariate normality (Mindrila, 2010). The 18 items of the DJS were evaluated by the height of their factor loadings and potential residual correlations. In case of too low factor loadings (< .50) and substantial residual correlations with

Table 1. Fit indices for the one-factor models of the Digital Jealousy Scale with 18-items (Model 1) and 9-items (Model 2) in Study 1 as well as the final 9-item version in the German (Model 3) and English samples (Model 4) of Study 2

Model	N	χ^2	df	p	CFI	RMSEA	SRMR
Study 1							
Model 1 (18 items, German sample)	637	260.752	135	<.001	.994	.038	.058
Model 2 (9 items, German sample)	637	30.092	27	.310	1.000	.013	.036
Study 2							
Model 3 (German sample)	272	37.218	27	.091	.994	.037	.072
Model 4 (English sample)	288	45.148	27	.016	.992	.048	.067

Note. CFI = comparative fit index, RMSEA = root-mean-square error of approximation, SRMR = standardized root-mean-square residual.

other items ($r > .25$), an item was discarded. The data/ model fit was evaluated by means of the χ^2 statistic, the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). Cutoff values of CFI ≥ .95, RMSEA < .05, and SRMR < .10 were considered as good model fit, while the values of CFI ≥ .90 and RMSEA < .08 were interpreted as evidence for acceptable model fit (Schweizer, 2010).

Invariance was tested with five different models. Configural invariance implies that the factorial structure of the latent variable holds across groups. Metric invariance means that the factor loadings do not differ substantially between groups. When scalar invariance is given, also the intercepts are equal across groups. With strict invariance, factor loadings, intercepts, and residual variances are equal across groups. Finally, complete invariance indicates that factor means are also equal across groups (Thompson, 2016). Invariance analyses were based on weighted least square mean and variance adjusted estimations (WLSMV). Model fit was evaluated by means of χ^2 statistics. Since χ^2 is sensitive to sample size and violation of the normality assumption (Hu & Bentler, 1999), difference scores such as ΔCFI and ΔRMSEA were also considered (Chen, 2007).

The reliability of the digital jealousy questionnaire was calculated by means of Cronbach's α and McDonald's ω. Strict convergent validity with romantic jealousy was tested by latent correlations using Structural Equation Modeling (SEM). Lenient convergent and discriminant validity with other personality dimensions was determined by Spearman's rank correlations since data were not normally distributed.

Results

Factorial Structure and Internal Consistency of the Digital Jealousy Scale

Fit indices to evaluate the CFA model of the 18-item model are shown in Table 1. Except for the χ^2 statistic, the 18-item

model showed a good fit. Factor loadings ranged from .562 to .871, with only one item having a factor loading <.50. This item was thus discarded. Furthermore, items with residual correlations higher than $r > .25$ were removed from the scale. At the same time, it was considered that the breadth of the construct was still covered with affective, cognitive, and behavioral aspects of jealousy. This procedure resulted in a 9-item model, which met all the criteria for a very good data/model fit (Table 1). The nine items of the DJS, their means, *SD*s, skewness, kurtosis, item-total correlations, and factor loadings on the common factor are provided in Table 2. Most items showed moderate-to-high difficulty (i.e., disagreement toward item) with symmetric to right-skewed distribution. This pattern is also reflected in the total score, which exhibits high difficulty ($M = 2.72$) and right-skewed distribution (skewness = 0.56). The reliability of the DJS was very good, McDonald's ω = .91 and Cronbach's α = .91. The DJS is provided in Electronic Supplementary Material 1 (ESM 1), and an English version of the items (see Study 2) is provided in Table 2.

Measurement Invariance

To use the DJS for comparing men and women as well as singles and individuals in a relationship, the measurement invariance of the one-dimensional 9-item model for the respective groups needs to be shown. The results of the measurement invariance analyses are reported in Table 3. For gender, the fit indices revealed a good fit for the assumption of configural, metric, and scalar invariance, indicating that the factorial structure, item loadings, and item intercepts did not significantly differ between men and women (Thompson, 2016). Further restricting the residuals to be equal for both genders led to a significant increase in the χ^2 value. However, the ΔCFI ≤ .010 and ΔRMSEA ≤ .015 suggested strict invariance between men and women (Chen, 2007). The final model for complete invariance led to a poorer absolute model fit according to the differences in χ^2, CFI, and RMSEA values. Thus, the factor means differed

Table 2. Means, *SDs*, skewness *s*, kurtosis κ, and item-total correlations r_{it}, of the nine items of the Digital Jealousy Scale as well as their factor loadings λ on the common factor in the confirmatory factor analysis in the German sample of Study 1 as well as the German and English samples in Study 2

Items	Study 1 – German sample (*N* = 637)						Study 2 – German sample (*N* = 272)						Study 2 – English sample (*N* = 288)					
	M	*SD*	*s*	κ	r_{it}	λ	*M*	*SD*	*s*	κ	r_{it}	λ	*M*	*SD*	*s*	κ	r_{it}	λ
1. It makes me nervous when my partner "likes" or leaves a comment on another woman's/man's photograph.	2.52	1.63	0.70	2.21	.805	.854	2.43	1.43	0.88	2.85	.707	.764	2.78	1.56	0.48	2.13	.741	.800
2. It bothers me when I notice that my partner is texting with other women/men.	3.43	1.70	0.03	1.69	.767	.817	3.14	1.56	0.32	2.03	.784	.861	3.27	1.67	0.10	1.78	.773	.840
3. It worries me when a new woman/man appears on my partner's friends list.	2.53	1.66	0.75	2.24	.798	.849	2.69	1.46	0.57	2.39	.751	.811	2.89	1.55	0.35	2.02	.791	.855
4. It is important to me that my partner makes a point of showcasing our relationship on social media (through photographs, comments, etc.) so that everyone knows that we are in a relationship.	2.14	1.50	1.14	3.12	.574	.590	1.94	1.26	1.28	3.80	.489	.484	2.35	1.44	0.84	2.75	.566	.589
5. I feel offended when my partner does not "like" or leave a comment on a photograph of me.	2.26	1.62	1.00	2.62	.566	.585	2.03	1.42	1.40	4.06	.482	.488	2.41	1.51	0.79	2.46	.588	.600
6. I feel hurt when my partner texts with other people more than with me.	3.10	1.71	0.17	1.67	.704	.742	3.32	1.66	0.12	1.83	.666	.713	2.73	1.48	0.48	2.21	.663	.690
7. I feel offended when my partner prevents me from seeing chats, texts etc., that they received from other women/men.	3.86	1.74	−0.37	1.81	.663	.700	3.74	1.69	−0.20	1.77	.713	.775	3.57	1.69	−0.05	1.81	.678	.716
8. I look over my partner's shoulder when I know they are texting with someone else.	2.53	1.51	0.65	2.23	.641	.666	1.85	1.15	1.30	3.87	.584	.587	2.33	1.40	0.79	2.63	.615	.642
9. I feel the need to look through my partner's phone for possible chat threads with other women/men.	2.12	1.55	1.23	3.27	.701	.731	1.71	1.14	1.75	5.44	.603	.613	1.93	1.34	1.50	4.36	.657	.685

significantly between men and women. This difference was paralleled by significant gender differences in the test scores, $t(633) = 4.629$, $p < .001$, Cohen's $d = 0.38$, with women ($M \pm SD$: 2.90 ± 1.28) scoring significantly higher on the DJS than men ($M \pm SD$: 2.45 ± 1.12). Together with the results of the invariance analyses, this difference in test scores could be attributed to gender differences in digital jealousy as the underlying construct rather than to gender differences in response behavior and/or item functioning.

Comparing singles and individuals in a committed romantic relationship revealed configural measurement invariance across the two groups (see Table 3). Although restricting factor loadings across groups led to a significant

χ² difference value, neither ΔCFI nor ΔRMSEA exceeded the critical cutoff values of .010 and .015, respectively, indicating metric invariance. Furthermore, all three difference indices supported scalar and strict invariance. However, complete measurement invariance was not obtained since restricting the factor means in both groups to the same value led to a poorer fit according to Δχ², ΔCFI, and ΔRMSEA. Thus, the factor means differed significantly between singles and nonsingles. This difference was paralleled by significant differences in the test scores, $t(625) = 3.169$, $p < .002$, Cohen's $d = 0.27$, with singles ($M \pm SD$: 2.96 ± 1.18) scoring significantly higher on the DJS than nonsingles ($M \pm SD$: 2.62 ± 1.26). Together with the results of the invariance analyses, this difference in test

Table 3. Measurement invariance across gender and relationship status in Study 1 and across a German and an English sample in Study 2

Model	χ^2	df	$\Delta\chi^2$	Δdf	p value	CFI	ΔCFI	RMSEA	ΔRMSEA	SRMR
Women versus Men (Study 1)										
Configural	129.704	54				.964		.067		.035
Metric	101.879	62	8.819	8	.358	.981	.017	.045	−.021	.043
Scalar	111.035	70	9.677	8	.288	.980	−.001	.043	−.002	.044
Strict	138.044	79	27.015	9	.001	.972	−.009	.049	.006	.056
Complete	262.107	80	21.867	1	< .001	.913	−.059	.085	.036	.081
Single versus in a relationship (Study 1)										
Configural	125.645	54				.966		.065		.035
Metric	80.324	62	4.378	8	.822	.991	.025	.031	−.034	.036
Scalar	106.480	70	25.997	8	.001	.983	−.009	.041	.010	.042
Strict	111.277	79	9.229	9	.416	.985	.002	.036	−.005	.045
Complete	160.176	80	8.949	1	.003	.962	−.023	.057	.020	.059
German versus English sample (Study 2)										
Configural	82.365	54				.885		.110		.064
Metric	120.253	62	18.337	8	.019	.916	.031	.088	−.022	.072
Scalar	184.49	70	184.490	8	< .001	.861	−.045	.106	.018	.085
Strict	301.676	79	211.960	9	< .001	.859	−.002	.101	−.006	.094
Complete	227.260	80	3.099	1	.078	.872	.013	.095	−.005	.096

Note. Number of observations per group: women: 383, men: 252, single: 197, in a relationship: 432, German sample: 272, English sample: 288. Subsequential restriction of factorial structure (configural), factor loadings (metric), intercepts (scalar), residuals (strict), and factor means (complete). The χ^2 column contains the robust test statistics, whereas the χ^2 difference test column is the function of two standard test statistics and therefore differs from the test statistics of the χ^2 column (Rosseel, 2012).

Table 4. Descriptive statistics, Cronbach's α, and McDonald's ω for all measures used in Study 1

Measures	Mean	SD	Min–Max	Skewness	Kurtosis	α	ω
Digital Jealousy Scale (DJS)	2.72	1.24	1.00–6.00	0.56	2.39	.91	.91
Romantic Jealousy Scale	2.72	1.11	1.00–6.00	0.72	3.02	.90	.91
Romantic Distrust Scale	1.80	0.88	1.00–5.40	1.28	4.28	.82	.89
Self-Esteem	3.17	0.55	1.30–4.00	−0.77	3.35	.90	.92
Adult Attachment Depend	3.92	0.79	1.17–5.00	−0.69	3.12	.81	.89
Adult Attachment Anxiety	2.39	0.89	1.00–5.00	0.46	2.57	.75	.82
Adult Attachment Closeness	3.57	0.93	1.00–5.00	−0.33	2.32	.83	.86
Neuroticism	2.98	0.79	1.00–5.00	0.06	2.44	.90	.92
Extraversion	3.39	0.69	1.10–5.00	−0.40	3.04	.88	.91
Openness	3.87	0.46	2.00–5.00	−0.36	3.33	.74	.81
Conscientiousness	3.50	0.60	1.90–5.00	−0.06	2.52	.80	.84
Agreeableness	4.06	0.53	1.90–5.00	−0.86	4.16	.82	.85

Note. SD = standard deviation. Number of observations = 637.

scores can be attributed to relationship status differences in digital jealousy.

Construct Validity With Other Personality Measures
Descriptive statistics for test scores of the DJS and all other personality measures are depicted in Table 4. Convergent validity between digital jealousy and romantic jealousy was tested using SEM. For this purpose, a latent variable representing digital jealousy was extracted from the nine DJS items and a further latent variable representing romantic jealousy from the 10 items of Bauer's jealousy scale. The correlation between the two latent variables was freely estimated. Fit indices for the model yielded a very good fit, $\chi^2(151) = 186.146$, $p = .027$, CFI = .998, RMSEA = .019, and SRMR = .042. Digital jealousy and romantic jealousy showed a very strong positive

Table 5. Spearman correlations between all measures used in Study 1

Variables	1. Age	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
2. Gender	.16***													
3. Relationship status	.09*	−.07												
4. Digital jealousy scale	−.21***	−.18***	−.15**											
5. Romantic jealousy	−.20***	−.15**	−.20***	.75***										
6. Romantic distrust	.00	−.13**	−.40***	.40***	.55***									
7. Self-esteem	.13*	.12*	.10*	−.29***	−.33***	−.28***								
8. Adult attachment depend	.05	.12*	.15**	−.34***	−.39***	−.42***	.52***							
9. Adult attachment anxiety	−.15**	−.16***	−.14**	.42***	.49***	.35***	−.55***	−.65***						
10. Adult attachment close	.08*	.09*	.16***	−.20***	−.26***	−.28***	.42***	.64***	−.50***					
11. Neuroticism	−.09*	−.35***	−.02	.30***	.40***	.29***	−.55***	−.44***	.51***	−.35***				
12. Extraversion	.02	.05	−.08*	−.02	−.03	−.04	.32***	.32***	−.26***	.39***	−.19***			
13. Openness	.01	.05	−.02	−.14**	−.12*	−.02	.24***	.13**	−.10*	.11*	−.03	.24***		
14. Conscientiousness	.10*	−.10*	.14**	−.05	−.14**	−.19***	.26***	.17***	−.17***	.16***	−.09*	.06	.14**	
15. Agreeableness	−.03	−.34***	−.04	−.04	−.06	−.06	.18***	.30***	−.13**	.36***	−.05	.29***	.27***	.20***

Note. For gender, men were coded as 1 and women as 0. For relationship status, singles were coded as 0 and individuals within a committed relationship as 1.*$p < .05$. **$p < .01$. ***$p < .001$.

correlation ($r = .861$). We further restricted the correlation between digital jealousy and romantic jealousy to 1.00 to test for construct identity. However, the restricted model, $\chi^2(152) = 295.046$, $p < .001$, CFI = .993, RMSEA = .038, and SRMR = .053, described the data worse than the unrestricted model, $\Delta\chi^2 = 108.09$, $p < .001$. This result indicates that digital jealousy and romantic jealousy share a large portion of variance but are not identical. Correlations of digital jealousy and romantic jealousy with other personality measures further supported this result (see Table 5). Although digital and romantic jealousy showed correlations of similar strength with other personality measures, Steiger's comparison of two overlapping correlations revealed significant differences in romantic distrust, $z = 6.211$, $p < .001$, the anxiety dimension of the adult attachment scale, $z = 2.847$, $p = .004$, the close dimension of the adult attachment scale, $z = 2.201$, $p = .028$, neuroticism, $z = 3.838$, $p < .001$, and conscientiousness, $z = 3.221$, $p = .001$, with romantic jealousy showing stronger correlations to all these constructs compared to digital jealousy (see Table 5). As expected, digital jealousy showed moderate-to-large negative correlations with self-esteem, the close and depend dimensions of the adult

attachment scale, and a positive correlation with the anxiety dimension of the adult attachment scale. The moderate positive correlation between digital jealousy and neuroticism was further confirmed, whereas the correlation with the other Big Five personality measures was nonsignificant except for a weak but significant negative correlation with openness.

Study 2

Method

Participants and Procedures

This study comprised two samples with a total of 560 participants. The first sample consisted of 272 German-speaking participants (201 women, 68 men, three others) from Germany with a mean age of 36.8 years ($SD = 11.4$). Eighty-two were not in a committed romantic relationship, 186 were in a committed romantic relationship, and four stated to be in another unspecified relationship. The second sample consisted of 288 English-speaking participants (228

women; 60 men) from the United Kingdom with a mean age of 38.9 years (*SD* = 12.6). Regarding the current relationship status, 233 participants were in a romantic relationship, and 55 were not in a committed romantic relationship. Participants of both the German and the English sample were recruited online through Prolific (https://www.prolific.co) and were paid £1.30.

The survey was administered on Qualtrics (Qualtrics, Provo, UT), and this study was approved by the local ethics committee (No. 2022-03-00003). The measures used in the German sample included the German version of the 9-item DJS and the German self-report questionnaire by Bauer (1988; cited by Schmitt et al., 1994) measuring romantic jealousy. For the English sample, the DJS was translated into English and compared with other scales measuring Facebook jealousy (Muise et al. 2009) and multidimensional aspects of romantic jealousy (MJS, Pfeiffer & Wong, 1989). Before completing this study, all participants provided informed consent.

Measures

Item Translation of the Digital Jealousy Scale

For the English sample, the nine items of the DJS were translated into English according to the *ITC Guidelines for Translating and Adapting Tests* (International Test Commission, 2017). First, items were translated into English by a native English-speaking person with excellent knowledge of the German language. In a second step, the items of the translated questionnaire were back-translated by a native German-speaking person with excellent knowledge of the English language. In a final step, the original German version, the translated English version, and the back-translated German version were placed side by side, discussed, and adjusted in case of discrepancies. The goal was to obtain English items that reflected the meaning of the original German items while being as close as possible to the German wording. The English items of the DJS are summarized in Table 2, and the complete questionnaire in ESM 1.

Facebook Jealousy Scale

The Facebook Jealousy Scale consisted of 27 items assessing how likely an event would trigger feelings of jealousy ("How likely are you to feel threatened if your partner added a previous romantic or sexual partner to his or her Facebook friends?") or how often someone engaged in jealousy-related behavior ("How likely are you to question your partner about his or her Facebook friends?"). Each item was rated on a seven-point Likert scale from *very unlikely* to *very likely*. Participants were instructed to think about their current relationship or about past relationships.

Multidimensional Jealousy Scale

The multidimensional jealousy scale by Pfeiffer and Wong (1989) was used to measure affective, cognitive, and behavioral facets of jealousy within a romantic relationship. The affective subscale asks how someone would emotionally react to various situations (e.g., "X smiles in a very friendly manner to someone of his/her preferred sex") where X refers to the current or former romantic partner. The cognitive subscale measures how often someone has jealousy-related thoughts about his/her partner (e.g., "I think that some members of his/her preferred sex may be romantically interested in X"). The behavioral subscale asks about specific jealousy-related behavior (e.g., "I say something nasty about someone of the preferred sex if X shows an interest in that person"). The subscales contain eight items each to be rated on a seven-point Likert scale (affective subscale from 1 = *very pleased* to = 7 *very upset*, cognitive and behavioral subscales from 1 = *never* to 7 = *all the time*).

Statistical Analysis

The factor structure of both the German and the English version of the DJS was tested by means of CFA using the package lavaan (Rosseel, 2012) in RStudio version 4.1.0. The estimation method was DWLS (Mindrila, 2010). For evaluation of the data/model fit, the χ^2 statistic, CFI, RMSEA, and SRMR were used (for criteria of good fit, see Study 1).

Furthermore, invariance of the DJS across the German-speaking and the English-speaking sample was tested. Invariance analyses were based on WLSMV estimations. Model fit was evaluated by means of χ^2 differences, ΔCFI, and ΔRMSEA. Convergent validity with Facebook jealousy was tested by latent correlations using SEM. Convergent validity with other measures of jealousy was calculated using Spearman correlations since data were not normally distributed.

Results

Factorial Structure and Internal Consistency of the Digital Jealousy Scale

As summarized in the fit indices in the lower part of Table 1, a one-factor model described the variance/covariance matrix of the nine items of DJS well in both the German and English samples. The only exception was the χ^2 statistic in the English sample, which was statistically significant but still smaller than twice its degrees of freedom (Kline, 2016). Furthermore, construct reliability was high, with ω = .89 in the German sample and ω = .90 in the English sample. Descriptive statistics of all measures are summarized in Table 6.

Table 6. Spearman correlations, descriptive statistics, Cronbach's α, and McDonald's ω of all measures used in the German and English samples in Study 2

Measures	1.	2.	3.	4.	5.	6.	7.	Mean	SD	Min–Max	Skewness	Kurtosis	α	ω
1. Digital Jealousy Scale (DJS)[a]								2.54	1.04	1.00–5.44	0.63	2.66	.89	.89
2. Romantic Jealousy Scale[a]	.77***							2.31	0.88	1.00–5.70	0.94	3.72	.88	.91
3. Romantic Distrust Scale[a]	.30***	.35***						1.97	0.92	1.00–5.60	1.15	3.93	.87	.91
4. Digital Jealousy Scale (DJS)[b]								2.70	1.14	1.00–5.67	0.47	2.64	.90	.90
5. Facebook Jealousy Scale[b]				.81***				3.06	1.33	1.00–6.37	0.41	2.27	.97	.98
6. MJS Emotional[b]				.43***	.55***			4.97	0.92	1.50–7.00	−0.56	3.82	.86	.92
7. MJS Cognitive[b]				.57***	.60***	.24***		2.16	1.26	1.00–7.00	1.40	4.53	.95	.97
8. MJS Behavioral[b]				.61***	.59***	.22***	.57***	1.90	0.92	1.00–6.00	1.48	5.28	.87	.91

Note. MJS = Multidimensional Jealousy Scale. [a]Data of study with the German sample N = 272. [b]Data of study with the English sample N = 288. ***p < .001.

Measurement Invariance

To examine measurement invariance of the DJS across the German and the English sample, the one-factor model was tested for configural, metric, scalar, strict, and complete measurement invariance. The results of these analyses are shown in Table 3. Given that the one-factor model described the data well in both samples, we proceeded from the assumption of configural invariance. When restricting the factor loadings to be equal in the two samples, the χ^2 value increased substantially. Concurrently, however, CFI even increased, and RMSEA decreased, indicating metric measurement invariance (Thompson, 2016). Therefore, correlations of the DJS versions with other constructs can be compared between the German and the English version of the DJS. The restriction of item intercepts and the restriction of residuals to be equal across both samples led to a decrease in model fit so that neither scalar nor strict measurement invariance was obtained. As a consequence, the nonsignificant mean differences in test scores between the German and the English sample, $t(558) = 1.694$, $p = .091$, Cohen's $d = 0.14$, cannot be interpreted meaningfully (Thompson, 2016).

Construct Validity

Convergent validity between the DJS and Facebook jealousy in the English sample was tested using SEM. For this purpose, a latent variable representing digital jealousy was extracted from the nine DJS items and a further latent variable from the 27 items of the Facebook jealousy scale. The model fitted the data well, $\chi^2(593) = 697.298$, $p = .002$, CFI = .997, RMSEA = .028, and SRMR = .075. The results showed that the DJS and the Facebook jealousy scale showed a very strong positive correlation ($r = .873$). In a next step, we restricted the correlation between digital jealousy and Facebook jealousy to 1 to test for construct identity. However, compared to the unrestricted model, the restricted model, $\chi^2(594) = 969.935$, $p < .001$, CFI = .990, RMSEA = .052, and SRMR = .085, described the data worse. The χ^2 difference value was significant,

$\Delta\chi^2(1) = 272.64$, $p < .001$, indicating that digital jealousy and Facebook jealousy share a large portion of variance but are not identical. As summarized in Table 6, correlations of digital jealousy and the multidimensional jealousy scale's emotional, cognitive, and behavioral aspects at the manifest level revealed moderate-to-strong positive correlations ranging from $r = .43$ to $r = .61$, indicating that all aspects of jealousy postulated by Pfeiffer and Wong (1989) are covered in the DJS. Furthermore, convergent validity between the DJS and the Romantic Jealousy Scale by Bauer (1988; cited by Schmitt et al., 1994) in the German sample could be replicated (see Table 6).

Discussion

With the present studies, we developed the DJS to measure romantic jealousy in the context of social media. In Study 1, we examined the psychometric properties and factorial structure of the DJS using a large and diverse sample, tested for measurement invariance across gender and relationship status, and examined construct overlap with romantic jealousy unspecific to the digital context, attachment styles, and personality measures. The final 9-item DJS can be described as one-dimensional according to CFA and the factor underlying the nine items exhibited excellent construct reliability and internal consistency. Moreover, strict invariance was found across gender and relationship status, suggesting that the differences between men and women, as well as between singles and nonsingles, were attributable to differences in digital jealousy rather than differences in response behavior. Finally, the DJS revealed convergent validity with a romantic jealousy scale, which does not refer to the context of social media, and convergent and discriminant validity with relevant attachment style patterns and personality traits such as self-esteem and the Big Five.

In Study 2, we translated the German version of the DJS into English and examined the factorial structure and psychometric properties for the German and the English version of the DJS using two different samples from Germany and the United Kingdom. We further tested for measurement invariance across both populations and examined convergent validity with different jealousy scales. Both the German and English versions of the DJS could be clearly described by a one-factor model, supporting the assumption of one-dimensionality and exhibited excellent internal consistencies. The moderately high correlations between the DJS and MJS subscales referring to cognitive, affective, and behavioral aspects of jealousy indicated that all three aspects are represented in the DJS. The two DJS versions were metrically invariant across the German and the English sample and showed high convergent validity with other measures of jealousy.

The DJS developed in this study offers the advantage of capturing SoMJ independently of a specific social media platform. Compared to the scales introduced by Muise et al. (2009) and Utz et al. (2015), which measure jealousy in a specific context such as Facebook or Snapchat, the DJS adapts to the constantly changing and newly developing digital world. This is necessary as people visit more than seven social media platforms per month on average (KEPIOS Analysis, 2022). The items, constructed based on Tandon et al.'s (2020) latest SoMJ definition, tap into cognitive and emotional reactions to the partner's activities and one's own resulting behavioral intentions and thus adequately represent SoMJ. With only nine items, the DJS is an economic, but highly reliable research instrument. Moreover, the utility and generalizability of the DJS is maximized by its validation in three large and heterogeneous samples as well as by showing metric invariance for the German and the English version and even strict invariance for gender and relationship status.

Comparison of the DJS Across Gender, Relationship Status, and Germany and the United Kingdom

By achieving strict measurement invariance across gender, it was demonstrated that the self-evaluation regarding SoMJ was equivalent for men and women. Thus, the content interpretation of similarities or differences between the genders is permissible. Further analysis of gender differences revealed that women scored significantly higher than men on the DJS. This finding is consistent with previous research showing that women generally exhibit more jealousy than men in both the offline and the online world (Aretz et al., 2010; Elphinston & Noller, 2011; Hudson et al., 2015; Marshall et al., 2013). However, other studies have not found overall differences in

jealousy levels between men and women (e.g., Brem et al., 2015) and rather postulate that the focus should lie on the type of infidelity, e.g., emotional or sexual infidelity, that induces jealousy (Buss, 2018; Buss et al., 1992; Demirtaş-Madran, 2018; Dunn & Billett, 2018). In this context, it would be interesting for future studies to determine which social media–related predictors are associated with gender differences in SoMJ for which the DJS can be used.

Strict measurement invariance was also obtained across relationship status, meaning that content interpretation of similarities or differences between singles and individuals in a committed relationship is possible. This is an interesting finding, as one could argue that the relevance and validity of items measuring digital jealousy may be less pronounced for individuals referring to the past (Elphinston & Noller, 2011). Further analyses revealed that individuals referring to a past relationship reported more SoMJ than individuals in a current relationship. This finding may be explained by the fact that some past relationships ended because of the partner's infidelity (Machia & Ogolsky, 2021). Consequently, individuals who have experienced some form of infidelity in a previous relationship may be more jealous than individuals who are currently in a functioning relationship.

Finally, metric invariance was achieved between the German and the English version of the DJS. Metric invariance implies that the two groups interpreted and responded to the items of the DJS similarly, as evidenced by the invariant factor loadings. Metric invariance can be used to examine structural relationships or correlations with other measures across groups (Thompson, 2016). Therefore, the DJS is suitable for cross-cultural studies in which the association of the German and English versions with other constructs can be compared. However, metric invariance cannot rule out a systematic downward or upward bias in item scores between both groups (Sabiston et al., 2010; Thompson, 2016). Therefore, metric invariance alone is not appropriate for interpreting or comparing the means between the English and German versions of the DJS.

Convergent and Discriminative Validity

The DJS shared a high proportion of variance with both the Romantic Jealousy Scale by Bauer (1988; cited by Schmitt et al., 1994) with a latent correlation of $r = .861$ and the Facebook Jealousy Scale by Muise et al. (2009) with a latent correlation of $r = .873$. However, SEM analyses revealed that the DJS and the other jealousy scales do not measure identical constructs. Nevertheless, the substantial construct overlap suggests that the DJS differs from the romantic jealousy scale only in terms of context (offline vs.

online) and, such as Muise et al.'s (2009) scale, can also be characterized as a form of trait jealousy (Cohen et al., 2014). Furthermore, the DJS showed medium to high correlations with the emotional, cognitive, and behavioral aspects of SoMJ as measured by the MJS (Pfeiffer & Wong, 1989), indicating that the DJS is content valid regarding the broad area of jealousy-related experience and behavior. Together with the high correlations between the DJS and other measures of jealousy in both the offline and digital contexts, these results provide evidence for strict convergent validity of the DJS.

The high overlap between the DJS and the romantic jealousy scale is further underlined by the correlative findings with other personality constructs, as the DJS shows similar associations with self-esteem, attachment styles, and the Big Five personality dimensions as the more general romantic jealousy scale. These findings align with studies reporting that individuals with low self-esteem (Moyano et al., 2017), a more anxious and less close attachment style (Fleuriet et al., 2014; Marshall et al., 2013), and with more neuroticism (Seidman, 2019) also report more SoMJ. Furthermore, except for the small correlation with the openness to experience dimension, which is consistent with the report by Richter et al. (2022), the DJS exhibited no association with the other Big Five personality dimensions. These results provide overall evidence for both convergent validity in a lenient sense and discriminant validity.

However, the results raise the question of whether DJS and measures of *classic* romantic jealousy nevertheless differ – for instance, with respect to what they predict. We assume that there could be instances in which "general" jealousy and digital jealousy diverge – for example, digital jealousy might be more strongly predicted by a person's (or their partner's) social media usage patterns than by general jealousy. Similarly, the DJS might be a more suitable scale than the MJS when assessing the effects of smartphone addiction interventions or other programs aimed at managing online behavior. More broadly, general and digital jealousy may also differ regarding their stability over time. Digital jealousy as a more specific construct may be more strongly influenced by situational aspects (e.g., the degree to which one witnesses one's partner using their smartphone throughout the day) than general jealousy. This might also explain why the romantic jealousy scale by Bauer (1988; cited by Schmitt et al., 1994) showed significantly stronger associations with all the aforementioned personality constructs compared to the DJS.

The review by Tandon et al. (2020) provides further guidance with respect to open questions regarding SoMJ that could be studied with the DJS. In particular, future studies should examine the potential benefits and disadvantages of higher jealousy in the digital context as assessed

with the DJS and how these can be managed. For instance, to a certain degree, feeling hurt or concerned by observing one's partner engage on social media with individuals that may pose a threat to the relationship might foster behaviors that can protect the relationship (Buss, 2000). A very high level of jealousy in the digital context, however, may result in harmful activities such as cyberstalking, partner violence, or detrimental effects on one's health (Tandon et al., 2020).

Conclusion

With regard to the practical relevance of the findings presented here, it can be stated that social media are becoming increasingly relevant in our lives. According to recent estimates, there are more than 4.2 billion active social media users worldwide (Statista, 2021). The lockdowns imposed to combat the coronavirus pandemic (COVID-19) have further increased the use of social media platforms (Global Web Index, 2022). Therefore, it seems essential to better understand both the positive and negative consequences of social media use (Akram & Kumar, 2017; Baccarella et al., 2018; O'Reilly, 2020). Meanwhile, studies are accumulating examining social media's potentially beneficial and harmful effects on relationship satisfaction and SoMJ (for reviews, see Rus & Tiemensma, 2017; Tandon et al., 2020). The DJS developed in this study represents an economic and reliable tool with a clear and stable factorial structure that can be used to shed further light on the consequences of social media use in terms of romantic jealousy irrespective of the social media platform.

Electronic Supplementary Material

The electronic supplementary material is available with the online version of the article at https://doi.org/10.1027/2698-1866/a000033
ESM 1. German and English version of the instructions

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Conflict of Interest
The authors have no conflicts of interest to declare.

Publication Ethics
Study 1 was approved by the local ethics committee (Nr. 74/2018). Study 2 was approved by the local ethic committee (Nr. 2022-03-00003).

Authorship
Danièle A. Gubler; Formal analysis, writing – original draft, visualization, Katja Schlegel; Writing – original draft, Marina Richter; Conceptualization, writing – review & editing, project administration, Tugba Kapanci; Writing – review & editing, project administration, Stefan J. Troche; Resources, writing – review & editing, supervision, project administration.

Open Science
Data and analysis script can be accessed under the Open Science Framework https://osf.io/vft6d/. The authors confirm that there is sufficient information for an independent researcher to reproduce all of the reported results (Gubler & Troche, 2023).
The German and English versions of the DJS can be found in ESM 1. This study was not pre-registered.

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