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# Is swiping right risky? Dating app use, sexual satisfaction, and risky sexual behavior among adolescents and young adults

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## ABSTRACT

Risky sexual behaviors (RSBs) are a prevalent public health concern among adolescents and young adults. Dating apps, which are relatively new technological means to meet sexual partners, are on the rise among this population. However, the scientific literature is mixed regarding the association between the use of dating apps and RSBs, with most studies focusing exclusively on condom use. The present study examined the associations between dating app use and a comprehensive range of RSBs, as well as the moderating role of sexual satisfaction. Self-report questionnaires assessing the level of activity on dating apps, sexual satisfaction, and RSBs were completed by 342 adolescents and young adults. The results revealed significant positive associations between dating app use and a variety of RSBs. Sexual satisfaction was a significant moderator of the link between dating app use and impulsive sexual behaviors. Specifically, dating app use was positively associated with impulsive sexual behaviors at both low and high levels of sexual satisfaction, but more strongly so at low levels of sexual satisfaction. The findings highlight the importance of examining a wide variety of RSBs beyond condom use and have meaningful implications for the prevention of RSBs among youth.

## LAY SUMMARY

Dating app use was linked to higher levels of risky sexual behaviors, such as having multiple sexual partners. In addition, low sexual satisfaction played a role in amplifying the link between dating app use and impulsive sexual behaviors. These findings are relevant for the promotion of sexual health among youth.

## ARTICLE HISTORY

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## KEYWORDS

Sexual risk taking; dating apps; sexual satisfaction; adolescents; young adults; sexual health

Risky sexual behaviors (RSBs) are common among adolescents and young adults. According to the 2019 Youth Risk Behavior Surveillance, 46% of sexually active high school students in the United States did not use a condom during their last sexual intercourse, 12% did not use any pregnancy prevention method, and 21% used drugs or alcohol before sexual intercourse (Underwood et al., 2020). Overall, the prevalence

of engaging in at least one form of RSB among sexually active college students and young adults reached 52% (Dolphin et al., 2018; Institut national de santé publique du Québec, 2017). RSBs refer to a variety of sexual behaviors that can lead to sexually transmitted infections (STIs) and unwanted or unplanned pregnancies (Institut de la statistique du Québec, 2014; Rotermann, 2012; Scott et al., 2011). These include, for instance, unprotected sex, sex under the influence of alcohol or drugs, use of interrupted coitus as a method of birth control, co-occurrence of sexual partners over a short period of time, sexual intercourse before discussing sexual history and disease status, and casual sex. Other indicators can account for RSBs, such as age at first sexual intercourse and number of lifetime sexual partners (Institut de la statistique du Québec, 2014; Institut national de santé publique du Québec, 2017; Joffe et al., 1992; Rotermann, 2012; Scott et al., 2011). According to the 2018 Sexually Transmitted Disease Surveillance, half of the 20 million new STIs detected annually in the United States are among young people aged 15–24 years (Centers for Disease Control & Prevention, 2019a). In 2018 in the United States, 180,000 babies were born to teen girls aged 15–19 years (Martin et al., 2019). Given the prevalence of RSBs and their impacts on health and unwanted pregnancies, understanding the risk factors among youth is paramount.

### ***Dating apps and RSBs***

Dating applications (apps), such as Tinder, Bumble, and Grindr, are online services, often free, accessible via smartphones and intended to generate romantic or sexual encounters. They commonly use the GPS locations of subscribers to suggest nearby available partners. The number of smartphone dating app users in the United States was estimated to be 26.6 million in 2020 (Statista, 2021). While most dating apps request users to be aged 18 or older, some apps, such as MyLol and Yubo, target teenagers. In addition, the minimal control exercised to monitor the age of users allows teenagers to have an account on most dating apps. A Pew Research Center survey revealed that 24% of American teens aged 13–17 who were dating, amounting to 8% of all American teens, have met a romantic or hook-up partner online (Lenhart et al., 2015). Of the 200 sexually experienced adolescent men having sex with men (MSM) aged 14–17 recruited in a study, 52.5% had used a dating app specific to MSM (Macapagal et al., 2018). According to the Pew Research Center, 30% of American adults used a dating site or app in 2019, while this proportion was 15% in 2015 (Smith & Duggan, 2013; Vogels, 2020a). Among those aged 18 to 29, this proportion was 48%, and sex- and gender-diverse people were twice as likely as heterosexuals to use dating sites or apps (Vogels, 2020a). Single and/or unmarried individuals, as well as those who did not live with a partner, were among the highest users of dating sites or apps (Vogels, 2020b). This statistic suggests that people in committed romantic relationships are less likely to use dating apps.

In addition to being increasingly widely used, these new technological tools represent means that differ from conventional romantic and sexual dating methods by simplifying the process of identifying potential partners. Dating apps allow a convenient and easy access at any time through smartphones to other individuals looking

for potential partners, whom they would be unlikely to encounter in other contexts. In addition, dating apps are considered a non-threatening way to establish a connection by allowing virtual communication with a potential partner before a first meeting in person (Anzani et al., 2018; Finkel et al., 2012). Dating apps have been considered in studies of RSBs, as they provide easy and quick access to a large number of potential sex partners and allow for virtual or in-person contact with more than one person simultaneously (Anzani et al., 2018). Correspondingly, multiple and concomitant sexual partners are examples of RSBs. They also differ from meeting partners on other social media, both in terms of the purpose of use and of the operation of use, making them two distinct new technologies to study. The aim of dating apps is specifically to generate romantic or sexual encounter, often by using the GPS location to propose new profiles to chat with after a match, while social media like Facebook more broadly aim to “connect with friends and the world around you” (Facebook, 2022) and are more focused on sharing content with one’s social network.

Some authors explain the potential influence of dating app use on RSBs by an erroneous subjective perception of the risks incurred and a sense of intimacy by users of dating apps (Couch & Liamputtong, 2008; Nguyen et al., 2012; Rosen et al., 2008; Siegel et al., 2017). More precisely, online communication would generate an idealization of the partner, which creates an exaggerated sense of intimacy (Rosen et al., 2008) and an increased trust that could lead to RSBs. Also, since dating apps allow filtering and selecting potential partners based on users’ profiles, they are likely to provide a greater sense of control and risk management, which in turn reduces the perception of the risks involved compared to traditional forms of dating (Couch & Liamputtong, 2008).

Other explanations were formulated to understand how the use of dating apps could be linked to more RSBs. Among these are studies that have looked at the new social norms generated on dating apps. In a study investigating the use of Grindr (Blackwell et al., 2015), an app primarily used by MSM, there was a consensus from participants that a proportion of users were using the app to seek for casual sex. Indeed, many features of dating apps may contribute to create that perceived norm, such as sexually suggestive photos, sexting, and the possibility to connect with many potential partners at the same time. Another study demonstrated that perceiving that searching for casual sex partners through dating apps was a norm was associated to a higher intent to use dating apps for casual sex in the following week (Chan, 2017). Degen & Kleeberg-Niepage, (2022) also highlight, among Tinder users, a tension between the user’s individuality (i.e. what one intimately needs and desires while using apps) and the pressure of normativity (i.e. what one decodes of the implicit norms on the platform). The authors also describe how Tinder speeds up the dating process. This is likely to contribute to more RSBs, given that a quickening of meetings, sometimes with several potential partners in parallel, and impression of intimacy can promote certain behaviors included in RSBs: multiplication of sexual partners, sexual partners without commitments, sexual activities without knowing the sexual history of the partner, etc. Another experimental study showed that when participants were exposed to sexually suggestive photos on social media, they estimated that more of their peers would engage in

RSBs (unprotected sex and sex with strangers) and were more likely to report that they would themselves also engage in those RSBs (Young & Jordan, 2013).

These studies illustrate certain avenues for explaining the association between the use of dating apps and RSBs. However, empirical investigation of this association has produced conflicting results. One study found that users of Tinder have higher odds of having five or more previous sexual partners than non-users, while Tinder use was not significantly associated with condom use (Shapiro et al., 2017). This suggests that dating app use might be differentially associated with different types of RSBs. Another study revealed that, after controlling for variables such as age and relationship status, using dating apps in the last two months predicted five of the six RSBs measured: having three or more sexual partners in the last year, engaging in a hook-up in the last two months, having a hook-up involving alcohol or drugs, and reporting an STI in their lifetime. The only behavior that was not predicted was condomless sex with new partners in the last two months (Rogge et al., 2020). Cabecinha et al. (2017) found that finding partners online was associated with reporting various RSBs: condomless sex with two or more partners, concurrent sexual partners, and a higher number of sexual partners. However, this study assessed online dating specifically through websites rather than dating apps, as data were collected between 2010 and 2012, before the creation of Tinder.

A recent systematic review based on 25 studies published before September 2017 did not reach a clear conclusion regarding the association between online dating and RSBs (Tsai et al., 2019). Of the 19 studies that assessed RSBs based on measuring condom use, 26% found no association with finding a partner online, 16% found that online partner search was a protective factor against unprotected sex, and 58% found that online partner search was associated with a higher risk of unprotected sex or irregular use of condoms during sex compared to traditional means of meeting new partners. Tsai et al. (2019) point out that as all studies included in their systematic review were cross-sectional, they do not permit to conclude on the direction of the association. It should be noted that 56% of these studies targeted young adults aged 18 to 25 years, and 25% of the studies were conducted exclusively among women. This heterogeneity in samples could explain the divergent results, as gender and age are likely to influence RSBs (Centers for Disease Control & Prevention, 2019b; Rotermann & McKay, 2020). In addition, the review included only studies that focused on samples of individuals who engaged in heterosexual sex. It should be noted that meta-analyses that targeted MSM found a positive association between dating app use and RSBs as well as a higher risk of STIs (Liau et al., 2006; Wang et al., 2018). However, no study assessed the association between dating app use and RSBs among other gender/sex diverse couples. In addition, Tsai et al. (2019) used the measure of RSBs based on condom use and the presence of STIs only, although RSBs include a wider range of behaviors. Finally, recent empirical data are required, as data collection for many of the studies reviewed were conducted several years before the rise of dating apps, and some studies assessed mostly seeking partners through internet websites, which differ from dating apps, such as lacking easy access at any time on a smartphone.

Beyond methodological differences pertaining to sample characteristics, RSBs measurement, and year of publication, these conflicting results point to a positive,

negative, or insignificant association between dating app use and RSBs, suggesting that certain factors are likely to modify the strength or the direction of the association. Tsai et al.'s (2019) systematic review highlighted the necessity of examining moderators of this link in future studies, as the association between the use of dating apps and RSBs may vary across individuals. Sexual satisfaction might be a relevant factor to consider.

### ***Sexual satisfaction and RSBs***

Sexual satisfaction is defined as “an affective response arising from one’s subjective evaluation of the positive and negative dimensions associated with one’s sexual relationship” (Lawrance & Byers, 1995, p. 268). Sexual satisfaction is a central feature of sexual health. The World Health Organization (2006) defined sexual health as “a state of physical, emotional, mental, and social well-being in relation to sexuality; it is not merely the absence of disease, dysfunction, or infirmity. Sexual health requires a positive and respectful approach to sexuality and sexual relationships, as well as the possibility of having pleasurable and safe sexual experiences, free of coercion, discrimination, and violence” (p. 5). This definition emphasizes that sexual health is broader than the absence of disease or risk and invites the understanding of RSBs, a risk factor of sexual health, in relation to positive dimensions of sexuality, including sexual satisfaction.

Studies that have examined the association between sexual satisfaction and RSBs demonstrated some divergence in their findings. The link between sexual satisfaction and RSBs has been found to be negative in some studies (Auslander et al., 2007; Heiman et al., 2011; Raj & Pollack, 1995; Rudolph et al., 2020), positive in others (Haavio-Mannila & Kontula, 1997; Pedersen & Blekesaune, 2003), and insignificant or unclear in yet others (Higgins et al., 2011; Lehmiller et al., 2014; Zimmer-Gembeck et al., 2015). Among other factors, differences in the conceptualization of RSBs, such as being limited to condom use or number of sex partners, and sexual satisfaction, such as global evaluation of one’s sex life vs. satisfaction with specific sexual intercours, could explain these disparities.

Despite the limitations of previous studies on the nature of the link between sexual satisfaction and RSBs, sexual satisfaction remains a relevant variable to consider as a potential moderator of the association between dating app use and RSBs. As Seehuus and Rellini (2013) pointed out, individuals tend to present differences in their sociosexual orientation, that is, their tendency to engage in sexual activities with more than one person, and with partners that are not romantic ones (i.e. just met, a one-night stand, or friend with benefits). The authors also raised the importance, in the face of divergent results to explain the risk factors surrounding sexuality, of examining more complete models including relevant variables that have received less interest. In parallel, research shows that individuals engage in sexual relationships for several different underlying motivations (Cooper et al., 1998). Among these, some engage in RSBs as a way to alter or manage negative effects (Cooper et al., 1998). Following this logic, sexual satisfaction could act as a moderator of the association between the use of dating apps and RSBs. Individuals with lower sexual satisfaction place less value on their sexuality or perceive it as negative, unsatisfying,

and unpleasant. These individuals could be more prone to engage in risky behaviors in the context of dating app use, that is, platforms specifically dedicated to generate potential partners and that promote, by their social norms, certain RSBs. Adolescents and young adults with lower sexual satisfaction could therefore be more likely to engage in RSBs as a means of improving their sexuality, including condomless sex as an attempt to gain pleasure or satisfaction, and sex under the influence of drugs or alcohol in an effort to enhance the experience (Carballo-Diéguez et al., 2011). In this context, youth engaging in RSBs could be motivated to improve their sexuality and make it more satisfying. RSBs such as multiplying partners, engaging in sex with someone just met, or riskier sex acts (such as vaginal, oral or anal sex without adequate protection against pregnancy or STIs) could be understood as attempts to actively seek satisfactory and enjoyable sexual experiences. Therefore, low sexual satisfaction could amplify the link between the use of dating apps and RSBs. In contrast, individuals with greater sexual satisfaction, who consider their sexuality as more valuable, positive, satisfying, and pleasant, might be more protective of this sphere of their life and less inclined to engage in behaviors that would put their sexual health at risk when meeting sexual partners through dating apps. In addition, the gratification they already derive from their sexuality might make them less vulnerable to situations that trigger RSBs, such as those provided by dating app use, compared to their sexually dissatisfied counterparts.

This rationale for the moderating role of sexual satisfaction is consistent with the evolutionary model of RSBs (Ellis et al., 2012). Despite deleterious outcomes, the evolutionary model understands youth RSBs not just as a maladaptive response, but also as a strategy for which gains are expected to exceed costs. For example, gaining higher dominance in social hierarchies might be perceived as an important gain, even if it implies engaging in RSBs. Moreover, RSBs during adolescence and emerging adulthood have also been understood as part of an exploration of identity to meet exploration needs in the sexual sphere (Arnett, 2000). Taken together, this suggests that the pursuit of benefits such as a more satisfying sex life and an exploration of one's sexual identity might prompt RSBs in sexually dissatisfied youth, especially in a risky context such as dating app use, despite the potential costs associated.

To our knowledge, the moderating effect of sexual satisfaction on the link between the use of dating apps and RSBs has not been studied to date. Understanding this effect could help reconcile conflicting results observed in the scientific literature regarding the link between dating apps and RSBs. Furthermore, from a practical perspective, it is important to understand more precisely the phenomenon of RSBs in the context of dating app use, as this new form of dating has become widespread. Identifying the role of sexual satisfaction in the association between dating app use and RSBs may highlight a relevant target for the promotion of sexual health and reducing engagement in RSBs among youth. Like Ellis et al. (2012) point out, an understanding of RSBs as a strategy for deriving gains makes it possible to develop more tailored, effective, and successful interventions with young people, because it allows working *with* youth motivations and goals, instead of working *against* them. Steinberg (2008) emphasizes how traditional prevention programs, where information about risks is shared to young people, are useless, since it is not cognitive factors,



but affective and social factors, that are at the heart of risky behaviors among young people. Following this logic, better understanding the role of subjective and affective factors, such as sexual satisfaction, in the association between the use of dating apps and RSBs becomes a relevant first step in establishing a more effective prevention and promotion of sexual health.

### ***The present study***

This study aimed to gain a better understanding of the risk factors for RSBs among adolescents and young adults, specifically the role of dating app use and sexual satisfaction. To overcome the limitations of previous research, which focused only on a few RSBs, this study used a broad definition of RSB, including a wide range of behaviors classified into five different factors: sexual risk-taking with uncommitted partners, risky sex acts, impulsive sexual behaviors, intent to engage in RSBs, and risky anal sex acts (Turchik & Garske, 2009). Specifically, this study sought to examine (1) the links between dating app use and the RSB global score, including specific factors, and (2) the moderating effect of sexual satisfaction on the link between dating app use and the RSB global score and each factor. This study hypothesized that (1) dating app use would be positively associated with the RSB global score and various RSB factors and that (2) sexual satisfaction would moderate these associations. More specifically, the association between dating app use and RSBs was expected to be significant and positive at low levels of sexual satisfaction, and nonsignificant at high levels of sexual satisfaction. Given the potential confounding effect of age, sex, sexual orientation, and relationship status on the association between dating apps and RSBs (Anzani et al., 2018; Farmer & Meston, 2006; Fehr et al., 2018; Institut national de santé publique du Québec, 2019; Milhausen et al., 2018; Underwood et al., 2020), these variables were considered as covariates.

## **Materials and methods**

### ***Participants and procedure***

A convenience sample of adolescents and young adults aged 16 to 29 years was recruited from the general population of French-speaking Canadians, through online advertisements, such as Facebook, Instagram, and mailing lists. The study was part of a larger research on social media, intimate relationships, and sexuality. Data were collected through an online survey available in French on the *Qualtrics* platform. The participants had to follow a link to complete the questionnaires. They were first required to complete a consent form before being redirected to eligibility questions and then to the questionnaire. The main eligibility criterion for the larger research was being between 16 and 29 years of age. Data were collected from January 2019 to October 2019. Completion of the questionnaires required 30 to 45 minutes, and each participant was compensated CAN\$10. The study was approved by the research ethical board of the Université du Québec à Trois-Rivières.

A total of 1,508 participants were interested in the broader study. Among them, 1,090 met the eligibility criterion, consented to provide their personal information



to participate in the study, and answered correctly at least two out of three attention questions. Participants in exclusive relationships were excluded from the present study, as this group is less likely to use dating apps, as mentioned above, and RSBs measured in this study included behaviors that are not risky in the context of stable sexual relationships with known partner sexual history, such as lack of condom use. The final sample consisted of 342 adolescents and young adults ( $M=21.94$ ;  $SD=3.40$ ).

The sample included 188 (55.0%) women and 154 (45.0%) men. The majority of the participants identified as French Canadians (87.1%,  $n=298$ ) and the remaining identified with other cultural backgrounds, such as Western European or Middle Eastern. Most participants had a college education (74.5%,  $n=255$ ) and an annual income of less than \$15,000 (63.5%,  $n=217$ ). The majority of participants had at least one consensual sexual partner in their lives (84.2%,  $n=288$ ). Regarding sexual attraction, 81.3% ( $n=278$ ) were identified as attracted exclusively or mainly to people of the other sex and 18.7% ( $n=64$ ) were attracted exclusively or mainly to people of the same sex, attracted to both sexes, attracted regardless of sex or gender, not attracted to anyone, or unsure about their sexual attraction. Regarding relationship status, over half (68.1%,  $n=233$ ) of the participants reported being single with no sexual partner, 23.1% ( $n=79$ ) single with one or more friends with benefits, and 8.8% ( $n=30$ ) in a non-exclusive relationship.

## Measures

Participants were asked sociodemographic questions to assess their sex, age, sexual attraction, and relationship status. As no participant identified as “intersex,” sex was coded as 0 = *man* or 1 = *woman*. Age was considered a continuous variable. Sexual attraction was coded as 0 (individuals attracted exclusively or mainly to people of the opposite sex) or 1 (individuals attracted exclusively or mainly to people of the same sex, to both sexes, regardless of sex or gender, not attracted by anyone, or unsure about their sexual attraction). Relationship status was coded as 0 (single, either with no sexual partner or with one or more friends with benefits) or 1 (in a non-exclusive relationship).

## Dating app use

Dating app use was assessed using three items developed for the present study: “Among the new sexual or romantic partners met in the last 6 months, how many were met through a dating app or site, such as Tinder, Badoo, and Happn?” (with responses rated from 0 [*none*] to 4 [*all*]), “When using a dating app or site, how many people are you chatting with at the same time?” (with responses rated from 1 [*one person at a time*] to 5 [*ten or more*]), and “After how long are you comfortable seeing in person someone met on a dating app or site?” (with responses rated from 1 [*never*] to 6 [*after a month or more*]). Dating app use items were created to measure the extent to which the participants actively used dating apps rather than being limited to markers of frequency or duration of use (Ellison et al., 2007). For the first item, participants who had not met a new sexual or romantic partner in the last six months had a score of zero. For the two other items, participants who did not have an active account on a dating app had a score of zero. As items

varied in the number of response choices, some response options were merged and recoded on a five-point Likert scale. A global score of dating app use, ranging from 0 to 4, was obtained by averaging across the three items. Lower scores indicated less active dating app use, while higher scores indicated more active dating app use. The internal consistency of the scale was  $\alpha = 0.79$ . The questionnaire measured the use of both dating sites and dating apps; however, the term “dating apps” was used in this study, as this technology is more likely to be used among individuals aged 16 to 29.

### *Risky sexual behaviors*

A French version of the sexual risk survey (SRS; Turchik & Garske, 2009) was used to measure RSBs. This 23-item questionnaire assessed the frequency of various RSBs. For each item, participants were asked to indicate the number of times they had engaged in the behavior over the last six months. The SRS is divided into five factors: sexual risk taking with uncommitted partners (eight items, such as number of times involved in sexual intercourse with someone you know but are not involved in any sort of relationship with, with someone just met, with someone who had multiple partners or before discussing sexual history or disease status), risky sex acts (five items, such as vaginal or oral sex without condoms or protection against pregnancy and using alcohol or drugs before or during sex), impulsive sexual behaviors (five items, such as having an unexpected and unanticipated sexual experience and leaving a social event with someone just met), intent to engage in risky sexual behaviors (two items: going to a social event with the intent to hook up and engage in sexual behavior or sexual intercourse with someone), and risky anal sex acts (three items: anal sex, fisting, or analingus without condom or adequate protection). Following Turchik and Garske’s (2009) recommendations, responses to each item were recoded on a five-point Likert scale (0 = did not happen, 4 = high frequency of this behavior). Raw scores of 0 were coded as such for the newly created variable. The remaining scores were considered to represent 100% of the responses and recoded following this guideline: 1 = 40% of responses, 2 = 30% of responses, 3 = 20% of responses, and 4 = 10% of responses. For instance, for the item “How many times have you given or received fellatio without a condom?”, 41.6% answered 0, and the remaining raw scores ranged from 1 to 50. Among these non-zero scores, raw scores from 1 to 4 represented 40.1% of the responses and were recoded as 1; raw scores from 5 to 15 represented 30.2% of the responses and were recoded as 2; raw scores from 16 to 42 represented 20.3% of the responses and were recoded as 3; and raw scores from 43 to 50 represented 9.3% of the responses and were recoded as 4. The frequency ranges for each code varied to some extent across items, as the distribution of raw scores differed from one item to another. A global score was obtained by averaging across the 23 recoded items, and five scores were obtained by averaging the respective items of each factor. The SRS had excellent internal consistency for the global score in the present sample ( $\alpha = 0.92$ ) and adequate internal consistency for each of the five factors: sexual risk-taking with uncommitted partners ( $\alpha = 0.89$ ), risky sex acts ( $\alpha = 0.87$ ), impulsive sexual behaviors ( $\alpha = 0.76$ ), intent to engage in risky sexual behaviors ( $\alpha = 0.65$ ), and risky anal sex acts ( $\alpha = 0.82$ ).

### ***Sexual satisfaction***

The French version of the global measure of sexual satisfaction (GMSEX; Lawrance & Byers, 1998) was used to assess sexual satisfaction. This questionnaire is based on a seven-point bipolar scale that rates five different aspects of sexuality: good to bad, pleasant to unpleasant, positive to negative, satisfying to unsatisfying, and valuable to worthless. A global score was obtained by summing the five items. The global score ranged from five to 35, where a higher score indicated greater sexual satisfaction. For the present sample, the internal consistency was  $\alpha=0.90$ .

### ***Data analysis***

*A priori* tests were performed on G\*Power, which revealed that 103 participants were required for an effect size of 0.15, an error probability of 0.05, and a power of 0.80, which was obtained in the present study. Descriptive correlational analyses were performed using SPSS Statistics version 26. The Kolmogorov-Smirnov test was used to test for normality. As expected for constructs that are naturally non-normally distributed, data for the RSBs' global score and all factors departed from normality ( $p<0.001$ ) and were positively skewed. No missing data were found for sociodemographic variables, including age, sex, relationship status, and sexual attraction) and for dating app use. For RSBs, missing data ranged from 11.40% to 12.28%, depending on the factor and represented 6.73% for sexual satisfaction. Missing data were handled using the full information maximum likelihood method with a robust estimator (MLR) to account for the non-normal distribution of RSB scores. To test our main hypotheses, we conducted separate regression models for each RSB outcome: global score of RSBs, sexual risk taking with uncommitted partners, risky sex acts, impulsive sexual behaviors, intent to engage in risky sexual behaviors, and risky anal sex acts. In each model, dating app use, sexual satisfaction, and the interaction term between the two were entered as independent variables. The variables were centered to avoid multicollinearity. In the case of meaningful interactions between dating app use and sexual satisfaction, these interactions were decomposed and the association between dating app use and RSBs was examined at a high level of sexual satisfaction (1 SD above the mean) and at low levels of sexual satisfaction (1 SD below the mean). Sex, age, relationship status, and sexual attraction were entered as covariates in all analyses. Regression models were constructed using Mplus, version 8.6.

## **Results**

### ***Descriptive and bivariate analyses***

Among all participants, 224 (65.5%) had an account on a dating app at least once in their life, and 192 (56.1%) had used a dating app account in the last six months. Among the participants who had met new sexual or intimate partners in the last six months ( $n=222$ ), 103 (46.4%) had met at least one partner through a dating app. Among the participants who had used a dating app account in the last six months ( $n=192$ ), 124 individuals (64.6%) reported that they had a conversation with more than one person at a time, 40 (20.8%) were comfortable meeting in

person the same day or the next day someone they had met on a dating app, and 38 (19.8%) had a sexual intercourse the same day or the next day they had met someone on a dating app.

Regarding RSBs, only 51 participants (16.9%) reported that they had not engaged in any form of risky sexual behavior in the past six months. Descriptive statistics for all RSB items are presented in Table 1, using raw scores that represent the frequency of endorsed behaviors rather than recoded scores for ease of interpretation.

Correlational analyses are reported in Table 2 and showed significant and positive associations between the use of dating apps and the global score of RSBs, as well as the five RSB factors. The results revealed a significant and positive link between dating app use and sexual satisfaction, and between the RSBs global score and factors and sexual satisfaction, except for the intent to engage in risky sexual behaviors. Concerning covariates, age was significantly and positively correlated with dating app use and RSB global score and factors, except intent to engage in risky sexual behaviors. Age did not correlate with sexual satisfaction. Sex was significantly correlated with sexual risk taking with uncommitted partner factors and sexual satisfaction, with women having higher scores. Relationship status was significantly and positively correlated with the RSB global score, risky sex acts factor, and risky anal sex acts factor, as well as with sexual satisfaction, with people in a non-exclusive relationship demonstrating higher scores on these variables.

**Table 1.** Descriptive statistics for risky sexual behaviors (RSBs) items.

Item	<i>N</i>	Number of participants endorsing the item at least once in the last 6 months	%	<i>M</i>	<i>SD</i>
Number of sex partners	300	198	66.00	1.76	2.25
Fellatio without a condom	299	172	57.53	7.51	12.90
Number of sexual behavioral partners	301	167	55.48	1.21	2.90
Sex under influence of substances	301	153	50.83	3.72	7.42
Number of uncommitted sex partners	298	145	48.66	1.71	5.23
Cunnilingus without protection	299	138	46.15	6.35	11.95
Vaginal sex without a condom	302	134	44.37	6.67	13.57
Sex with partner having many past partners	294	130	44.22	2.63	7.76
Unexpected sexual experience	302	128	42.38	.86	1.46
Sex before discussing risk factors	303	114	37.62	1.08	3.32
Sex with someone they did not know well or just met	300	104	34.67	.81	1.75
Sexual behavior with a stranger or someone they did not know well	300	84	28.00	.53	1.27
Number of untested sexual partners	286	80	27.97	.56	1.28
Intent of sexual behavior	303	84	27.72	1.04	2.48
Intent of engaging in sex	300	78	26.00	1.01	2.40
Regretted sexual encounter	303	77	25.41	.54	1.51
Sex with partners having other current partners	293	69	23.55	.97	3.77
Left social event with someone	301	58	19.27	.38	1.00
Number of sex partner they did not trust	298	55	18.46	.32	.78
Vaginal sex without birth control	301	55	18.27	2.15	8.79
Analingus without protection	300	41	13.67	.67	2.92
Unprotected anal penetration of finger/object	301	41	13.62	.92	3.71
Anal sex without a condom	300	33	11.00	.79	4.64

*N* = total sample. % = percentage of participants among total sample who endorsed the item at least once in the last 6 months. *M* = mean raw score. *SD* = standard deviation of raw scores.

**Table 2.** Correlations and descriptive statistics for the study variables.

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Dating app use												
2. RSBs (global score)	.38**											
3. Sexual risk taking with uncommitted partners	.41**	.92**										
4. Risky sex acts	.22**	.80**	.59**									
5. Impulsive sexual behaviors	.27**	.77**	.72**	.41**								
6. Intent to engage in risky sexual behaviors	.16**	.42**	.32**	.15*	.35**							
7. Risky anal sex acts	.20**	.57**	.39**	.51**	.24**	.15**						
8. Sexual satisfaction	.12*	.36**	.26**	.52**	.13*	-.01	.29**					
9. Age	.35**	.26**	.24**	.30**	.12*	.04	.13*	.09				
10. Sex	-.07	.10	.13*	.11	.09	.01	-.05	.12*	.03			
11. Sexual attraction	.08	-.05	-.03	-.11	-.02	-.04	.09	—	-.05	-.08		
12. Relationship status	-.01	.18**	.08	.33**	.01	-.04	.22**	.19**	.13*	-.03	.14**	
<i>M</i>	.98	.64	.74	.88	.55	.52	.26	21.84	21.94	—	—	—
<i>SD</i>	1.11	.62	.83	.96	.62	.86	.66	7.47	3.43	—	—	—

Note. RSB=risky sexual behaviors. *M* = mean. *SD* = standard deviation. *n* = number of score 1. % = percentage of score 1. For sex, 0=men and 1=women. For sexual attraction, 0=attracted exclusively or mainly by people of the other sex and 1=attracted exclusively or mainly to people of the same sex, to both sexes, regardless of the sex or gender, not attracted by anyone, or unsure about their sexual attraction. For relationship status, 0=single and 1=in a non-exclusive relationship.

\**p* < .05; \*\**p* < .01.

### **Main effect of dating app use on risky sexual behaviors**

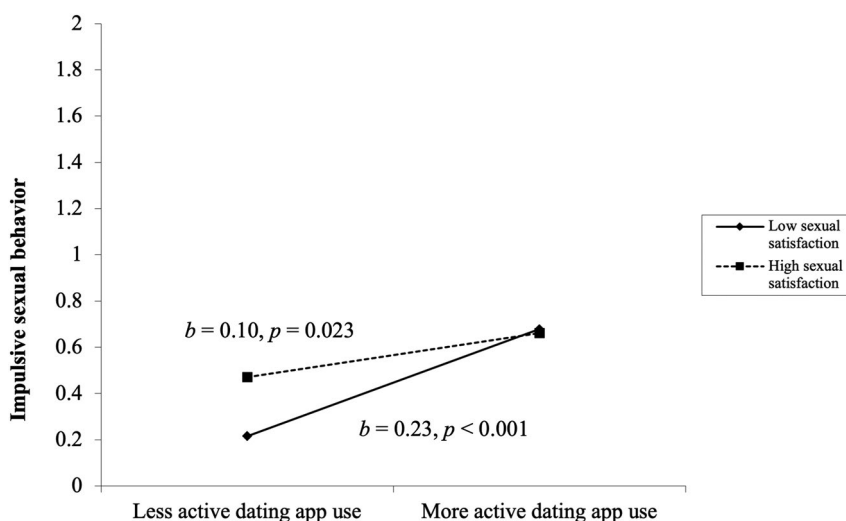
Regression analyses were performed to examine the main effect of dating app use on RSBs, controlling for age, sex, relationship status, and sexual attraction. Five regression models were conducted with the RSB global score and each RSB factor as dependent variables (see Table 3, Model 1). The results revealed that dating app use was significantly and positively associated with the RSB global score and all five RSB factors. Age was significantly and positively associated with RSB global score and risky sex acts. Being a woman was related to a higher RSB global score, more sexual risk-taking with uncommitted partners, and more risky sex acts. Being attracted exclusively or mainly to people of the opposite sex was associated with more risky sex acts. Being in a non-exclusive relationship was related to a higher RSB global score and more risky sex acts and risky anal sex acts. Dating app use and the covariates explained 2.9% to 23.6% of the variance in RSB global score and factors.

### **The moderating role of sexual satisfaction**

Sexual satisfaction and its interaction with dating app use were included in a second set of regression analyses (see Table 3; Model 2). The results indicated a statistically significant moderating effect of sexual satisfaction on the association between dating app use and impulsive sexual behaviors when covariates were considered. As illustrated in Figure 1, the simple slope test revealed that dating app use was positively and significantly associated with impulsive sexual behaviors at both low (1 *SD* below the mean) and high levels (1 *SD* above the mean) of sexual satisfaction. Visual inspection of the slopes (see Figure 1) revealed that impulsive sexual behaviors were overall high when sexual satisfaction was also high. However, the association between

**Table 3.** Main effect of dating app use on risky sexual behaviors (RSBs) global score and factors and moderation effect of sexual satisfaction.

	Model 1: Main effect of dating app use		Model 2: Moderating effect of sexual satisfaction	
Predictors	$\beta$	$p$	$\beta$	$p$
RSBs global score				
Dating app use	.36	<.001	.32	<.001
Age	.11	.040	.10	.049
Sex	.12	.016	.09	.079
Sexual attraction	-.08	.102	-.07	.144
Relationship status	.19	<.001	.13	.010
Sexual satisfaction	-	-	.29	<.001
Dating app use X Sexual satisfaction	-	-	.02	.750
R <sup>2</sup>	21.6%		29.4%	
Sexual risk taking with uncommitted partners				
Dating app use	.40	<.001	.38	<.001
Age	.09	.112	.08	.130
Sex	.16	.002	.13	.010
Sexual attraction	-.06	.242	-.05	.310
Relationship status	.09	.098	.05	.348
Sexual satisfaction	-	-	.19	<.001
Dating app use X Sexual satisfaction	-	-	.01	.776
R <sup>2</sup>	21.5%		25.1%	
Risky sex acts				
Dating app use	.18	.001	.12	.009
Age	.19	<.001	.18	<.001
Sex	.11	.026	.06	.215
Sexual attraction	-.14	.004	-.12	.006
Relationship status	.33	<.001	.25	<.001
Sexual satisfaction	-	-	.44	<.001
Dating app use X Sexual satisfaction	-	-	.06	.181
R <sup>2</sup>	23.6%		42.0%	
Impulsive sexual behaviors				
Dating app use	.27	<.001	.28	<.001
Age	.02	.695	.02	.801
Sex	.10	.066	.08	.129
Sexual attraction	-.04	.450	-.05	.376
Relationship status	.02	.780	.01	.898
Sexual satisfaction	-	-	.10	.093
Dating app use X Sexual satisfaction	-	-	-.11	.041
R <sup>2</sup>	8.5%		10.7%	
Intent to engage in risky sexual behaviors				
Dating app use	.17	.006	.16	.007
Age	-.02	.793	-.01	.815
Sex	-.01	.838	.02	.786
Sexual attraction	-.05	.408	-.05	.423
Relationship status	-.03	.597	-.03	.631
Sexual satisfaction	-	-	-.02	.708
Dating app use X Sexual satisfaction	-	-	.02	.686
R <sup>2</sup>	2.9%		2.9%	
Risky anal sex acts				
Dating app use	.18	.002	.14	.013
Age	.04	.480	.04	.508
Sex	-.03	.632	-.06	.266
Sexual attraction	.04	.423	.06	.297
Relationship status	.22	<.001	.17	.002
Sexual satisfaction	-	-	.25	<.001
Dating app use X Sexual satisfaction	-	-	.03	.542
R <sup>2</sup>	9.5%		15.8%	



**Figure 1.** Moderation effect of sexual satisfaction in the association between dating app use and impulsive sexual behaviors.

the use of dating apps and impulsive sexual behaviors was stronger at lower levels of sexual satisfaction. The final moderation model explained 10.7% of the variance in impulsive sexual behavior. No other moderating effects of sexual satisfaction were found in the association between dating app use and RSB global or remaining RSB factors. However, significant main effects emerged, indicating that sexual satisfaction was positively associated with the RSB global score, sexual risk taking with uncommitted partners, risky sex acts, and risky anal sex acts. Dating app use, sexual satisfaction, and the covariates explained 2.9% to 42.0% of the variance of the RSB global score and factors.

## Discussion

This study aimed to examine the association between dating app use and RSBs among adolescents and young adults and test the moderating role of sexual satisfaction on this association. This study considered a wide range of RSBs, beyond the typical focus on condom use. It was hypothesized that dating app use and RSBs—regardless of the subtype—would be positively associated, which was supported by the findings. In addition, it was hypothesized that sexual satisfaction would moderate these associations and, when low, act as a risk factor by amplifying the link between dating app use and RSBs. This assumption was partially supported, as there was a significant interaction between dating app use and sexual satisfaction in the prediction of one specific RSB subtype: impulsive sexual behaviors. With regard to the expectation that low sexual satisfaction would be a risk factor, the findings suggested a more complex pattern. Although the association between dating app use and impulsive sexual behaviors was stronger at lower levels of sexual satisfaction compared to higher levels of sexual satisfaction, higher sexual satisfaction appeared to be linked to higher overall impulsive sexual behaviors.



### ***Dating app use and risky sexual behaviors***

The results indicated that individuals who had a more active use of dating apps, such as those who used their account to talk to more people at a time, were ready to quickly meet in person, and had met a greater proportion of their recent partners on an app, were more likely to report engaging in a variety of RSBs, even when accounting for age, sex, sexual attraction, and relationship status. Faced with mixed previous literature regarding the association between dating app use and RSBs, these results are in line with past research supporting a positive association between dating app use and RSBs.

These findings provide new empirical support for a positive link between dating app use as a risk factor for RSBs among adolescents and young adults. Using a more comprehensive conceptualization of RSBs is particularly relevant, as it allows more nuances to be captured to what extent each type of RSB is associated with dating app use. It is possible that the broad range of RSBs examined in this study partly explains the discrepancy in results found with previous work based on a narrower definition of this construct (Al-Tayyib et al., 2009; Bateson et al., 2012; Brown et al., 2015; Cabecinha et al., 2017). In addition, past studies examining the link between online dating and RSBs have often been conducted before dating apps were accessible via smartphones (Al-Tayyib et al., 2009; Bateson et al., 2012; Buhi et al., 2012). In contrast, dating apps were already widely used at the time of data collection for this study. As dating app use has been democratized, it represents a more normative behavior than in early studies on this phenomenon, when dating apps were likely to be used by a distinct subgroup of individuals. In this context, the present findings are more likely to represent the current reality of online dating among youth and its link with sexual risk-taking.

These results demonstrate that sexual risk-taking with uncommitted partners—having sex with someone just met or with a *friend with benefits*—was the RSB factor most strongly associated with dating app use. This is in line with the fact that dating apps promote encounters and sexual relations with partners one does not know well and facilitates involvement with multiple sexual partners. In addition, this seems to predispose unanticipated and unexpected sexual experiences, as shown by the strong association between dating app use and impulsive sexual behaviors. It should be noted that these two factors encompass behaviors that do not include condom use. Thus, previous studies focusing exclusively on condom use have overlooked an important array of behaviors that are, according to the present findings, most strongly associated with dating app use.

Although smaller in magnitude, the results revealed positive associations for the three remaining factors: risky sex acts, intent to engage in sexual behaviors, and risky anal sex acts. This indicates that a more active use of dating apps is associated with a higher level of risky sexual acts, such as oral, vaginal, or anal sexual intercourse without condom or birth control, or intent to engage in sexual behaviors.

### ***The contribution of sexual satisfaction***

In partial support for the present hypothesis, the results indicated that sexual satisfaction significantly moderated the association between dating app use and impulsive

sexual behaviors. A closer look at this finding indicates that the more extensively the participants used dating apps for new romantic or sexual encounters, the more likely they were to have a higher level of impulsive or unplanned sexual behaviors, which was especially true for less sexually satisfied individuals. Highly sexually satisfied individuals, on the other hand, seemed to exhibit high levels of impulsive sexual behaviors overall; however, this was less associated with dating app use. Impulsive sexual behaviors more specifically refer to unplanned sexual behaviors, which often implies having sexual behaviors or sexual intercourse with someone that one just met or one did not know well. It is then possible that the way dating apps work—quick and easy dating and access to a large number of partners at once—elicit impulsive sexual behaviors. For sexually dissatisfied adolescents or young adults, dating app use could represent a more important trigger for engaging in impulsive sexual behaviors. They could engage in impulsive ways in sexual encounters when they use apps in an attempt to improve their sexuality and get more satisfaction from their sex life. For sexually satisfied individuals, dating app use has a significant, yet weaker association, as they appear to engage in impulsive sexual behaviors even when dating app use is low. This could be understood by the fact that, for these individuals, sexuality is a positive and pleasant experience. This could make them more inclined to take the opportunity of sexual encounters when they arise, whether through dating apps or otherwise, inadvertently increasing the likelihood of impulsive sex.

The present findings revealed that, above dating app use, sexual satisfaction was uniquely and positively associated with the RSB global score and three factors: sexual risk-taking with uncommitted partners, risky sex acts, and risky anal sex acts. This is in line with the few studies that demonstrated a positive link between the two (Haavio-Mannila & Kontula, 1997; Pedersen & Blekesaune, 2003). These findings are likely due to the sample used in the present study. While many past studies that have examined the link between sexual satisfaction and RSBs are based on heterogeneous samples that include all relationship statuses, the present study only included single individuals and people in a non-exclusive relationship. However, sexually satisfied individuals who are in a romantic relationship are less likely to take sexual risks and are more likely to have an exclusive partner or fewer simultaneous partners, as well as knowledge of their partner's sexual history. Previous research found that single individuals usually have a lower level of sexual satisfaction (Birnie-Porter & Hunt, 2015). Therefore, singles and romantically committed partners are two distinct groups in terms of sexual satisfaction and RSBs, which might explain the discrepancy in results between this study and previous work on more heterogeneous samples. Specifically, sexually satisfied singles and individuals in a non-exclusive relationship seem to be more inclined to engage in casual sex or unprotected oral, vaginal, and anal sex. Given that sexuality is satisfying for them and that they are not engaged in an exclusive relationship, they may seek sexuality with casual partners, be less likely to use condoms to avoid reduction of pleasure during sexual act, or engage in sexual intercourse even if they do not have access to protection. However, the present data suggest that sexual satisfaction was not associated with intent to engage in risky sex beyond dating app use. Therefore, it appears that adolescents and young adults who reported higher sexual satisfaction were more likely to engage in RSBs "in the heat of the moment," including having

sex with an unknown or uncommitted partner and having many sexual partners; however, they did not necessarily plan or intend to do so.

The positive association between sexual satisfaction and some forms of RSBs, as well as the nature of its interaction with dating app use, could be further understood by the fact that adolescents and young adults tend to underestimate the negative impact of their RSBs. Indeed, 90% of adolescents and young adults who were diagnosed with an STI perceived themselves to be only at low or moderate risk of contracting an STI when they considered their sexual activities over the past 12 months (Institut national de santé publique du Québec, 2017). In addition, some studies have identified that in the context of friends with benefits, which constitutes a risky sexual practice, higher levels of commitment in the relationship were associated with lower perceptions of vulnerability to STIs and lower condom use (Agnew et al., 2017; VanderDrift et al., 2012). This tendency to underestimate sexual risks, coupled with high sexual satisfaction, which could be associated with a potential search for sexual pleasure, might explain greater engagement in RSBs. In short, although the literature has highlighted the benefits of high levels of sexual satisfaction on the relationship and sexual well-being of romantically committed individuals (Brassard et al., 2012; Butzer & Campbell, 2008; Byers, 2005; Davison et al., 2009; Dundon & Rellini, 2010; Henderson et al., 2009; MacNeil & Byers, 1997; Young et al., 1998), its role in the sexual sphere of single people and people in non-exclusive relationships, particularly adolescents and young adults, does not appear to be protective, at least with respect to RSBs.

### ***Direction of the associations between dating apps use, sexual satisfaction and risky sexual behaviors***

As the design of the study is cross-sectional, it remains important to note that no causality can be inferred from these findings. A possible direction of the association between dating app use, sexual satisfaction, and RSBs has been argued above based on theoretical and empirical evidence. However, we cannot rule out other possible interplays between the constructs. Indeed, it has already been raised in previous empirical studies that it may not be the use of dating apps that leads to RSBs, but rather that individuals with a predisposition to engage in RSBs may use dating apps more (Bolding et al., 2006). In other words, individuals seeking for casual sex through traditional ways (e.g. bars, friends) and engaging in RSBs might use dating apps as another means of meeting partners, and it is not the dating app *per se* that would create a particular risk. The same goes for the role of sexual satisfaction. Indeed, the current findings show positive associations between sexual satisfaction and RSBs. It may also be that engaging in RSBs increases sexual satisfaction in adolescents and young adults. Indeed, the benefits obtained by engaging in sexual relations with several partners, for example, or in sexual relations with partners without commitments, might be perceived and experienced as more valuable than the risks and costs incurred. This could be due to the perception that engaging in RSBs corresponds to normative sexual experiences in young people, conveyed among other things by dating apps (Young & Jordan, 2013). Longitudinal designs are needed to better understand the direction of the associations between dating app use, sexual satisfaction, and RSBs among adolescents and young adults.

### **Limitations and future research**

This study had several limitations. First, the measure of dating app use was created for the present study and did not take into account certain facets of the phenomenon, such as duration of daily use and actual frequency of different types of behaviors, including swiping, chatting, and meeting in person. Future research should develop and validate a more comprehensive measurement tool for dating app use. As the present study supported the link between these widely used apps and youth sexuality, research using a psychometrically sound instrument is required to deepen our understanding of their implications. Second, as previously mentioned, the cross-sectional design of the study did not allow for temporal inferences. Using longitudinal designs, future work could help clarify whether dating app use puts individuals at increased risk for RSBs, whether the tendency to engage in RSBs explains the greater use of dating apps, and the specific interplay of these constructs with sexual satisfaction. Third, the data collection relied solely on self-report questionnaires. This introduces several potential biases, including the presence of shared-method variance that could result in overestimation of the magnitude of the associations observed, social desirability bias, which may be particularly important in the study of variables such as RSBs, the introspection bias, and the recall bias. Future studies should use different methodologies, such as daily diaries, to measure dating app use and RSBs as well as direct and objective monitoring of dating app use. Finally, the generalization of the results is limited by the convenience sampling, which presents low cultural and sexual diversity.

In order to deepen and refine our understanding of the complex phenomenon of RSBs, its association with dating app use, and the moderating role of sexual satisfaction on this association, future research should examine motivations for using dating apps and sexual motives. This could perhaps shed light on why sexual satisfaction moderates the link between dating app use and impulsive sexual behaviors and help further explain the positive association between sexual satisfaction and other RSB factors.

### **Conclusion**

This study contributes to the mixed literature regarding the association between dating app use and RSBs and provides support for a positive link between these factors. Furthermore, this study is the first to examine the moderating role of sexual satisfaction in an attempt to better understand the discrepant findings to date. The results highlighted that low sexual satisfaction acts as a risk factor in the link between dating app use and impulsive sexual behaviors. Nevertheless, sexually satisfied youth seem more likely to engage in various types of RSBs. These findings suggest that the use of dating apps should be targeted in prevention and intervention efforts aiming to reduce RSBs among youth. The results indicate that support for sexually dissatisfied young people could focus on healthy ways to improve their sexuality in the context of dating app use. Moreover, these findings suggest the need for a careful approach to effectively decrease sexual risk-taking among sexually satisfied youth while preserving their positive attitude toward sexuality. A sex-positive approach in

which sexual satisfaction can be cultivated in ways that do not threaten sexual health, while highlighting the possible risks of online dating, could be recommended. Emphasis on the importance of sexual health and the protection of this valued sphere of life, including avoiding risky behaviors, may constitute a promising avenue.

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The authors report there are no competing interests to declare.

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