Comparing Sexuality-Related Cognitions, Sexual Behavior, and Acceptance of Sexual Coercion in Dating App Users and Non-Users

Paulina Tomaszewska[1] · Isabell Schuster[1]

Abstract

Using dating apps has become popular for many young adults worldwide, promising the chance to meet new sexual partners. Because there is evidence that using dating apps may be associated with risky sexual behavior, this study compared users and non-users concerning their sexuality-related cognitions, namely their risky sexual scripts and sexual self-esteem, as well as their risky and sexually assertive behavior. It also explored the link between dating app use and acceptance of sexual coercion. A total of 491 young heterosexual adults (295 female) participated in an online survey advertised in social media and college libraries in Germany. Results indicated that users had more risky sexual scripts and reported more risky sexual behavior than non-users. Furthermore, male dating app users had lower sexual self-esteem and higher acceptance of sexual coercion than male non-users. In both gender groups, dating app use predicted casual sexual activity via a more risky casual sex script. Gender differences, potential underlying mechanisms, and directions for future research are discussed.

Keywords Dating app use · Sexual scripts · Sexual behavior · Acceptance of sexual coercion · Young adults

Dating applications (apps), of which Tinder is the most famous, have become increasingly popular and an integral part of the life of many young adults worldwide. With their proliferation, it did not last long until they were publicly known as hookup apps, promising unlimited opportunities for casual sex. In the media, it has even been suggested that Tinder started a new sexual revolution (McLaren, 2018). At the same time, there is evidence that dating app use is associated with more sexual risk behavior (Sawyer, Smith, & Benotsch, 2018) and sexual victimization (Choi, Wong, & Fong 2018; Shapiro et al., 2017). Hence, the question emerges if there are any differences between users and non-users of dating apps in their sexuality-related cognitions and behaviors. Addressing this issue, the purpose of the present study was to compare users and non-users of dating apps in Germany regarding sexual scripts, sexual self-esteem, acceptance of sexual coercion, sexual assertiveness, and risky sexual behavior.

Paulina Tomaszewska and Isabell Schuster shared first authorship.

✉ Paulina Tomaszewska
paulina.tomaszewska@uni-potsdam.de

1 Department of Psychology, University of Potsdam, Karl-Liebknecht-Straße 24-25, 14476 Potsdam, Germany

The Use of Dating Apps and Related Risks

According to Tinder statistics, there are 1.6 billion swipes per day and 1 million dates per week across 196 countries (Tinder, 2018), showing that it is anything but a negligible phenomenon. A representative survey of German Internet users revealed that one in four (26%) have ever used online dating services, of whom 28% used flirting services such as Tinder, Lovoo, or Grindr (Bitkom Research, 2017). In the last years, an enormous increase in mobile dating app use has been observed in the USA, rising from 3% in 2013 to 9% in 2015 (Pew Research Center, 2016). Particularly, young adults are attracted by dating apps, with 22% of 18- to 24-year-olds reporting their use in 2015.

Prior studies have documented increased levels of risky sexual behavior as well as negative health outcomes among individuals seeking sexual partners through dating apps. Particularly, they have shown that dating app use is associated with unprotected sexual contacts, more (life-time and recent) sexual partners, alcohol or drug use prior to or during sexual intercourse, and sexually transmitted infections (Choi, Wong, & Fong; 2017; Choi et al., 2016; Lehmiller & Ioerger, 2014; Sawyer et al., 2018; Shapiro et al., 2017). In addition, some authors addressed the role of dating app use in relation to unwanted sexual activities. For example, Shapiro et al.

(2017) have found that using Tinder was associated with higher odds of reporting non-consensual sex. Likewise, Choi et al. (2018) have shown that users of dating apps were more likely to report being sexually victimized (i.e., a sexual partner insisted on sex that the person did not want) in the past year and lifetime compared to non-users. Although the mentioned studies indicate an association between the use of dating apps and risky sexual behavior as well as sexual victimization, far too little is known about the underlying mechanisms. Furthermore, most of the studies are lacking a proper theoretical foundation for selecting the correlates or predictors of risky sexual or sexual aggressive behavior in users and non-users of dating apps. Therefore, we postulate that one important approach to studying the differences between users and non-users of dating apps in relation to their risky sexual behavior is looking at their sexuality-related cognitions, especially their risky sexual scripts. In addition, looking at sexual self-esteem, i.e., how people perceive and appraise their sexuality and sexual experiences, may also contribute to a better understanding of users and non-users' sexual and sexually assertive behavior (Krahé & Berger, 2017). These variables are explained in the following sections.

Risky Sexual Scripts and Risky Sexual Behavior

One important key to understanding sexual behavior lies in the mental representations of consensual sexual interactions, described in the literature as *sexual scripts*, which serve as guidelines for sexual behavior (Simon & Gagnon, 1986; see Krahé, Bieneck, & Scheinberger-Olwig, 2007; Schuster & Krahé, 2019a, 2019b; Tomaszewska & Krahé, 2018, for empirical evidence). Among the wide range of script components, past research has conclusively shown that (1) *casual sexual activities*, (2) *alcohol use in sexual interactions*, and (3) *ambiguous communication of sexual intentions* are part of the consensual sexual scripts in young adults (D'Abreu & Krahé, 2016; Schuster & Krahé, 2019a, 2019b; Tomaszewska & Krahé, 2018). These features have been identified as factors that may increase the odds of committing and experiencing sexual aggression (Lorenz & Ullman, 2016; Muehlenhard, Humphreys, Jozkowski, & Peterson, 2016; Schuster & Krahé, 2019a, 2019b; Tharp et al., 2013; Tomaszewska & Krahé, 2018). Therefore, sexual scripts which comprise these features may be considered as *risky*. Furthermore, risky sexual scripts may be translated into risky sexual behavior which in turn may increase the probability of sexual aggression victimization and perpetration (Schuster & Krahé, 2019a, 2019b; Tomaszewska & Krahé, 2018). Given the evidence that dating app users have more sexual partners and are more likely to use alcohol or drugs prior to or during sex (Choi et al., 2016; Sawyer et al., 2018), we assumed that

dating app users compared to non-users would have more risky sexual scripts and behavior.

Sexual Self-Esteem and Sexual Assertiveness

Dating app users and non-users may also differ in their *sexual self-esteem*, referring to one's self-evaluation as a sexual being (Zeanah & Schwarz, 1996), and *sexual assertiveness*, reflecting one's ability to make autonomous sexual choices (Morokoff et al., 1997). In particular, behaving sexually assertively is shown by refusing unwanted sexual advances, referred to as *refusal assertiveness*, and initiating wanted sexual activities, conceptualized as *initiation assertiveness*. Past research has shown that sexual experiences, for example, having multiple partners, are positively linked to sexual self-esteem (Zeanah & Schwarz, 1996) and initiation assertiveness (Morokoff et al., 1997), whereas inconsistent findings emerged for the relationship between sexual experiences and refusal assertiveness, showing both positive (Morokoff et al., 1997) and negative links (Testa, VanZile-Tamsen & Livingston, 2007, Walker, Messman-Moore & Ward, 2011. Because previous research has suggested that more sexual experience is associated with higher sexual self-esteem and higher initiation assertiveness, we proposed that dating app users may have also higher sexual self-esteem and higher initiation assertiveness than non-users. Despite inconsistent findings on sexual experience and refusal assertiveness, having more sexual experience may be an indicator of knowing more about one's own sexual limits. Therefore, we would expect that dating app users report higher refusal assertiveness than non-users.

Acceptance of Sexual Coercion

A recent report from UK's National Crime Agency (NCA) has identified a significant increase of serious sexual assault cases from 2009 to 2014 that resulted from face-to-face encounters initiated online. NCA has registered a sixfold increase (from 33 cases in 2009 to 184 cases in 2014) in sexual offenses initiated through online dating (NCA, 2016). Even though the reported figures are provided for the entire online environment including dating and hookup websites, and other services, these are alarming findings that require more academic research. To our knowledge, only two studies reported the link between dating app use and sexual victimization (Choi et al. 2018; Shapiro et al., 2017). None of these examined the link between dating app use and perpetration of sexual aggression or attitudes condoning sexual coercion in sexual interactions. However, several studies have found the link between impersonal sex, conceptualized as casual, non-intimate sexual relations, alcohol use in sexual situation, and sexual aggression

perpetration (Malamuth, Linz, Heavey, Barnes, & Acker, 1995; see Casey & Masters, 2017; Tharp et al., 2013, for reviews). Because previous studies have revealed that users of dating apps report more permissive attitudes toward sex (Shapiro et al., 2017) and show more sexual risk behavior (e.g., Choi et al., 2016), they may have also more risky sexual scripts, which in turn may be linked to the acceptance of sexual coercion. The association of risky sexual scripts with attitudes condoning sexual aggression has already been demonstrated in previous studies with adolescents and young adults (Krahé et al., 2007; Tomaszewska & Krahé, 2016).

The Current Study

Past studies on the role of dating apps have shown that users report more risky sexual behavior and have a higher vulnerability to sexual victimization than non-users (Choi et al., 2018; Shapiro et al., 2017). However, there is a paucity of data on potential differences between users and non-users in their sexuality-related cognitions and actual sexual behavior going beyond the number of sexual partners. Addressing this gap in the current literature, the first aim of the present study was to compare users and non-users of dating apps concerning their sexuality-related cognitions, namely their risky sexual scripts and sexual self-esteem, as well as their risky and assertive sexual behavior. Based on previous findings reviewed above, we hypothesized that, compared to non-users, users of dating apps would hold more risky scripts (casual sex script, communication script, and alcohol script) and risky sexual behavior (casual sex, sexual communication, and alcohol in sexual situations), and have higher sexual self-esteem, initiation assertiveness, and refusal assertiveness. Because higher sexual activity goes hand in hand with a higher risk for perpetrating sexual aggression, the second aim of the study was to explore the link between dating app use and acceptance of sexual coercion. Based on existing evidence, we expected that, compared to non-users, users of dating apps would be more accepting of the use of coercion in sexual relations. Finally, to better understand which mechanisms may be operating, our third aim was to examine the prediction that sexuality-related cognitions (risky sexual scripts and sexual self-esteem) would mediate the relationship between dating app use and risky and assertive sexual behavior as well as the acceptance of sexual coercion. Even though we have made these assumptions, we do not claim that the relationship between the respective constructs may not work in the opposite direction. As there are no clear findings from longitudinal or experimental studies into the effects of dating app use on sexual behavior, the postulated mechanism is of an explorative nature.

Method

Participants

A total of $N = 506$ individuals (302 female and 204 male) completed the study. Participants 36 years of age and older ($n = 9$) and participants who self-identified as gay, lesbian, or asexual ($n = 6$) were excluded because the study addressed young adults' sexuality in opposite-sex constellations. The final sample consisted of $N = 491$ participants (295 female and 196 male), comprising college students and community participants. A total of 98.9% of participants had German nationality. The sample characteristics are presented in Table 1.

Sample Recruitment and Procedure

All data were collected via an online survey entitled *Sexuality and Social Media* during 2017 in Germany. The study was conducted in compliance with APA ethical standards and the ethical requirements of the authors' university. Participants were recruited via diverse social media groups and flyers with the web link of the study were distributed in college libraries in Berlin, Germany. On the first page of the survey, information on the study was provided and active consent was required to participate and to proceed to the survey questions. Participants were informed that they can withdraw from the survey at any point. After completing the survey, all participants were invited to participate in a raffle for one of ten Amazon gift cards.

Instruments

Use of Dating Apps The use of dating apps was operationalized with five items developed by the authors. First, participants were asked whether they used or had ever used dating apps (yes/no) and if yes, which of them (different options were provided, e.g., Tinder, as well as an open-ended format). Furthermore, the frequency of the use of dating apps was assessed. Responses were made on an eight-point scale ranging from 1 (*once a year or even less often*) to 8 (*several times a day*). Participants were also asked how often they had personally met his/her dating app partner (open-ended format) and how often they had had a sexual contact with him/her. Different sexual activities, namely petting, oral sex, sexual intercourse, and other sexual activities, were presented to the participants, and responses were made on five-point scales ranging from 1 (*never*) to 5 (*very often*).

Risky Sexual Scripts We employed a composite measure of risky sexual scripts for consensual sexual interactions, addressing both descriptive and normative features. A scenario-based measure was used to assess the descriptive features of the sexual scripts, using 22 items from Krahé

Table 1 Sample characteristics

	Total	Women ($n = 295$)	Men ($n = 196$)
Age, M (SD)	25.9 (4.22)	*25.3 (4.01)*	*26.9 (4.33)*
Relationship experience[a]	92.7%	94.2%	90.3%
Sexual intercourse[a]	96.5%	97.6%	94.9%
Age at first sexual intercourse, M (SD)	17.1 (2.61)	*16.9 (2.47)*	*17.5 (2.79)*
Number of sexual partners lifetime, M (SD)	12.6 (14.01)	*11.3 (11.79)*	*14.7 (16.67)*

Figures in italics denote significant gender differences; all tested via *t* tests

[a] Percentage of yes responses

et al. (2007). Participants were asked to imagine a situation in which they had sexual intercourse with a new partner for the first time and to rate the presence of the following features: (1) length of previous acquaintanceship and engagement in casual sex (12 items; e.g., "How long have the two of you known each other before this evening?", reverse coded), (2) ambiguous communication of sexual intentions (four items; e.g., "How likely is it that you first say 'no' even though you also want to have sex with her/him?"), and (3) alcohol consumption in the situation and degree of intoxication of both parties (six items; e.g., "How drunk is the woman/man?"). Responses were made on a five-point scale that ranged from 1 (*very unlikely*) to 5 (*very likely*) for alcohol or drug consumption, ambiguous communication, and casual sex; from 1 (*not at all*) to 5 (*totally*) for intoxication; from 1 (*not at all*) to 5 (*a few months or longer*) for the length of previous acquaintanceship; and from 1 (*never*) to 5 (*many times*) for the frequency of previous meetings between the two of them. Internal consistency was $\alpha = .78$ for the whole scale. Since we have planned to conduct analyses with each of the script features, internal consistency was computed for the three subscales: $\alpha = .78$ for the casual sex feature, $\alpha = .56$ for the communication feature, and $\alpha = .83$ for the alcohol use feature.

The normative component of the sexual scripts was measured by a 13-item scale also developed by Krahé et al. (2007). This scale assessed the participants' normative evaluation of the same risk features as in the descriptive part, with seven items addressing the engagement in casual sex (e.g., "It is ok for a woman to have sex with a man on their first night out."), four items referring to the ambiguous communication of sexual intentions (e.g., "It is part of the game for a woman to say 'no' at first when a man wants to have sex with her even though she wants it too."), and two items addressing alcohol consumption in sexual situations (e.g., "Drinking alcohol when meeting a man and having sex with him is part of the game."). Response options ranged from 1 (*completely disagree*) to 5 (*completely agree*). Internal consistency was $\alpha = .75$ for the whole scale. Internal consistencies for the three subscales were $\alpha = .92$ for engagement in casual sex, $\alpha = .68$ for ambiguous communication, and $\alpha = .90$ for alcohol consumption. To create an overall index, the mean scores of both the descriptive and normative scales were multiplied (Schuster

& Krahé, 2019a, 2019b; Tomaszewska & Krahé, 2018), yielding a risk score for the total script and for the casual sex script, communication script, and alcohol script.

Risky Sexual Behavior To assess risky sexual behavior, we adapted nine items from Krahé et al. (2007), addressing the participants' frequency of casual sex (two items, e.g., "How often did you sleep with a man/woman whom you did not know well?"), ambiguous communication of sexual intentions (four items, e.g., "How often did you say 'no' at first despite actually wanting sex?"), and alcohol consumption in sexual situations (two items, e.g., "How often did you drink alcohol in situations in which you had sexual intercourse?"). Response options for these items ranged from 1 (*never*) to 5 (*always*). In addition, one open-ended question assessed the number of casual sexual partners. To create an overall index of risky sexual behavior, all items were z-standardized before calculating a mean score. The same procedure was used to compute an index of casual sex, whereas mean scores without z-standardization were calculated for sexual communication and alcohol use in sexual situations. Internal consistency for the entire scale was $\alpha = .65$ and $\alpha = .82$, $\alpha = .46$, and $\alpha = .93$ for casual sex, ambiguous communication, and alcohol consumption, respectively.

Sexual Self-Esteem Participants' sexual self-esteem was measured by 12 items from the short form of the Sexual Self-Esteem Inventory by Zeanah and Schwarz (1996), modified by Krahé & Berger (2017). Participants were asked to assess their sexual thoughts, feelings, and behaviors (e.g., "I feel good about my ability to satisfy my sexual partner."). Responses were made on a five-point scale that ranged from 1 (*do not agree at all*) to 5 (*totally agree*). Internal consistency was $\alpha = .83$.

Sexual Assertiveness To assess the participants' ability to refuse unwanted sexual contacts and initiate wanted sexual activities, four items each from the Refusal subscale (e.g., "I refuse to have sex if I don't want to, even if my partner insists.") and the Initiation subscale (e.g., "I begin sex with my partner if I want to.") of the Sexual Assertiveness Scale (Morokoff et al., 1997) were employed. A five-point response

scale was provided, ranging from 1 (*never*) to 5 (*always*). Cronbach's alpha was .71 for refusal assertiveness and .66 for initiation assertiveness.

Acceptance of Sexual Coercion To rate the extent to what participants accept the use of physical force to make a woman engage in unwanted sexual intercourse, we used an instrument developed by Krahé et al. (2007), which was based on Goodchilds, Zellman, Johnson, & Giarrusso's (1988) measure. The participants were asked to imagine a man who wants to have sexual intercourse with a woman, but the woman says "no". Then, they had to rate under which circumstances they would find it understandable that the man uses or threatens to use physical force to make her have sex with him. A list of "justifications" for the use of physical force to obtain sex was presented (e.g., "He is so aroused that he cannot stop himself anymore."), and responses were made on a five-point scale ranging from 1 (*absolutely not*) to 5 (*absolutely yes*). The internal consistency was $\alpha = .95$.

Plan of Analysis

Differences in relation to user status, gender, and their interaction in participants' sexuality-related cognitions and behaviors were tested conducting a multivariate analysis of variance (MANOVA). To test our mediation model (see Fig. 2), we used the Mplus software (version 8.2; Muthén & Muthén, 1998–2017). All variables, except for gender, dating app use, and casual sexual script, were modeled as latent factors. We could not estimate a model with the latent interaction of the descriptive and normative elements of the casual sexual script because this would require numerical integration which would be computationally too heavy to test. For this reason, the casual script was used as manifest variable. Indicative of good model fit are CFI $\geq .95$, RMSEA $\leq .06$, and SRMR $\leq .08$ (Hu & Bentler, 1999).

For our mediation model, the robust maximum likelihood (MLR) estimator was employed, accounting for the non-normal distribution of the data, and statistical significance of the pathways was assessed by 95% and 99% bias-corrected bootstrapped confidence intervals based on 10,000 replications. Because bootstrapping is not available with the MLR estimator, the maximum likelihood (ML) estimator was employed for these analyses.

Results

Descriptive Statistics of Dating App Use

Of the total sample of 491 participants, 277 participants reported currently using dating apps or having used dating apps in the past. The most frequent dating apps used in the sample

were Tinder (70.8%) and Lovoo (41.5%), whereas other apps, such as Badoo, OkCupid, Happn, Jauma, and Zoosk, were used only by a small percentage of participants. Among the users, 19.5% used dating apps once a year or less often, 16.6% every few months, 6.5% once or twice a month, 6.1% three or four times a month, 9.4% once or twice a week, 17.7% three or four times a week, 15.5% daily, and 8.7% several times a day. A total of 13.6% of the users had never met their counterpart in real. A total of 68.4% had met their counterpart once to ten times, whereas the remaining 18% of the sample reported 12 to 150 encounters. Participants reported the following sexual activities in which they and their online date had engaged at least once: 65.1% petting, 58.6% oral sex, 68.1% sexual intercourse, and 46.8% other sexual activities. For the purposes of further analyses, we treated dating app use as a dichotomous variable and assigned those who have never used dating apps, used them once a year or more seldom, or only every few months to the *non-users* category (0). This decision was based on the rationale that using dating apps so rarely cannot be considered as regular behavior which might have the potential to change future cognition and behavior. Those participants who reported having used dating apps at least once or twice a month were assigned to the *users* category (1). Based on this categorization, 177 participants were identified as users and 314 as non-users. There were more male ($n = 115$) than female users ($n = 62$), $\chi^2 (1, N = 491) = 72.43, p < .001$.

Differences Between Users and Non-Users and Correlations

Based on MANOVA, the multivariate tests were significant for the main effects of participant gender [$F (12, 440) = 15.78, p < .001$], user status [$F (12, 440) = 6.84, p < .001$], and their interaction [$F (12, 440) = 1.86, p = .037$]. The means and *SD*s by gender and user status are shown in Table 2.

Regarding gender differences, men's compared to women's sexual scripts were more risky regarding drinking alcohol when having sex and the use of ambiguous communication of sexual intentions. Women endorsed in their scripts the readiness for casual sex to a greater extent than did men. Furthermore, men reported more ambiguous sexual communication during a sexual interaction than did women. In comparison to women, men reported a lower assertiveness in not only refusing unwanted sexual contacts but also initiating wanted sexual activities. In addition, men accepted sexual coercion more than women. No gender differences were found for the total risky sexual scripts, sexual self-esteem, casual sex, and drinking alcohol in sexual situations.

In terms of user status, users of dating apps had in general more risky sexual scripts and reported more risky sexual behavior than non-users. However, looking at the specific features of the scripts and behaviors, it is noteworthy that this

Table 2 Mean scores and *SD*s of the study variables by gender and use of dating apps

Scale (*n* items)	Range	$M (SD)_{Gender}$			*F* value[1]	$M (SD)_{Use}$		*F* value[2]
		Total	Men	Women		Non-users	Users	
Risky sexual script total (35)[a]	1–25	7.65 (1.95)	8.04 (2.18)	7.40 (1.74)	3.48	7.34 (1.97)	8.21 (1.79)	13.29***
Casual sex script (19)[a]	1–25	12.59 (3.53)	12.43 (3.61)	12.69 (3.48)	7.59**	12.07 (3.59)	13.52 (3.23)	24.71***
Communication script (8)[a]	1–25	3.00 (2.09)	3.93 (2.49)	2.39 (1.51)	59.89***	2.78 (2.03)	3.39 (2.16)	0.03
Alcohol script (8)[a]	1–25	3.38 (2.62)	3.95 (3.10)	3.00 (2.18)	12.70***	3.21 (2.39)	3.66 (2.96)	0.17
Sexual self-esteem (12)	1–5	3.91 (0.58)	3.89 (0.56)	3.93 (0.60)	0.54	3.94 (0.59)	3.87 (0.58)	1.05
Risky sexual behavior total (9)[b]	1–5	0.00 (0.52)	0.15 (0.57)	− 0.09 (0.45)	9.52**	− 0.10 (0.47)	0.18 (0.55)	16.26***
Casual sex (3)[b]	1–5	0.01 (0.87)	0.23 (0.94)	− 0.13 (0.80)	1.51	− 0.24 (0.75)	0.45 (0.91)	58.02***
Sexual communication (4)	1–5	1.61 (0.55)	1.75 (0.60)	1.52 (0.50)	16.85***	1.56 (0.53)	1.69 (0.59)	0.59
Alcohol in sexual situations (2)	1–5	2.95 (0.91)	2.95 (1.00)	2.94 (0.85)	0.06	2.98 (0.87)	2.89 (0.98)	1.24
Refusal assertiveness (4)	1–5	3.73 (0.92)	3.18 (0.89)	4.08 (0.75)	110.60***	3.88 (0.85)	3.46 (0.98)	0.85
Initiation assertiveness (4)	1–5	3.49 (0.78)	3.28 (0.71)	3.63 (0.79)	22.63***	3.53 (0.78)	3.42 (0.77)	0.14
Acceptance of sexual coercion (7)	1–5	1.21 (0.61)	1.34 (0.79)	1.13 (0.42)	12.13**	1.16 (0.51)	1.30 (0.74)	1.08

**p < .01; ***p < .001

[a] Mean scores of the descriptive and normative components multiplied

[b] Z-standardized

[1] Differences between men and women

[2] Differences between non-users and users

difference was mainly driven by the casual sex script and casual sexual behavior, which were more pronounced in users than non-users. In addition, the gender × use interaction was significant for sexual self-esteem, $F (1, 451) = 4.46$, $p = .035$, and acceptance of sexual coercion, $F (1, 451) = 5.40$, $p = .021$. As shown in Fig. 1, men who have used dating apps had lower sexual self-esteem than men who have not used such apps. There was however no difference between female users and non-users. The difference between female and male users was only marginally significant. The second significant interaction (see also Fig. 1) revealed that men who reported the use of dating apps accepted sexual coercion more than did men who did not use these apps, whereas female users and non-users did not differ. Finally, male users accepted sexual coercion to a greater extent than did female users, but male and female non-users did not differ between each other. Overall, the acceptance of sexual coercion was low.

With respect to the relationship between user status on the one hand and sexuality-related cognitions and behavior as well as the acceptance of sexual coercion on the other hand, the respective correlation coefficients are reported in Table 3 separately for men and women.

Mediation Model

A further purpose of the present study was to examine the mediating role of sexuality-related cognitions, namely risky sexual scripts and sexual self-esteem, on sexual behavior

patterns (risky sexual behavior, refusal assertiveness, and initiation assertiveness) and the acceptance of sexual coercion. Based on the finding that the difference among users and non-users in risky sexual scripts was mainly due to differences in the casual sex script (see Table 2), only this feature of risky sexual scripts was considered as a mediator in the analysis in addition to sexual self-esteem. Correspondingly, only casual sex as a part of risky sexual behavior was included into the model.

To test our path model, in a first step, we estimated a multi-group model by gender with paths constrained to be equal for men and women (*constrained model*). This model showed an acceptable fit with the data, $\chi^2 (929, N = 489) = 1532.780$, $p < .001$, CFI = 0.90, RMSEA = 0.05 90% CI [.0047, .056], SRMR = .10. In a second step, we tested a multi-group model by gender with paths that were allowed to vary between men and women (*unconstrained model*). The model fit of the unconstrained model was good, $\chi^2 (876, N = 489) = 1397.11$, $p < .001$, CFI = 0.92, RMSEA = 0.05 90% CI [.044, .054], SRMR = .08. Finally, to examine whether gender plays a moderating role, we compared both models using the Satorra-Bentler scaled chi-square difference test. The comparison of the constrained and unconstrained model showed that the model fit of the unconstrained model was significantly better, Satorra-Bentler scaled chi-square difference test $\chi^2 (53) = 117.68$, $p < .001$. Therefore, the unconstrained model was
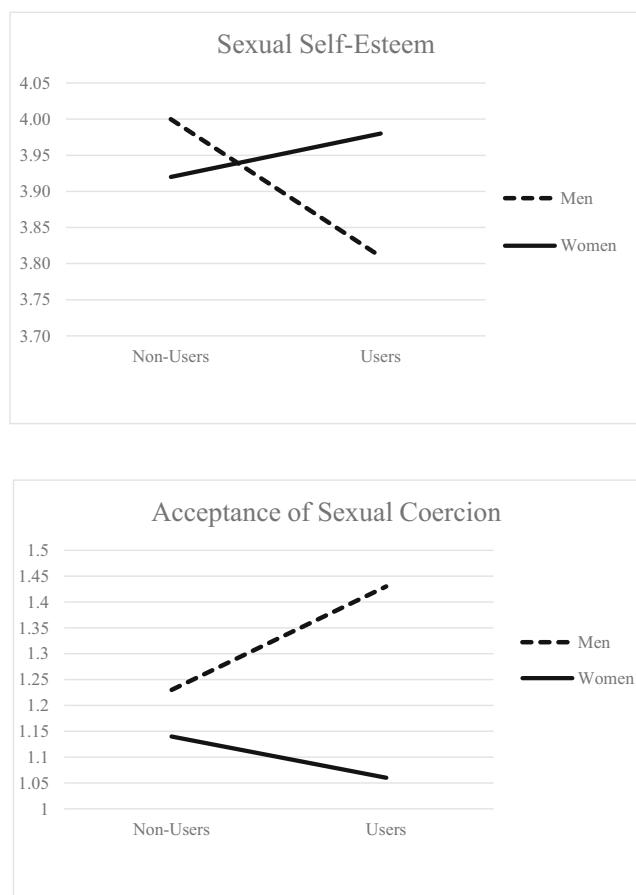
Fig. 1 Interaction effects of sexual self-esteem and acceptance of sexual coercion by gender × dating app use.

adopted as the final model. In a post-hoc analysis, gender differences in the coefficients for each path were tested using the model constraint option in Mplus. Fig. 2 depicts the final mediation model.

Among both men and women, dating app use was positively associated with the casual sex script, which, in turn, was positively linked to casual sexual activity. The indirect path between dating app use and casual sex was significant among men ($\beta = .10$, 99% CI [.005, .204]) and women ($\beta = .15$, 99% CI [.054, .214]), consistent with the proposed role of the casual sex script as a mediator in both gender groups. Against our prediction, the indirect pathways to refusal and initiation assertiveness as well as acceptance of sexual coercion through the casual sex script were not confirmed, neither among men nor among women.

Regarding dating app use and sexual self-esteem, a marginally significant negative association was found among men, whereas this link was non-significant among women. Furthermore, dating app use was significantly linked to lower initiation assertiveness via lower sexual self-esteem among men ($\beta = -.08$, 95% CI [−.234, −.002]), but not among

women ($\beta = .03$, 95% CI [−.035, .096]). No further significant indirect effects emerged.

Discussion

The purpose of the present study was to compare users and non-users of dating apps regarding their sexuality-related cognitions, such as risky sexual scripts and sexual self-esteem, as well their risky and sexually assertive behavior. Furthermore, we examined the link between the use of dating apps and acceptance of sexual coercion.

The key assumption underlying our research was that risky sexual scripts may play an important role as guidelines for risky sexual behavior and that they might be more pronounced in users of dating apps compared to non-users. Our analyses revealed that users of dating apps scored higher on the casual sex script and reported more casual sexual behavior. In particular, compared to non-users, both male and female dating app users expressed more readiness to engage in sexual contacts in their scripts, for example at a first date, and reported more casual sex behaviors, such as having sex with someone who they hardly knew. This result validates the function of dating apps as hookup apps that give young adults opportunities for casual sex, being consistent with previous findings (e.g., Sawyer et al., 2018). Moreover, the mediation analysis revealed that the link between dating app use and casual sex was mediated by the casual sex script. More precisely, dating app use was related to a more pronounced casual sex script, which in turn predicted more casual sexual behavior. Although these paths were assessed only cross-sectionally, this finding is consistent with previous research that sexual scripts may be considered as guidelines for sexual behavior (Krahé et al., 2007). Contrary to our expectations and to previous literature (e.g., Choi et al., 2016), no differences between users and non-users in other components of risky sexual scripts or behavior (alcohol and communication) emerged. Because dating apps are used for meeting potential casual sex partners, it may be that the casual sex script is therefore more pronounced compared to non-users, whereas dating app use is maybe less closely tied to drinking alcohol in sexual situations and using ambiguous communication of sexual intentions. Rather, one could assume that young people who make conscious decisions about hookups are more competent to communicate their sexual intentions and control their alcohol consumption in sexual situations. However, users and non-users did not differ regarding their sexually assertive behavior. Future research is needed to clarify these mechanisms.

It is noteworthy that young men who used dating apps reported a lower level of sexual self-esteem compared to young men who did not use such apps. Although it is an unexpected finding, previous research has provided similar results. Strubel and Petrie (2017) found a significantly lower

Table 3 Zero-order correlations of the study variables for men and women

| Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Dating app use	–	.16*	.19**	.03	.07	−.12†	.15*	.29***	.12	−.12	−.11	−.07	.12†
2. Sexual script total	.18**	–	.82***	.43***	.62***	.07	.55***	.45***	.29***	.39***	−.12	.00	.16*
3. Casual sex script	.27***	.86***	–	−.01	.23**	.24**	.48***	.55***	.15*	.29***	.01	.04	−.01
4. Communication script	−.08	.15**	−.22***	–	.29***	−.22**	.19*	.00	.41***	−.10	−.19**	−.07	.31***
5. Alcohol script	−.04	.54***	.21***	.12*	–	−.10	.34***	.17*	.15*	.44***	−.17*	.04	.21**
6. Sexual self-esteem	.08	.03	.17**	−.30***	−.09	–	.04	.10	−.11	.13†	.02	.31***	−.05
7. Sexual behavior total	.19**	.53***	.47***	.14*	.21***	.05	–	.75***	.70***	.57***	−.02	.04	−.02
8. Casual sex	.36***	.50***	.59***	−.07	.13*	.15*	.72***	–	.27***	.22**	.07	.12	−.00
9. Sexual communication	−.04	.11†	−.00	.36***	−.04	−.15*	.55***	−.01	–	.08	−.10	−.05	.13†
10. Alcohol in sexual situations	.00	.41***	.29***	.00	.36***	.08	.67***	.35***	.06	–	−.04	.04	−.16*
11. Refusal assertiveness	.01	−.11†	.02	−.28***	−.12*	.30***	−.10†	−.02	−.25***	.08	–	.03	−.19*
12. Initiation assertiveness	.11†	−.02	.06	−.15*	−.09	.37***	−.01	.09	−.16**	.05	.26***	–	.07
13. Acceptance of sexual coercion	−.08	.01	−.05	.23***	.04	−.09	.00	.04	−.02	.00	−.22***	−.15**	–

Correlation coefficients for men above the diagonal; coefficients for women below the diagonal

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

self-esteem in male Tinder users compared to male and female users and non-users. Although Strubel and Petrie (2017) have found no gender differences in terms of the user status in body image, such as body satisfaction, body surveillance, and body shame, the results suggest that male dating app users may be especially vulnerable in their self-esteem because of the pressure that dating apps may exert on them regarding their body and appearance. This in turn is consistent with studies showing that young people use dating apps also for self-worth-validation motives (e.g., Sumter, Vandenbosch, & Ligtenberg, 2017). Also, research has shown a negative link

between happiness or mood and casual sex (e.g., Bennett & Baumann, 2000; Vasilenko & Lefkowitz, 2018). This may also apply to our finding regarding male users' lower sexual self-esteem. Furthermore, the mediation model revealed additionally a negative indirect link between the use of dating apps and initiation assertiveness via lower sexual self-esteem in males. This finding indicates that young males in our sample who used dating apps reported lower sexual self-esteem, which in turn could discourage them to initiate a sexual contact they desired. Thus, these results suggest that dating app use may affect not only the

Fig. 2 Mediation model. All study variables, except for dating app use, gender, and casual sex script, were modeled as latent factors. The standardized coefficients before the slash are for men and after the slash for women. The shaded coefficients were significantly different between men and women. † $p < .10$ (90% CI); * $p < .05$ (95% CI); ** $p < .01$ (99% CI)
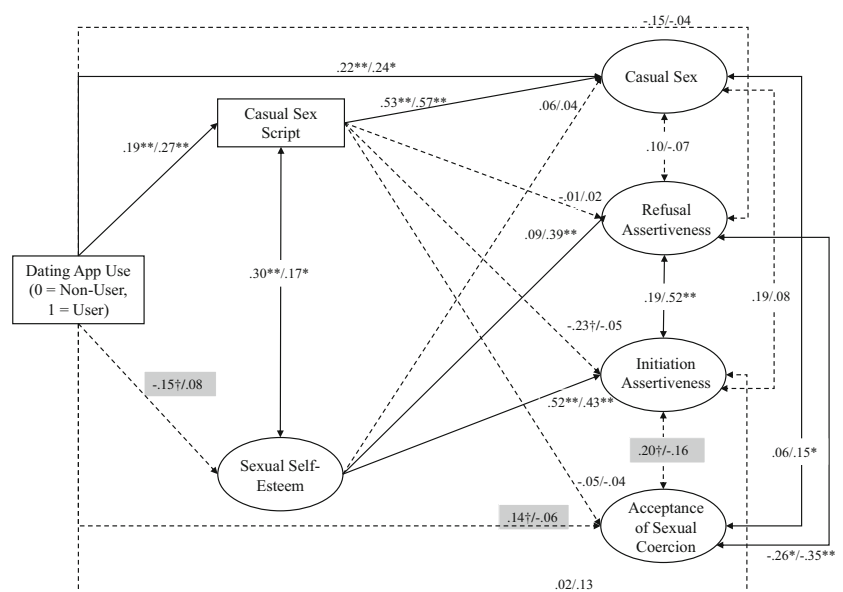
way how young males perceive themselves as sexual beings but also whether they initiate a sexual contact they want. Whether males with lower sexual self-esteem are particularly prone to use dating apps or whether more frequent use of dating apps could have a negative impact on males' sexual self-esteem should be explored more carefully in future research. Given that we found this specific pattern of results only among men, more research is needed to understand potential gender differences. Looking at different motives and sexuality-related cognitions and behaviors may help to clarify this picture.

Additionally, men who used dating apps scored higher on acceptance of sexual coercion than male non-users and female users. Specifically, male users of dating apps accepted the use of sexual coercion under certain circumstances, such as if the men is so aroused that he cannot stop himself anymore or if the men and women have been in a relationship for some time. Engaging in casual sex contacts has been conceptualized in the literature as "impersonal sex" and is one pathway that explains men's sexual aggression toward women within the confluence model by Malamuth et al. (1995). According to this model, impersonal sex is characterized by a non-committal, game-playing orientation toward sexual relations and increases the odds of perpetration of sexual aggression (Vega & Malamuth, 2007).

Implications

With respect to the implications of our study, at the research level, more studies are needed, in particular experimental and longitudinal ones, to examine the potential bidirectional influences of dating app use and sexuality-related cognitions and behaviors. At the practical level, because of the popularity of dating apps among young adults, strengthening their media literacy may help to develop a more aware handling of these applications. Based on our result that dating app use was associated with more casual sex and given that past research has identified casual sex as a risk factor for sexual aggression perpetration and a vulnerability factor for sexual victimization (Sutton & Simons, 2015; Tharp et al., 2013), intervention programs should address the role of casual sex in relation to unwanted sex. Additionally, the potential adverse impact of dating app use on the way how young adults, especially young men, perceive themselves as sexual beings should be addressed more carefully in sexual education programs. All actions should be supported by policy measures, for example, by including these topics in sex education curricula.

Limitations

Several limitations have to be taken into account when interpreting the data. First, our findings are based on a cross-sectional design, thereby precluding causal inference. Thus, future longitudinal and experimental research is needed to clarify the direction of the paths, particularly if the use of dating apps contributes to more risky sexual scripts or if individuals with risky sexual scripts are more likely to seek the use of dating apps. Second, our participants were recruited through convenience sampling. Hence, findings may not be applicable to young adults in general. Future research should aim to study random or representative samples of adolescents and young adults. Finally, because of the low reliability of our communication measure, future research should include further aspect of ambiguous communication in sexual situations. This could, for example, involve aspects of clear consent and non-consent.

Despite these limitations, the present study is the first to examine differences between dating app users and non-users in sexuality-related cognitions and behaviors, allowing a better understanding of how these two groups differ. Our findings indicated that users of dating apps reported more pronounced casual sex scripts and casual sexual behavior. Considering that previous research has shown that more risky scripts are indirectly linked to a higher probability of sexual aggression victimization and perpetration via more risky sexual behavior (Schuster & Krahé, 2019a, 2019b; Tomaszewska & Krahé, 2018), this may explain, at least partly, the previous finding that dating app use is linked to a higher vulnerability of sexual victimization (Choi et al., 2018; Shapiro et al., 2017). Beyond effects on casual sex scripts and behavior, it was notable that male dating app users reported lower sexual self-esteem, lower sexual initiation assertiveness, and more condoning attitudes toward sexual coercion. Given the growing market of dating apps, this group should be studied in more detail in the future.

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