Online Dating and Problematic Use: A Systematic Review

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Abstract

Despite the constant growth in the use of online dating sites and mobile dating applications, research examining potential problematic use of online dating has remained scarce. Previous research has obviated problematic use of online dating in favour of users' personality correlates and scams through online dating services. A systematic review was carried out using *PsycINFO* and *Web of Science* databases to gather previous findings that address potential problematic use of online dating by (i) identifying use and motivations, (ii) assessing users' personality correlates, (iii) outlining negative correlates of use, (iv) examining sexual and impulsive behaviour, (v) exploring substance use and behavioural addictions in relation to online dating, and (vi) examining problematic use of online dating, resulting in 43 studies. Findings suggest that personality correlates such as neuroticism, sociability, sensation-seeking, and sexual permissiveness are related to greater use of online dating services. Sex-search and self-esteem enhancement are predictors of problematic use of online dating. Previous research coincides with online dating risks (e.g. fear of deception) and objectification tendency due to online dating services (sites and apps) design. Observations regarding methodological weaknesses and future research implications are included.

Back in 1995, *Match.com* was launched for public use as a popular global online dating service. Within a decade, online dating became the second most popular industry for paid online content with an annual revenue of $1.9 billion (Matthews 2018), moving from being a service used by a minority to a tool frequently used by millions of individuals in modern societies. In 2007, location-based smartphone dating applications first appeared, which allowed

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users to access online dating anytime and anywhere, making them ubiquitous. Regarding the ubiquity of online dating, Jung et al. (2014) reported that higher availability may be associated with greater engagement in dating apps by showing higher rates of log-ins and use whilst engaged in day-to-day activities.

Greater use of online dating may not necessarily imply the existence of problematic use. However, previous literature in the field of internet disorders has found that extended use (higher frequency of use) is related to higher scores on smartphone addiction (Haug et al. 2015). Yet, extended use is not sufficient to describe problematic use of online dating. Its aetiology and maintenance may be a reflection of diverse factors of different nature (i.e. biological, psychological, and social). Hence, an interdisciplinary explanation (i.e. biopsychosocial framework) is needed. Problematic use of online dating could be explained by utilizing the 'addiction components model' (Griffiths 2005) which postulates all addictive behaviours comprise six core components: (i) salience (dating app use dominates to a great extent the cognitive and behavioural reality of the individual), (ii) mood modification (alteration of mood by use of dating apps), (iii) tolerance (individual's use of dating apps increases over time), (iv) withdrawal (distress when dating app use is interrupted for a longer period of time), (v) conflict (use of dating apps negatively affects the social reality of the user), and (vi) relapse (return to previous patterns of dating app use after interruption).

In terms of structural characteristics of dating applications, location-based structural characteristic appear to facilitate offline encounters (Miles 2017), enabling short-term gratification of users' needs (e.g. users seeking sex encounters are able to find other users at walking distance). In fact, based on the interaction of person-affect-cognition-execution (I-PACE) model (Brand et al. 2016), short-term gratification on dating apps can reinforce the appearance of dysfunctional coping styles to deal with unpleasant emotions (e.g. sadness, frustration and anger) and dysfunctional affective and cognitive responses in relation to dating apps (e.g. craving, urge for mood regulation and attentional bias), which are related to internet-based disorders and exemplify the criteria of Griffiths' (2005) model previously described.

In the scope of internet disorders, and more specifically addiction to social networking sites (SNSs), previous research has reported that availability increases the number of people engaged in the activity, which can lead to excessive use (Kuss and Griffiths 2011). In turn, excessive use of SNSs has been associated with factors such as introversion, extraversion, neuroticism, narcissism and dysfunctional coping mechanisms (Kuss and Griffiths 2011), as well as low self-esteem and anxious attachment (D'Arienzo et al. 2019). In terms of mental health problems, previous literature has noted a positive correlation between depressive symptoms and time spent on SNSs (Pantic 2014), the use of smartphones for different purposes, including SNSs and other media services (e.g. videos and chatrooms) before going to sleep has been found to correlate with depressive symptoms and sleep disturbances in adolescent populations (Lemola et al. 2014). Considering the similarities of SNSs and online dating (sites and applications) and similar findings in online dating research (e.g. low self-esteem related to higher use of online dating, higher availability of online dating sites leading to longer use), it appears plausible to consider previous research investigating SNSs as a guide for online dating research.

Another overlapping phenomenon between SNS use and online dating is the social changes that their usage (SNS use and online dating use) may create in individuals' life. In that sense, Pantic (2014) concluded that SNS use has created changes in how individuals relate to each other in the present time making social interactions more shallow and decreasing communication with family members (Pantic 2014). At the same time, online dating may potentially change the dating scene

because of the growth in popularity and ubiquity of the service due to smartphone applications. Previous literature highlighted that time needed to form long-lasting relationships (romantic and platonic) is mismatched with the time users spent on online dating for that same purpose (establishing a long-term relationship), thus favouring casual encounters over other types of dates (Yeo and Fung 2018) that may potentially lead to longer-lasting relationships and stronger bonding. Social changes in relation to dating may not necessarily lead to detrimental effects. However, research is needed to assess what types of changes are produced by the inclusion of online dating in our day-to-day life and how these changes affect individuals in a multidisciplinary perspective.

Contrary to other internet disorders, problematic online dating research is still in its initial stage, and as of today, online dating has not been particularly studied in terms of its problematic use. Considering the extended use that online dating services have in the present, and the concerns at the individual level (i.e. mental health problems) and societal level (i.e. dating scene changes), it seems appropriate to review previous literature in this field attending to the need of formulating new knowledge in relation to online dating use and problematic use. Therefore, the present review paper scans previous literature in the field of online dating that relates to longer or higher use of online dating sites and/or dating apps which may be one of the first steps towards the study of excessive and/or problematic use of online dating sites.

Consequently, the aim of the present paper is to review the empirical evidence examining the use and problematic use of online dating. Considering that previous literature concerning problematic use of online dating is scarce, the structure of this present review has been designed to assess and discuss relevant factors related to online dating use that may serve as the basis for further study of problematic use of online dating.

Method

An extensive literature search in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis statement (PRISMA) (Moher et al. 2009) was conducted in May 2019 using the *Web of Science* and *PsycINFO* databases. In order to be as inclusive as possible, terms also included extensively used online dating apps and platforms, as well as terms for 'addiction' and similar constructs, and technological mediums. The search was as follows: Ti=(dating OR tinder OR grindr OR match.com OR okcupid OR jack'd OR badoo) AND (smartphone OR mobile OR online OR internet OR apps OR cyber* OR patho* OR addict* OR compuls* OR depend* OR problem* OR excess* OR misuse OR obsess* OR habit* OR impuls*). The search yielded a total of 627 studies in Web of Science and 176 studies in PsycINFO. A total of 803 studies were identified which produced a final selection of 43 studies after inclusion and exclusion criteria were applied (see Fig. 1).

The inclusion criteria comprised full-text studies that (i) were published in peer-reviewed journals, (ii) were published from January 1 (2004) to May 30 (2019) as first studies on online dating in the consulted databases dating back to 2004, (iii) were written in English or Spanish as these are the languages that the first author speaks, (iv) made reference to patterns and/or motivations of use and (v) made reference to personality traits, negative consequences or risks, impulsive behaviours and/or addictions. Studies were excluded if they (i) primarily concerned cyberbullying and its derivatives, (ii) primarily concerned scams, and (iii) did not assess online dating as the main variable under investigation. This yielded 43 studies (see Table 1), only two of which specifically covered potential addiction to online dating.
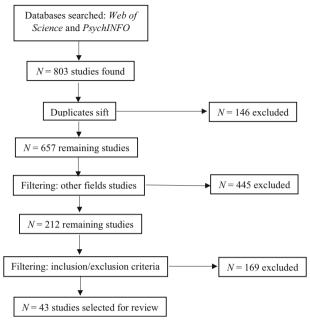
Fig. 1 Flowchart displaying the search process

Results

This section has been divided into six subsections which cover: (i) usage and motivation, (ii) personality correlates, (iii) negative correlates, (iv) impulsive behaviour, (v) substance use and behavioural addictions, and (vi) problematic use of online dating. Across the subsections, the focus is on the main findings of each study and, when applicable, how these findings relate to overuse/problematic attributes.

Usage and Motivations

A total of eleven studies were found that examined the characteristics of use or motivations of online dating use. Out of the eleven studies, there were ten quantitative studies, all of which were cross-sectional (Corriero and Tong 2016; Gunter 2008; Hance et al. 2018; Houran and Lange 2004; Hwang 2013; Kim et al. 2009; Menkin et al. 2015; Paul 2014; Stinson and Jeske 2016; Valkenburg and Peter 2007), and one qualitative study (Lawson and Leck 2006). One study examined heterosexual respondents only (Hwang 2013), and another study focused on male homosexual populations only (Corriero and Tong 2016), and the remaining studies did not differentiate between sexual orientations.

Before the proliferation of online dating platforms and smartphone applications, Gunter (2008) collected 3844 responses (67% female) from the British population in an online survey available on the website of a research agency that asked questions regarding motivations and users' satisfaction with the online dating service. All age groups were represented evenly: 16–24 years (11%), 25–34 years (31%), 35–44 years (27%), 45–54 years (20%) and 55+ years (11%). Results showed that 29% had used online dating sites and 90% of these users had spent up to £200 over the previous two years using online dating services (Gunter 2008). These

Table 1 Studies included in the review and analysis

Study [year]	Aims	Sample [design/method]	Instruments	Main results
Best and Delmege [2012]	Researched the prevalence, pragmatism and social impact of filtering mechanisms, and how they are shaping the culture of dating	*15 total respondents recruited through radio appeals, face-to-face recruiting, online posting and snowball sampling (from 18 to 62 years old; one-third was male) [Qualitative: exploratory, small scale, four focus groups]	N/A	Filtering starts at the first phase in order to catch incongruous behaviour; users rely on their instinct developed by the experience; 'shopping culture of dating' saps the dating energy of users
Blackhart et al. [2014]	Examined how several dispositional factors are related to the use of online dating sites and to online dating behaviours	725 volunteers 18–71 years of age (mean age = 22.31, $SD = 6.75$; 73.9% female; 91.6% heterosexual; 86.6% White/Caucasian) [Quantitative: cross-sectional study with self-reported measures]	Rosenberg Self-Esteem Scale; Rejection Sensitivity Questionnaire; Relationship Questionnaire; Relationship Scales Questionnaire; Big Five Inventory; Online Dating Inventory (ODI) (created by the researchers); including items assessing potential risky behaviours	Participants with higher rejection sensitivity are more likely to use online dating platforms. The latter, those lower in conscientiousness and men are more likely to engage in risky behaviours
Boonchutima and Kongchan [2017]	Evaluated the behaviours of Thai men who have sex with men (MSM) and are dating apps users toward illicit drug usage	*350 men respondents: 200 were from the eight carefully selected websites and 150 were from social media sites. 3 out of 4 are between 18 and 35 years old; 61.7% bachelor's degree [Quantitative: cross-sectional study with self-reported survey]	Survey created by researchers, 21 questions; 3 with 8 sub-questions. 18 remaining 5-point Likert scale	73% of the researched Thai MSM community is using dating apps to find their partners as well as for inviting others to engage in illicit drug practice with a 77% invitation success rate. Substance use was also associated with unprotected sex
Cali et al. [2013]	Examined the stigma associated with online relationship initiation and its relation to women's self-protective behaviour	82 women at a private Midwestern University; 18 and 36 years old ($M = 24.36; SD = 4.73$). 47 of them described themselves as White, 19 as African-American, 5 as Asian-American, 4 used the term 'other' to describe their racial background, and 7 of the	Dating Self-Protection Against Rape Scale (DSPARS); dating background and internet usage questionnaire	Greater importance given to self-protective behaviour after reading the online meeting scenario than the face-to-face scenario. This tendency was especially strong among participants who had never been on a date with someone they had met online

Table 1 (continued)

Study [year]	Aims	Sample [design/method]	Instruments	Main results
		participants identified themselves as Hispanic [Quantitative: comparison of 2 case scenario and self-reported measures]		
Chan [2017]	Examined the relationships between trust towards people online, sensation-seeking, smartphone use for accessing the internet, and the intent to use dating apps to look for romance and casual sex	257 heterosexual participants, 54.86% males. Mean age = 27.14, SD = 4.35; 70.03% White, 13.61% Asian, 13.22% Hispanic, and 8.17% African-American [Quantitative: cross-sectional study with self-reported measures]	Items: Behavioural intent, Attitude, Perceived norm, Self-efficacy, and desire for romantic relationships and general sexual drive; trust towards people online based on Pew Internet and American Life Project; Impulsivity and Sensation Seeking Scale; smartphone use for accessing the internet	Attitude and perceived norm are predictive of the use of dating apps. Sensation-seeking and smartphone use had a direct relationship with intent. Use of apps looking for sex was predicted by attitude and self–efficacy, indirectly related to smartphone use. Sensation-seeking and smartphone use had direct relation with this goal
Chin et al. [2019]	Examined attachment-related differences in the use of dating applications	183 participants, 60% male, Mage = 29.97 years, (SD = 8.50), range 18–65 years of age [Quantitative: cross-sectional study with self-reported measures]	Attachment Style Questionnaire. Use of dating apps measured by the authors' items	Users with higher anxious attachment orientation were more likely to report using dating apps, opposite to avoidant attachment ones. Most common reason of use was to meet others, and most common reason for not using it was difficulty in trusting people online
Choi et al. [2016a]	Aimed to explore the association between using smartphone dating applications and having unprotected sex with a casual sex partner	666 students based in Hong Kong; 17% homosexual/bisexual; 52.9% use dating apps (Mage = 20.03 years, SD = 1.52; 359 females) [Quantitative: cross-sectional study with self-reported data]	Structured questionnaire: dating apps, sexual history and socio-demographic information	Using dating apps was associated with having unprotected sexual intercourse. Using dating apps for more than 12 months was associated with having had a casual partner in the last sexual interaction and having had unprotected sex with that partner
Choi et al. [2017]	Examined the association between using smartphone dating applications and substance use in conjunction	*666 students based in Hong Kong (Mage = 20.03 years, SD = 1.52; 359 females) [Quantitative: cross-sectional study with self-reported data]	Questionnaires adapted from previous studies: the use of dating apps, sexual history and substance use	Using dating apps for more than 1 year was associated with recreational drug use together with sexual activities; risk factors of recreational drug use in conjunction with sexual activities included being bisexual/homosexual male, a smoker and having

Table 1 (continued)

Study [year]	Aims	Sample [design/method]	Instruments	Main results
	with sexual activities in homosexual men			one's first sexual intercourse at an age under 16 years; risk factors for alcohol consumption in conjunction with sexual activities were: being older, having monthly income more than HKD5,000 and being a smoker; risk factors for alcohol consumption in conjunction with the last sexual activity included currently being in a dating relationship, a smoker and having sex with a casual partner
Choi et al. [2018]	Examined the association between using dating apps and the sexual abuse of males and females	666 students based in Hong Kong (Mage = 20.03 years, SD = 1.52; 359 females; 16.66% homosexual/bisexual) [Quantitative: cross-sectional study with self-reported data]	Questionnaires: socio-demographics, use of dating apps and experience of sexual abuse; sexual coercion subscale of revised Conflict Tactics Scales (CTS-2)	Users of dating apps were more likely to be sexually abused in the past year than non-users. Using dating apps was also a risk factor of lifetime sexual abuse
Choi et al. [2016b]	Explored the association between the use of dating apps and risky sexual behaviours	666 students based in Hong Kong (Mage = 20.03 years, SD = 1.52; 360 females; 16.97% homosexual/bisexual) [Quantitative: cross-sectional study with self-reported data]	Questionnaires: use of dating apps, sexual behaviours and sexual orientation	Association between having unprotected sexual intercourse with more lifetime sexual partners and use of dating apps, having one's first sexual intercourse before 16 years of age, being older, currently being in a relationship, having a monthly income at least HKD $5000, being a current smoker and being a current drinker; users and current drinkers were less likely to have consistent condom use. Bisexual/homosexual users and females were more likely not to have used condoms the last time they had sex
Chow et al. [2018]	Investigated whether MSM who met their partners via smartphone dating apps are more likely to engage in sexual practices such as rimming (oro-anal sex), and use of partner's saliva as a lubricant	*1672 men; 17 to 78 years, median age of 29; 74% MSM used smartphone dating apps the last 3 months [Quantitative: cross-sectional study with self-reported data via short questionnaires]	Short questionnaire: (a) source of dating mates, (b) specific sexual practices	MSM who used smartphone dating applications were 1.78 times more likely to get rimmed, and 1.63 times more likely to use partner's saliva as a lubricant during anal sex, compared to other sources, after adjusting for age and other sources for meeting partners

Table 1 (continued)

Study [year]	Aims	Sample [design/method]	Instruments	Main results
Clemens et al. [2015]	Researched the role that biological and personality traits play in the use of online dating websites	*678 participants recruited from (a) the undergraduate student population ($n = 584$) and (b) the general population using online networking websites ($n = 94$); males (51%); 18–20 (86%) and 21–30 (11%) [Quantitative: cross-sectional survey study with self-reported data]	'Big-Five' Scale; ODS gratifications based on general internet use, television viewing motives and SNS gratifications	Homosexual users sought a wider range of gratifications (relationship, sex partner, distraction and convenient companion) from online dating sites than their heterosexual counterparts; women were less likely to use ODSs to find sexual partners, but more likely to use ODSs to be social. Those who were neurotic used dating sites to build an identity, as a convenient companion and as a distraction. People who are open to experiences were found to use dating sites to be social. Disagreeable people used dating sites because of peer pressure and as a status symbol, and conscientious people were found to use dating sites to find a relationship
Corriero and Tong [2016]	Examined individuals' experience of uncertainty within the context of Grindr, an all-male location-based mobile dating application	Study 1: 62 self-identified Grindr users, aged 18 and older ($M = 22.18$, $SD = 4.01$). Study 2: 326 men participants (Mage $= 24.33$, $SD = 5.63$) [Quantitative: cross-sectional survey with self-reported data]	Open- and close-ended items to measure concerns of use	Specific set of user goals and concerns predicted daters' desire for uncertainty, which in turn predicted information-seeking behaviour. Findings clearly indicate that Grindr users' responses to uncertainty were not limited to simple reduction strategies, but were dependent upon their desire for and tolerance of uncertainty in relation to their goals and concerns of application use
Couch and Liamputtong [2007]	Examined the behaviours and experiences of people who use online dating and how they may or may not address risk in their use of online dating	*15 participants; 11 males; 24 to 44 years old; 12 heterosexual; 10 single; most located in Melbourne metropolitan area [Qualitative: in-depth interview study via online chat platform]	N/A	For users, the control offered by the online environment was central to risk management. Additionally, the social context in which an individual encountered a potential risk would shape how they perceived the risk and responded to it. People who use online dating considered the risks involved and they demonstrated personal autonomy in their risk management
Couch et al. [2012]	Explored what online daters perceive to be the risks of online dating, along with providing accounts of dangers	*29 participants 18 to 70 years old. 12 women; all from Australia but one from the USA; 23 single; 23 from metropolitan area	N/A	Participants identified risks of lies and deceit, sexual risks, emotional and physical risks and the risks of encountering dangerous and untrustworthy people online and in person. Participants framed these risks

Table 1 (continued)

Study [year]	Aims	Sample [design/method]	Instruments	Main results
	and risky situations encountered by online daters	[Qualitative: in-depth interview study via online chat platform]		in terms of the risky 'other' moving the ownership of risks away from themselves
Erjavec and Fišer [2016]	Examined involvement of older adults in online dating: How older adults who lived the majority of their lives under socialism perceived online dating	*38 retired adults; 19 women; 63 to 77 years old; all participants were Slovenian, heterosexual, middle class and urban [Qualitative: semi-structured in-depth interview study]	N/A	Participants used economic metaphors and related them with extremely positive expressions of recovery; they have internalised the principles of the market economy and perceived their re-entry into the relationship market as their revival
Goedel and Duncan [2016]	Examined associations between contexts of app use (e.g. using apps when drinking) and condomless anal intercourse among a sample of MSM who use these apps	174 male users of Grindr app; $M = 30.8$ years old, $SD = 9.5$; 94.2% gay/bisexual [Quantitative: cross-sectional study with self-reported data via online survey]	Survey: app use, contextual factor and transactional sexual encounters, HIV status and sexual behaviours	Engagement in condomless receptive and insertive anal intercourse with one or more partners in the preceding 3 months was common (39.7% and 43.1%, respectively) and was associated with several app-use contexts; associations between alcohol and other drug use when using these apps and condomless receptive and insertive anal intercourse
[2008]	Find out the extent to which internet users subscribe to online dating services and assess users' experiences of such services and their eventual outcomes	*3844 respondents; 67% women; 16–24s (11%), 25–34s (31%), 35–44s (27%), 45–54s (20%) and 55+ (11%) [Quantitative: descriptive with self-reported data via online survey]	Survey: motivations of use and satisfaction with the service	29% said they had used an online dating site. Most of these respondents (90%) had spent up to £200 on internet dating in the past 2 years, with 70% of users achieving at least one date, 43% enjoying at least one sexual relationship and 9% finding a marriage partner
Hall et al. [2010]	Examined factors like gender, self-monitoring, the Big Five personality traits and demographic characteristics, that influence online dating service users' strategic misrepresentation (the conscious and intentional misrepresentation of personal characteristics)	5020 participants; 74% female; average age of 39.8 years old, $SD = 11.4$; primarily White, non-Hispanic (83.2%), with 4.1% Hispanic, 5.3% African-American, 3.5% Asian-American and 3.6% other [Quantitative: cross-sectional with self-reported data via online survey]	Survey items: personal assets, relationship goals, personal interests, personal attributes, past relationships; 25-item Revised Self-monitoring Scale; 44-item Big Five Inventory	Men were more likely to misrepresent personal assets, relationship goals, personal interests and personal attributes, whereas women were more likely to misrepresent weight; self-monitoring was the strongest and most consistent predictor of misrepresentation in online dating. Agreeableness, conscientiousness and openness also showed consistent relationships with misrepresentation
Hance et al. [2018]		Study 1: 640 participants (67% female), 18–65 years of age	16-item Rejection Sensitivity Questionnaire (RSQ); Real	True self mediated the relationship between rejection sensitivity and online dating site usage;

Table 1 (continued)

Study [year]	Aims	Sample [design/method]	Instruments	Main results
	Explained the relationship between rejection sensitivity and online dating site usage	(M=23.59). Study 2: 326 participants (206 female), 18–59 years of age (M=24.15, SD=7.61) [Quantitative: cross-sectional study with self-reported data]	Me Scale; Online Dating Inventory (ODI) Study 2 only: Revised Self-Disclosure Scale	rejection-sensitive individuals felt they can more easily represent their 'true' selves in online environments, such as online dating sites, which partially explains why they were more likely to engage in online dating
Heijman et al. [2016]	Examined the association between unprotected anal intercourse (UAI) with partners dated online and with partners dated offline; examined whether differences can be explained by self-perceived HIV status of the index and knowledge of partnership characteristics	*3050 men who have sex with men (MSM); median age was 37; most participants (73.8 %) were Dutch [Quantitative: cross-sectional study with self-reported data via questionnaires]	Questionnaire: socio-demographics and HIV status, the three most recent partners in the preceding 6 months and sexual behaviour with those partners	Online dating was not significantly associated with UAI among HIV-negative users. HIV-positive participants were more likely to practise UAI with partners dated online; after correction for partner and partnership characteristics, online partnership acquisition was not associated with a significantly increased risk of UAI
Heino et al. [2010]	Explored the ways in which the marketplace metaphor resonates with online dating participants and how this conceptual framework influences how they assess themselves, others and make decisions about whom to pursue	34 participants from a large online dating site; 25 to 70 years old (M=42, SD=9.35); 50% female; (76%) resided in urban Los Angeles [Qualitative: semi-structured in-depth interview study via telephone]	N/A	Marketplace metaphor was salient for participants, who employed several strategies that reflected the assumptions underlying the marketplace perspective (including resisting the metaphor); implications of this metaphor for romantic relationship development, such as the objectification of potential partners
Hospers et al. [2005]	Described the process of internet chatting, and subsequent dating and sexual (risk) behaviour among Dutch men who have sex with men (MSM), and to compare the demographic profile of the internet sample with a traditional Dutch MSM sample	4984 users of an online platform; (M=33.2 years, SD=10.05); most respondents (81%) reported a Dutch cultural background; 44% had ever been tested for HIV. Among tested men, 6% reported being HIV-positive [Quantitative: cross-sectional study with self-reported data via online	Questionnaire: demographics, chatting and dating behaviour, sexual behaviour with last e-date	Especially among HIV-positive men, a high percentage of unprotected anal sex was reported (39%). After correcting for the disclosure of HIV status, this percentage remained twice as high compared with HIV-negative and never tested men (28% versus 14%). Compared with a traditional MSM sample, the internet sample was significantly younger and comprised more non-Dutch and bisexual men,

Table 1 (continued)

Study [year]	Aims	Sample [design/method]	Instruments	Main results
		questionnaire through the online dating site]		whereas the level of sexual risk behaviour with casual partners was comparable
Houran and Lange [2004]	Examined whether individuals with intentions to use online matchmaking services had unrealistically optimistic expectations of finding a perfectly compatible partner	222 participants of non-married status; 109 men; 24–50 years old (Mage = 37.39, SD = 6.88); 9 Asian, 15 African-American, 182 Caucasian and 16 Other [Quantitative: correlational study with self-reported data]	Items: probability estimates, conditional probabilities and attitude	Individuals with intentions to use online dating are not motivated by positive distortions or unrealistic optimism as measured by attitudinal indicators
Hwang [2013]	Examined dating preferences using a multiracial randomised sample of online daters	*2123 profiles (523 Asians, 504 Blacks, 473 Latinos and 632 White; 1074 females; age ranges from 18 to 69 years) [Quantitative: cross-sectional study]	Measures from profiles: demographics and willingness to date a different/same racial group(s)	Results indicated that willingness to date intra-racially was generally high and that willingness to date inter-racially was lower and influenced by racial social status
Jung et al. [2019]	Explored the changes in user behaviour induced by adoption of a mobile application, in terms of engagement and matching outcomes in the online dating context	100.000 users of one online platform; female mean age 36.10, SD = 12.61; male mean age 33.22, SD = 11.49; mostly White [Quantitative: longitudinal study with real users' data]	N/A	Mobile app adoption induces users to become more socially engaged as measured by: visiting significantly more profiles, sending significantly more messages, and importantly, achieving more matches; men act more impulsively than women; both men and women exhibit disinhibition, in that users initiate actions to a more diverse set of potential partners
Kim et al. [2009]	Explored the three major consumer characteristics that underlie the use of internet dating services: self-esteem, involvement in romantic relationships and sociability	*3345 responses received; (47.5 %) were from men. Ages ranged from 19 to 89 [Quantitative: cross-sectional study with secondary data]	Items: self-esteem, involvement in romantic relations, sociability and use of online dating services	Among sociable people, individuals with high self-esteem were more likely to use internet dating services when they were highly involved in romantic relationships; individuals with low self-esteem used internet dating services more often than did those with high self-esteem when romantic relationships were not important
Kok et al. [2007]	Investigated social-cognitive determinants of HIV-risk precautionary intentions among men who have sex with men,	*1375 men who have sex with men from an online dating site [Quantitative: cross-sectional study with data from online survey]	Items: demographics, attitude, subjective/descriptive/-personal norm, perceives behavioural control,	Attitude, subjective norms and perceived control explained 55% of the variance in intention to use condoms for anal sex with future e-dates; adding

Table 1 (continued)

Study [year]	Aims	Sample [design/method]	Instruments	Main results
	who meet sex partners on the internet		anticipated regret and intention	descriptive norms, personal norm and anticipated regret explained 70%
Lawson and Leck [2006]	Examined the world of internet dating. It explored the motivations of daters, their styles of courtship and how they negotiated problems of trust and deception	*50 respondents; 25 female; 32.6 mean age male; 33 mean age female [Qualitative: open-ended informal interviews]	N/A	Internet daters sought companionship, comfort after a life crisis, control over presentation of themselves and their environments, freedom from commitment and stereotypic roles, adventure and romantic fantasy
March et al. [2017]	Explore the antisocial behaviour of trolling on Location-Based Real-Time Dating applications	357 adults; 71% women; 18–60 years of age (Mage = 22.50, SD = 6.55); majority heterosexual orientation (81%), bisexual orientation (10%), homosexual orientation (6%) and other orientation (3%) [Quantitative: cross-sectional study with self-reported measurement instruments]	Short Dark Triad Scale; Short Sadistic Impulse Scale; Dickman Impulsivity Inventory; Modified version of Global Assessment of Internet Trolling (GAIT)	The traits of psychopathy, sadism and dysfunctional impulsivity were significantly associated with trolling behaviours. Subsequent moderation analysis revealed that dysfunctional impulsivity predicted perpetration of trolling, but only if the individual had medium or high levels of trait psychopathy
Menkin et al. [2015]	Identified prioritised goals in new romantic relationships and whether importance of these goals differ by participants' age and gender	*5434 users; 50% female; 20 to 95 years old; 86% non-Hispanic White [Quantitative: cross-sectional study with self-reported online questionnaire]	Questionnaire: relationship goals, individual differences (e.g. personal interests) and demographics	Users valued interpersonal communication more than sex appeal. Older users rated sexual attraction as slightly less important than younger users, but they still highly valued the goal. Women placed even greater emphasis on communication over sexual attraction; men valued sexual attraction more than women at all ages; only the youngest women valued communication more than young men
Orosz et al. [2018]	Investigated the motivational, personality and basic psychological need-related background of problematic Tinder use	1055 total participants Study 1: 414 Hungarian participants (female = 246; 59.4%) between 18 and 43 years old (M = 22.71, SD = 3.56) Study 2: 346 (female = 165, 47.7%) aged 18 and 51	Study 1: focus group towards forming items for the development of the scale Study 2: Tinder Use Motivation Scale (TUMS); Problematic Tinder Use Scale (PTUS); Big Five Inventory (BFI)—Hungarian version	Study 1: 16-item first-order factor structure was identified with four motivational factors, such as sex, love, self-esteem enhancement and boredom Study 2: problematic Tinder use was mainly related to using Tinder for self-esteem enhancement. The Big Five personality factors were only weakly related to the four motivations and to problematic Tinder use

Table 1 (continued)

Study [year]	Aims	Sample [design/method]	Instruments	Main results
		Study 3: 298 (female = 177; 59.4%) aged between 19 and 65 (*M* = 22.02, *SD* = 3.41) [Quantitative: cross-sectional study with self-reported measurement instruments; including a validation procedure of a measurement scale]	*Study 3*: Tinder Use Motivational Scale (TUMS); Problematic Tinder Use Scale (PTUS); Rosenberg Self-Esteem Scale (RSES); Basic Psychological Need Satisfaction and Need Frustration Scale (BPNSFS)	*Study 3*: instead of global self-esteem, relatedness need frustration was the strongest predictor of self-esteem enhancement as Tinder-use motivation which, in turn, was the strongest predictor of problematic Tinder use
Orosz et al. [2016]	Created a short Problematic Tinder Use Scale (PTUS)	430 Hungarian respondents (female = 243; 56.5%) aged between 18 and 51 (*Mage* = 22.53, *SD* = 3.74); Majority lives in the capital [Quantitative: development of a measurement scale]	Problematic Tinder Use Scale (PTUS) built upon the six-component concept of Griffiths (2005)	The 6-item unidimensional structure has appropriate reliability and factor structure. No salient demography-related differences were found. Users irrespective of their relationship status have similar scores on PTUS
Paul [2014]	Examined differences in the outcomes of relationships that begin online compared to traditional offline venues including non-marital relationships in the comparison	4,002 adult respondents; Mean age online venue: 46.79, *SD* = 15.75; Mean age offline venue: 38.85, *SD* = 11.61 [Quantitative: with secondary data from waves I, II and III of the nationally representative longitudinal survey]	N/A	Couples who met their partners online were more likely to be involved in dating and romantic relationships than marital relationships compared to couples who met offline; breakup rates for both marital and non-marital romantic relationships were found to be higher for couples who met online
Peter and Valkenburg [2007]	Researched the individuals' motivations to date casually through online sites	*657 final respondents; mean age 39.26; women 51% [Quantitative: cross-sectional study with self-reported data via online survey]	Items: demographics, dating anxiety, physical self-esteem, sensation-seeking, sexual permissiveness, reduced visual cues, anonymity, controllability and control variables	Sexually permissive people and high sensation-seekers looked for casual partners online more frequently than sexually restrictive people and low sensation-seekers. Dating anxiety and physical self-esteem, in contrast, were unrelated to the seeking of casual partners online
Sánchez et al. 2015	Analysed the quality of cyberdating among adolescents by means of a mixed study	*Study 1*: 16 adolescents; 8 boys; 14–17 years old	*Study 1*: focus group to develop items for the development of the scale	Structure of six factors, namely online intimacy, emotional communication strategies, cyberdating practices, online control, online jealousy and online intrusive behaviour. Descriptive analysis showed

Table 1 (continued)

Study [year]	Aims	Sample [design/method]	Instruments	Main results
		Study 2: 626 respondents; 12–21 years old, mean age 15.13, SD = 1.34; 51.4% males [Study 1: qualitative, focus groups with semi-structured ad hoc interview; study 2: quantitative, development of a measurement scale]	Study 2: the Cyberdating Q_A scale	that these behaviours were very frequent among adolescents, with boys scoring higher on intrusive behaviour and cyberdating practices than girls
Solis and Wong [2019]	Investigated the motivations and risks involved in the use of mobile dating applications (MDAs) to meet strangers and the outcomes of using this technology	*433 users; 57.5% were males; 11 to 58 years old, mean age 30 [Quantitative: cross-sectional study with self-reported data via online survey]	Items based in the motivation categories from previous Tinder studies: demographics and use of dating sites	Sexuality was the only predictor for the use of MDAs to meet people offline for dates and casual sex; fear of self-exposure to friends, professional networks and the community, among the perceived risks of dating online
Stinson and Jeske [2016]	Examined the influence of personality (introversion and extraversion) and personal variables (social anxiety and public self-consciousness) on online dating preferences from two competing perspectives: the 'social compensation' (SC) hypothesis and the 'rich-get-richer' (RGR) hypothesis	162 participants; 18 to 64 years of age, M = 27.43, SD = 12.58; 43 males; half were students. The other half were professionals [Quantitative: cross-sectional study with self-reported data via online survey]	International Personality Item Pool (IPIP); Social Anxiety subscale; public self-consciousness; dating preference based in existing surveys; items on use and demographics	Stronger role of social influence in the decision to date online, which may make personality and personal traits less informative of whether individuals will opt to use such services
Sumter and Vandenbosch [2019]	Investigated how dating app use and motivations are related to demographic identity variables (i.e. gender and sexual orientation) and personality-based variables among young adults	541 respondents; 18 and 30 years of age, M = 23.71, SD = 3.29; 60.1% women: majority of Dutch 92.4% [Quantitative: cross-sectional study with self-reported data via online survey]	Dating App Motivation Scale (DAMS); Dating Anxiety Scale; Brief Sensation Seeking Scale; Sexual Permissiveness Scale; dating app user status	Non-users were more likely to be heterosexual, high in dating anxiety and low in sexual permissiveness than dating app users. Among app users, dating goal motivations were meaningfully related to identity features: sexual permissiveness was related to the casual sex motive
	Investigated the demographic predictors of online dating and		Demographics; 5 items from the active-intentions-for-dating	Online dating was unrelated to income and educational level. Respondents between 30 and 50 years old

Table 1 (continued)

Study [year]	Aims	Sample [design/method]	Instruments	Main results
Valkenburg and Peter [2007]	the validity of the social compensation and the rich-get-richer hypotheses in relation to users' use of online dating	367 Dutch adult singles; 18 to 60 years old, mean age 38 years, SD = 12.7; 50% males [Quantitative: cross-sectional study with self-reported data via online survey]	subscale of the dating anxiety survey; visit of dating sites	were the most active online daters. In support of the rich-get-richer hypothesis, people low in dating anxiety were more active online daters than people high in dating anxiety
Vandeweerd et al. [2016]	Understand the positives and negatives of online dating according to the lived experience of older women	*45 women aged 50+, mean age 57.3; 13% African-American/Black, 7% Hispanic/Latina, 78% were White and 2% as 'other' [Qualitative: semi-structured interviews via telephone]	N/A	Benefits of online dating: expand one's social network for both friendships and romantic partners, the ability to control dating risks and pace of relationship formation and knowing more about one's partner; identified risks: pervasive lying, attempted financial exploitation and unwanted electronic sexual aggression
Whitfield et al. [2017]	Examined whether the manner in which gay, bisexual and other MSM find sexual partners predicts an increase in likelihood of engaging in CAS (condomless anal sex) in an urban, non-coastal U.S. city	545 men; average age of 36.81 years, SD = 12.37; 54% White, 20% Hispanic/Latino, 10% Black/African-American, 8.3% multiracial, 2.4% American Indian/Alaskan Native, 2% Asian and 0.2% Native Hawaiian/Pacific Islander [Quantitative: cross-sectional study with secondary data from Denver NHBS]	Behavioural survey: sexual behaviour, substance use, STI history and HIV testing	Age and race are associated with the mode of finding sexual partners. Using the internet or a mobile app to find sexual partners was not predictive of CAS
Zlot et al. [2018]	Investigated the contribution of social anxiety and sensation-seeking to ratings of sex addiction among those who use online dating sites	279 participants; 128 males; mean age 25 years, SD = 2.75, age range of 18–38 years [Quantitative: cross-sectional study with self-reported data via online questionnaires]	Demographics; Liebowitz Social Anxiety Scale; Sensation Seeking Scale; Sexual Addiction Screening Test (SAST)	Dating app users showed higher scores on sexual addiction than non-users. Lower sex addiction scores correlated with social anxiety scores. There was no difference in sensation-seeking between participants with low and high scores of sexual addiction; social anxiety was a major factor affecting the use of internet-dating applications for obtaining sexual partners

results were supported by another study (Valkenburg and Peter 2007) with 367 single respondents (50% females) from the Netherlands. They were asked to complete an online survey that contained a subscale on active intentions from the Dating Anxiety Survey (Calvert et al. 1987). Findings showed that almost half of the respondents (43%) had used the internet to date potential partners. Both studies found differences in terms of use by gender, where men were found to be more likely (40%) to have used online dating services than women (24%) (Gunter 2008). However, there was no difference regarding income or education. Furthermore, in relation to age, it appeared that adults aged between 30 and 50 years were the most active users. In addition to the socio-demographic pattern of use, Hwang (2013) collected data from 2123 heterosexual users' profiles on an American online dating site in Los Angeles and compared the willingness to date between different racial groups (e.g. Asians and Latinos) and within the same group (i.e. whites with whites). In order to do this, demographic measures (i.e. age, gender, marital status, educational level and zip code of residence) were taken; also willingness to date inter- and intra-racially was registered; however, the authors did not specify how they measured that variable (willingness to date inter- and intra-racially). Generally, dating online intra-racially was favoured over inter-racial dating. However, men were found to be higher in willingness to date inter-racially in comparison to women. Nonetheless, considering the specificity of the sample, these results cannot be extrapolated to the general population. Further studies should consider including variability in terms of sexual orientations and cultural background to see if these findings can be replicated.

Considering the expectations of use in terms of finding a perfect partner, Houran and Lange (2004) studied a sample of 222 non-married participants from a paid survey panel (mean age = 37.39 years) and reported that online dating users did not hold unrealistic expectations (i.e. positive distortions towards finding the perfect match). However, the authors did not consider the participants' goals for using online dating, and arguably, depending on users' goals, expectations may differ. Taken together, the previous four studies indicate that young adult men are the most active online dating users tending to date intra-racially. However, three of these studies (i.e. Gunter 2008; Houran and Lange 2004; Valkenburg and Peter 2007) were carried out before the launch of smartphone dating apps, the appearance of which could have resulted in different findings.

Regarding psychological characteristics of users, Kim et al. (2009) surveyed 3354 American respondents across a wide age range (19 to 89 years) and found that those who experienced less dating anxiety were notably more present on online dating platforms. Furthermore, they found that users high in social skills (i.e. sociability), together with high self-esteem, and high relationship involvement were more likely to use online dating services in comparison to those with high sociability and high relationship involvement but with low self-esteem. On the contrary, individuals with low self-esteem and low relationship involvement (together with high sociability) were found to be more active users compared to less sociable participants, and those whose self-esteem was high but who scored low on relationship involvement, or vice versa. To clarify, the effect was only found in the interaction between self-esteem and relationship involvement among those high in sociability. Seemingly, being sociable appears as an important predictor of higher online dating use. However, being highly sociable is not a reliable predictor of online dating use by itself, but only in interaction with individuals' goals and self-esteem. In contrast to these results, a small survey by Stinson and Jeske (2016) of 162 participants found that peer pressure influenced the decision to use online dating services instead of personality factors (e.g. sociability, introversion). The authors claimed

that it may be due to the spreading popularity of online dating that personality features were not as predictive in regard to usage tendency.

In terms of individuals' motives, there appear to be many possibilities as to why people date online. In a study of 5434 respondents, Menkin et al. (2015) found that participants generally emphasised interpersonal communication over sex appeal, with women placing greater importance on social interaction, whereas men considered sexual attraction more important than women across all ages. However, younger individuals, aged between 20 and 39 years, considered sexual attraction more important than older individuals (75+ years old). Emphasising sexual attraction, in a study with 62 young men using an all-male dating app (mean age = 22.18 years), Corriero and Tong (2016) identified that casual sex goals were related with desire for uncertainty. Conversely, if users were concerned about their own personal information, health and privacy, then their desire for uncertainty decreased. Therefore, it may be argued that those young users who are looking for casual sex encounters put themselves at higher risk than those who are not looking for sex. This hypothesis is discussed in a later section.

In more general terms, online daters search for companionship, comfort after a life crisis, control over the presentation of oneself to others, to refrain from commitment and societal boundaries, new experiences, and romantic fantasies (Lawson and Leck 2006). In relation to control over self-presentation, it has been claimed that individuals with high rejection–sensitivity tend to feel more comfortable to express themselves in the online medium, and those who feel more comfortable expressing themselves online are found to score higher on online dating use (Hance et al. 2018). One of the reasons for high rejection-sensitive individuals to engage more in the online dating arena may be related to feeling less constrained to show themselves (i.e. 'true self'), identifying less difficulties in the online context. Nonetheless, it appears that common features in online dating like the absence of time limits (i.e. asynchronous communication) and selective self-presentation facilitate deceptive representations of oneself (Hall et al. 2010). In a study of secondary survey data from 4002 US participants, Paul (2014) found that couples who met online had higher split up rates in comparison to partners who met offline. Arguably, typical features of online dating services and apps such as asynchronous communication and selective self-presentation may negatively affect the quality of a long-term relationship between two online daters. Consequently, further studies are needed in the form of longitudinal designs that would help establish the causes that affect the quality of relationships initiated via online dating services.

Overall, the results of this subsection show that the use of online dating platforms is widespread and has grown rapidly in the past few years. In terms of use, younger adult men appear to be the most prevalent users of online dating services. In terms of motivations to use online dating, men favour sex appeal more compared to women. Regarding psychological characteristics, it appears that high sociability and high rejection–sensitivity are associated with higher use of online dating services. The studies reviewed suggest that there are some features in online dating services (i.e. sites and apps) that could enhance the chances of deception and decrease the quality of long-term relationships. Nonetheless, there are some methodological weaknesses (e.g. the use of non-validated psychometric instruments, and non-representative samples) that should be amended in future research so that the internal and external validity of these findings are increased. As to the design, the research should consider longitudinal approaches to help establish the direction of causality (i.e. is relationship quality affected by online dating or are there underlying factors that directly affect relationship quality).

Personality Correlates

Considering the association that exists between specific personality correlates and patterns of use, a total of seven studies (Blackhart et al. 2014; Chan 2017; Chin et al. 2019; Clemens et al. 2015; Hall et al. 2010; Peter and Valkenburg 2007; Sumter and Vandenbosch 2019) were found and reviewed focusing on the association of personality traits and use of online dating services. All the studies assessed used quantitative and cross-sectional methods.

Blackhart et al. (2014) surveyed 725 US participants (73.9% females; mean age = 22.31 years) using the Online Dating Inventory (Blackhart et al. 2014) and the Big Five Inventory (John et al. 1991) among other validated scales, and found that individuals low in conscientiousness were more likely to be involved in risky sexual behaviours in the context of online dating. Also, in a survey of 657 Dutch participants (51% females; mean age = 39.26 years), Peter and Valkenburg (2007) found that individuals high in sexual permissive-ness and sensation-seeking search more for sex dates. This association was also reported in a study of 257 US heterosexual participants (57.86% males; mean age = 27.14 years) incorpo-rating the integrative model of behavioural prediction, which suggests that intent to engage in a behaviour, normative beliefs, and one's self-efficacy are the key components to predict human behaviour (Fishbein 2000). Findings suggested that those high in sensation-seeking used online dating apps to look for casual partners and romantic dates (Chan 2017). The authors also found associations between trust towards people, sensation-seeking, and higher use of smartphones with increased dating app use, and a direct relationship between smartphone use and dating app use. Arguably, there may be an association between excessive smartphone use and dating app use. Furthermore, Sumter and Vandenbosch (2019) collected data from 171 students of the University of Amsterdam and 370 from a research agency (N = 541; 60.1% females; mean age = 23.71 years) using the Dating App Motivation Scale, based on the Tinder Motivation Scale (Sumter et al. 2017), Dating Anxiety Scale (Peter and Valkenburg 2007), Brief Sensation Seeking Scale (Hoyle et al. 2002) and Sexual Permissiveness Scale (Peter and Valkenburg 2007). They reported a positive correlation between sexual permissiveness and dating app use for casual sex dates. The authors also found that the odds ratio for likelihood of being an active user increased by 1.25 for those high in sexual permissiveness. This heightened use was related to feelings of excitement of new activities, coined as the 'thrill of excitement' (Sumter and Vandenbosch 2019, p. 661). Thrill of excitement also works as a motivation for online dating app use for sensation-seeking individuals.

There appears to be agreement concerning the relationship between some personality traits and the motives for online dating use (Sumter and Vandenbosch 2019). In a survey of 678 participants (584 undergraduate students and 94 individuals from the general population from online networking websites; 86% aged between 18 and 20 years), Clemens et al. (2015) took personality measures using the Big-Five Scale (Benet-Martínez and John 1998) and online dating gratifications (i.e. identity, social, companionship, distraction, intercourse, status, and relationship) with blended items from three different validated scales: the General Internet Use Scale (Charney and Greenberg 2002), Television Viewing Motives Scale (Rubin 1981) and Social Networking Scale (Guessennd et al. 2008). Results provided significant correlations between personality traits and online dating gratifications. For example, neuroticism was significantly related to identity gratification, which means that individuals high in neuroticism pursue the creation of their own identity by being free to choose what to show to others. Openness to experience was found to be associated with being social when using online dating sites. Disagreeable individuals were found to use online dating sites to be social and to search

for companions. Conversely, those who scored low in disagreeableness were found to use online dating sites with peer pressure (i.e. status). Furthermore, conscientiousness was correlated with finding a romantic relationship. Also, the authors included sex and sexual orientation in the model in order to relate them to personality traits and dating gratifications. Significant associations were found between homosexual participants and gratifications of relationship and sex. Additionally, homosexuals were found to score higher on neuroticism, together with heterosexual women.

It has already been noted that neurotic individuals aim to form their own identity via online dating sites (Clemens et al. 2015). Forming one's own identity on online sites, in this case online dating websites, can lead to misrepresentation (Hall et al. 2010). In a survey of 5020 American online daters (74% females; mean age = 39.8 years), Hall et al. (2010) found that self-monitoring, defined as the quality of adapting one's presentation in order to obtain a desired outcome (Back and Snyder 1988), was a predictor of misrepresentation in online dating. In terms of personality traits, the authors reported that participants low in openness to experience were more likely to misrepresent themselves on online dating sites in order to appear more appealing. Neurotic individuals, who have been claimed to pursue control over their online representation, were not found to misrepresent themselves (Hall et al. 2010).

Regarding attachment styles, Chin et al. (2019) surveyed 183 single American participants, and 60% of those were male (mean age = 29.97 years). A multivariate regression analysis was performed utilising data from the Attachment Style Questionnaire (Simpson et al. 1992), together with some items covering the use of dating apps. Results showed differences in use depending on the type of attachment and reported those with anxious attachment patterns tended to use online dating more than avoidant types.

The results in this section indicate that there is a relationship between the use of dating apps and personality characteristics, such as low conscientiousness, high sensation-seeking, and sexual permissiveness. The relationship suggests that individuals high in sensation-seeking and sexual permissiveness use dating app services for casual sexual encounters. Further research should study the relationship between sensation-seeking and sexual permissiveness with the use of dating apps. Also, there appears to be an association between neuroticism and higher online dating use. However, only two studies have reported a clear positive correlation (Chin et al. 2019; Hance et al. 2018). Regarding the limitations of the studies, all of them were cross-sectional; therefore, no causality or directionality of the findings can be inferred. In terms of samples, there are some limitations regarding generalisability considering that many of the studies used convenience and/or non-randomised samples.

Negative Correlates

This section reviews risks in relation to the use of online dating. A total of ten studies were identified. There were six qualitative studies (Best and Delmege 2012; Couch and Liamputtong 2007; Couch et al. 2012; Erjavec and Fišer 2016; Heino et al. 2010; Vandeweerd et al. 2016) and one paper which contained two studies: one qualitative and one quantitative (Sánchez et al. 2015). Three of the studies were purely quantitative (Cali et al. 2013; Choi et al. 2018; Solis and Wong 2019). Additionally, two studies utilised female-only samples (Cali et al. 2013; Vandeweerd et al. 2016).

According to the studies found in relation to perceived risks, there appears to be agreement on the existence of potential dangers of online dating. Vandeweerd et al. (2016) in an interview-based study with 45 women aged 50 years and older (mean age = 57.3 years) found

that there was acknowledgement of risks, such as pervasive lying, attempted financial exploitation, and unwanted electronic sexual aggression (Vandeweerd et al. 2016). Moreover, Solis and Wong (2019) in their study in mainland China with 433 users of dating apps (mean age = 30 years; 57.5% males) reported five categories of perceived risks: lies and deception, sexual risk, dangerous people, self-exposure, and harassment (Solis and Wong 2019). There were some shared perceived risk categories identified by these two studies: lying, finding people with ulterior motives, and aggression. In another study, with a female-only sample from a Midwestern University in the USA (mean age = 24.36 years), Cali et al. (2013) carried out a vignette study comparing two different dating scenarios (i.e. online vs. offline). Participants were randomly assigned to one of the two conditions and were given a description. Following this, they were asked to complete the Dating Self-Protection Against Rape Scale (Moore and Waterman 1999) and some items on internet usage. After analysis, results showed a difference between the two groups. Online dating scenario participants placed more importance on self-protective behaviours, and those who had never used online dating before scored the highest in self-protective behaviours. Here, it appears that time spent using online dating mitigates the perceptions of risks which could lead to the underestimation of potential dangers. Further research needs to verify this hypothesis.

Choi et al. (2018) studied a sample of 666 students from four different universities in Hong Kong (mean age = 20.03 years) and collected data on the use of dating apps and experience of sexual abuse with the subscale of the revised Conflict Tactics Scale (Straus et al. 1996). The data showed that users of dating apps were more likely to have been sexually abused than non-users in the past year. The use of online dating apps was also associated with lifetime sexual abuse, especially among sexual minorities (i.e. bisexual/homosexual males). These data need to be interpreted cautiously because the data did not discern whether the abuser was met online or offline. Further studies should discriminate whether or not the abuser was met via dating apps.

Among adolescent populations, Sánchez et al. (2015) carried out two studies. The first study was qualitative, with focus groups including 16 participants (eight males) with ages ranging from 14 to 17 years. The focus group data analysis resulted in identifying several factors which were later included in the development of a scale (second study). The scale, namely the Cyberdating Q_A, assesses the quality of online dating among adolescents over six dimensions (online intimacy, emotional communication strategies, cyberdating practices, online control, online jealousy, and online intrusive behaviour).

Couch and Liamputtong (2007) interviewed 15 participants from Melbourne (Australia) via online chat, eleven males aged between 24 and 44 years. After carrying out thematic analysis of the transcripts, the main findings reported that participants' management of risks was dependent upon the control they had over their own personal information on the online dating site (e.g. whether they can change their name, not showing telephone number and/or address). In a later study, Couch et al. (2012) carried out a qualitative study with 29 participants from Australia, 12 females, aged between 18 and 70 years (mean age = 32.83). After conducting the interviews via an online chat platform, they found that participants identified risks such as deceit, sexual risks, emotional and physical risks and risks of encountering dangerous and untrustworthy people.

Additionally, one of the key features of online dating (i.e. the screening of multiple profiles in order to select potential partners to establish an interaction which could later lead to an offline date) appears to have counterproductive effects on the users, such as partners' objectification and reduced energies for dating. Heino et al. (2010) reported objectification

of the potential dates in a study with 34 American online daters (50% females, mean age = 42) from a large dating site, all of them living in Los Angeles. Participants used many marketplace metaphors when referring to screening profiles, which were themed into five categories: (i) other market's worth, (ii) own market's worth, (iii) shopping for perfect parts, (iv) maximising inventory, and (v) calibrating selectivity (Heino et al. 2010). Another study carried out with 38 older Slovenian adults between 63 and 77 years of age (18 females) found that participants used economic metaphors (e.g. the best of what the market offers, to be back in the market) when speaking about their experience of online dating (Erjavec and Fišer 2016). Similar to these findings, Best and Delmege (2012) in a small-scale study with 15 respondents (66% females aged 18 to 62) from Western Australia found that the use of marketplace metaphors or a 'shopping culture of dating' (Best and Delmege 2012, p. 237) affected the online daters by decreasing their willingness to date. Based on these findings, further research could study the relationship between objectification of others and self in online dating use and mental health problems.

Overall, the studies covered in this section demonstrate that online dating is perceived as more dangerous than traditional offline dating. The perceived risks appear to coincide across studies, mainly involving deception, sexual harassment, and finding untrustworthy people. However, only one study (Choi et al. 2018) identified the risks of being abused in relation to dating apps use, although the findings in this study may be somewhat unspecific because it was not assessed whether the experienced abuse resulted from online or offline sources of aggression. There is agreement on the general perception of risks and the objectification effect by filtering through multiple profiles. Findings come mainly from qualitative studies; therefore, they are informative, but further analysis on more representative populations using quantitative approaches is needed to support these results.

Sexual and Impulsive Behaviour

There is an important body of research studying impulsive behaviours mainly in the form of risky sexual choices in the context of online dating. Consequently, a total of ten studies in relation to online dating were identified examining risky sexual behaviours (Choi et al. 2016a, 2016b; Chow et al. 2018; Goedel and Duncan 2016; Heijman et al. 2016; Hospers et al. 2005; Kok et al. 2007; Whitfield et al. 2017), antisocial behaviour (March et al. 2017), and behavioural changes based on site-to-apps shift (Jung et al. 2019). All the studies were quantitative and cross-sectional (Choi et al. 2016a, 2016b; Chow et al. 2018; Goedel and Duncan 2016; Heijman et al. 2016; Hospers et al. 2005; Kok et al. 2007; March et al. 2017; Whitfield et al. 2017) with the exception of one longitudinal study (Jung et al. 2019). In terms of samples, six of the studies focused exclusively on men who have sex with men (MSM) (Chow et al. 2018; Goedel and Duncan 2016; Heijman et al. 2016; Hospers et al. 2005; Kok et al. 2007; Whitfield et al. 2017).

Choi et al. (2016a, 2016b) collected data using questionnaires covering the use of dating apps and sexual history, together with some demographic variables. These data were collected in four universities in Hong Kong, which formed a convenience sample of 666 students (mean age = 20.03 years). Of those, at least 296 were male participants (ten did not answer the gender question). The aim was to examine the relationship between smartphone dating apps and risky sexual behaviours (i.e. condomless sex). In the first study (Choi et al. 2016a), results showed a robust positive correlation between dating app use and condomless sex. Additionally, the use of dating apps for a period longer than 12 months was associated with having casual

condomless sex in the most recent sexual interaction. In the second study (Choi et al. 2016b), similar results with further associations were found in addition to the previous findings. For example, dating app users and alcohol drinkers were less likely to use a condom during sex (alcohol consumption was categorised as current drinker or non-drinker). Being bisexual, homosexual, or female was significantly correlated with being less likely to have used a condom during the most recent sexual interaction.

Regarding homosexual populations, Chow et al. (2018) studied a large sample of 1672 Australian MSM from the Melbourne Sexual Health Centre (aged between 17 and 78 years; median age = 29 years) in relation to dating apps and use of saliva in sex as a form of lubricant, which has been shown to pose a higher risk of being infected by gonorrhoea (Chow et al. 2016). Findings reported that MSM who used dating apps were 1.78 times more likely to perform rimming (oro-anal sex) and 1.63 times more likely to use saliva as lubricant during anal sex (Chow et al. 2018). In line with these findings, Goedel and Duncan (2016) found a positive correlation between condomless sex and use of several dating apps in a sample of 174 New York City male users (age range 19 to 58; mean age = 30.8 years) of an all-male dating app. Additionally, a significant relationship between alcohol and drug use and condomless sex was found (drugs and alcohol consumption data were collected via an item based on a retrospective account of the last three months in conjunction with dating app use).

In contrast to these findings, Heijman et al. (2016) studied a sample of 3050 MSM Amsterdam participants (mostly Dutch [73.8%] with a median age of 37 years). The results found no significant association with dating app use and condomless sex among HIV-negative users; conversely, HIV-positive users were found to be more likely to perform anal sex without a condom, indicating that there are differences in risky sexual choices by MSM in the context of online dating. However, this association was not significant after inclusion of partnership characteristics in the multivariate model (e.g. HIV status, ethnic origin, and age). The authors suggested that knowing more information about partners (i.e. HIV status, lifestyle concordance, and ethnic origin) works as a mediating effect for condomless sex in the context of online dating.

In a previous study with MSM in the Netherlands, Hospers et al. (2005) reported a higher percentage (39%) of condomless anal sex especially in HIV-positive online daters in comparison to HIV-negative daters, but no differences were found between offline and online samples. Even though the sample comprised 4984 users (mean age = 33.2) of an online dating platform, the results may be interpreted with caution because smartphone dating apps were non-existent at the time the study was published. Nonetheless, a more recent study found no correlation between the use of dating apps and condomless sex among a homosexual sample of 545 men (mean age = 36.81 years) (Whitfield et al. 2017). Nonetheless, Whitfield et al. (2017) found ethnic group differences in terms of condom use in online daters, and the results of their research show that individuals with Latino/Hispanic origin are found to be 0.46 times more likely to have unprotected anal sex than Whites; other ethnic origins such as American Indian, Alaskan, Asian and Hawaiian were categorised as 'other' (Whitfield et al. 2017, p. 780) which increased the chances of condomless anal sex by 0.35 in comparison to their White counterparts in individuals who use online dating.

In order to explain the factors involved in the decision-making of sexual risky behaviours among MSM who actively use online dating platforms, Kok et al. (2007) used the theory of planned behaviour (Ajzen 1991) and found that attitude (e.g. behavioural beliefs about the use of condoms), subjective norms (i.e. normative beliefs), and perceived control (i.e. self-efficacy) explained 55% of the variance in intention of using protection during anal sex. Fantasising

about condomless sex was found to have a direct effect on intention to carry out condomless sex (intention is considered by the theory of planned behaviour to be the most reliable predictor of behaviour) (Ajzen 1991; Kok et al. 2007). In relation to online dating apps, it could be argued that specific structural characteristics (e.g. chat, sharing pictures) may increase fantasising about condomless sex. However, further research is needed to relate the aforementioned structural characteristics of dating apps and sexual behaviour.

Regarding behavioural changes among computer online dating and smartphone dating apps, Jung et al. (2019), in a study that accessed data from 100,000 users (geographical location was not specified) of an online dating site (female mean age = 36.10 years; male mean age = 33.22 years) reported that the shift from computer-only access (i.e. online dating site) to smartphone access (i.e. dating app) produced a behavioural change in the users, such as increasing the number of visits to others' profiles, sending more messages, and achieving more matches (Jung et al. 2019). As a consequence of computer-to-smartphone shift, the authors noted that men had increased impulsivity (i.e. they became even less deliberate in terms of quantity of messages sent and their targets). Regarding disinhibition, both men and women lowered their partners' preference standards. For example, viewing profiles of individuals from a different ethnic background increased by 85.3% per week for females and 127% for males (Jung et al. 2019). Therefore, according to these results, there appears to be an effect on the ubiquity factor to becoming more engaged and presumably increasing the chances of developing a misuse pattern of online dating services when using smartphone dating apps rather than computer-based online sites.

According to March et al. (2017), there is a relationship between dysfunctional impulsivity and antisocial behaviours, such as trolling (i.e. the act of being provocative, offensive or threatening [Bishop 2014]) on the Tinder app. In their study with 357 participants from Australia (mean age = 22.50 years), findings suggested that traits of psychopathy, sadism, and impulsivity were positively related to acts of trolling. Taking these two studies together (Jung et al. 2019; March et al. 2017), it appears that impulsivity plays a role in increasing users' behavioural repertoire in the context of online dating and also provides the possibility to engage in non-adjusted behaviours.

Overall, the results presented in this section suggest that online daters have higher chances of behaving impulsively in comparison to non-users in terms of risky sexual choices. The behaviours covered were mostly of sexual nature and focused mainly on homosexual male populations (MSM). This biased focus may be due to the fact that homosexual men's sexual practices pose a higher risk of HIV infection. Nonetheless, it could be beneficial for the sake of generalisability to know if these results can be replicated across individuals with other sexual orientations (i.e. heterosexual, bisexual, homosexual women). Apart from sexually risky behaviours, it has been reported how the ubiquity factor of dating apps facilitates users' engagement (Jung et al. 2019), potentially leading to an addictive pattern of use, but there is a need for further research to support this hypothesis.

Substance Use and Behavioural Addictions

In the final selection of studies, there are only two studies that have examined the relationship between online dating and substance use addiction (Boonchutima and Kongchan 2017; Choi et al. 2017) and one was dedicated to a behavioural addiction (i.e. sex addiction and online dating) (Zlot et al. 2018).

Boonchutima and Kongchan (2017) surveyed a sample of 350 MSM from Thailand (three out of four respondents aged 18 to 35 years) and asked about their online dating app use, sexual history, drug use history and intention of using drugs. Regression analysis reported that over 73% of the participants were using dating apps to find partners and to invite others to use illicit drugs with a 77% invitation success rate. Furthermore, one in three substance users (34.3%) engaged in condomless sex. Therefore, according to the findings, there may be an association between illegal drug use and condomless sex. Nevertheless, it should be noted there is no mention regarding what type of illicit drugs was used.

Regarding alcohol consumption and online dating, Choi et al. (2016b) recruited a convenience sample of 666 students from Hong Kong, and correlational analysis found that being an online dater was associated with inconsistent use of condoms during sexual interactions (use of condoms was categorised as consistent if condoms were always used, or non-consistent if condoms were not used every time) and being a current drinker (categories were non-drinker or current drinker, no specific description of those categories are provided), concluding that 'dating apps tend to skew their users toward risky sexual encounters' (Choi et al. 2016b, p. 8). In a later study, Choi et al. (2017), with a convenience sample of 666 students (mean age = 20 years) from Hong Kong, reported a relationship between longer use of online dating (i.e. more than a year) and recreational substance use in conjunction with sex. Again, the specific substances were not mentioned and were coined as recreational drugs (alcohol was independent of the recreational drugs category). It would be useful for further research to specify the respective substances as the scope of illicit or recreational drugs can be extensive. According to these studies, the co-occurrence of substance use with risky sexual behaviour in the context of online dating was indicated. Nonetheless, caution needs to be used with regard to this assumption because the assessed samples were skewed towards MSM; therefore, generalising the results to the general population is not possible.

In relation to behavioural addictions in the context of online dating, Zlot et al. (2018) studied a sample of 279 participants from Israel comprising 128 males (mean age = 25 years). In order to collect data, participants answered a series of validated psychometric instruments that were integrated in an online questionnaire. Measures included the Liebowitz Social Anxiety Scale (Liebowitz 1987), the Sensation Seeking Scale (Zuckerman et al. 1964) and the Sexual Addiction Screening Test (Carnes 1991). Following the analysis, associations were found between users of dating apps and higher scores on sexual addiction measures in comparison to non-app users, as well as a positive correlation between social anxiety and the use of smartphone dating. Again, the relationship between anxiety-tendency factors and the use of online dating was supported as was mentioned in the preceding sections.

The scarcity of the literature limits the conclusions. However, the findings can be considered as a guide for future study examining substance use and other types of behavioural addictions with online dating. There appears to be a relationship between substance use among partners who have met via online dating, at least among MSM who use dating apps. In relation to substance use and online dating among heterosexual populations, data come from only one study that reported no direct relationship (Choi et al. 2017). However, limitations in both studies include the use of general terms such as illicit/recreational drugs which necessitates further specification and replication. In terms of behavioural addiction, only sex addiction has been studied and it was found to be related to dating app use (Zlot et al. 2018).

Problematic Use of Online Dating

To date, only two studies have exclusively focused on problematic online dating. Both studies were quantitative and developed validated psychometric scales (Orosz et al. 2016, 2018). One of the studies used a mixed-methods approach (Orosz et al. 2018). The two studies solely focused on one specific dating app (i.e. Tinder). In the first study, Orosz et al. (2016) developed a psychometric instrument to assess the problematic use of Tinder (Problematic Tinder Use Scale, PTUS). This self-report measure is based on the components model of addiction (Griffiths 2005), which comprises six characteristics of addiction: salience, mood modification, tolerance, withdrawal, conflict and relapse. In order to validate the PTUS, a sample of 430 Hungarian Tinder users (243 females; mean age = 22.53 years) was selected, and the six-item unidimensional structure showed good reliability and factor structure. In the second study, Orosz et al. (2018) carried out three different studies. First, with a sample of 414 Hungarian respondents (246 females; mean age = 22.71 years), the TUMS (Tinder Use Motivations Scale) was developed, resulting in the identification of four main motivations of Tinder use arising from a 16-item first-order factor structure (i.e. sex, love, self-esteem enhancement, and boredom). In the second study, with a convenience sample of 346 participants (165 females; mean age = 22.02), measures were taken from the newly developed TUMS, together with the PTUS, and the Hungarian Big Five Inventory (John and Srivastava 1999). The results were weak in relation to personality factors and the four main motivations for Tinder use. However, self-esteem enhancement was related to Tinder use. In the third study, 298 participants (177 females; mean age = 25.09) were assessed with the TUMS, PTUS, the Hungarian 10-item Rosenberg Self-Esteem Scale (RSES) (Randal et al. 2015; Urbán et al. 2014), and the Hungarian version of the Basic Psychological Need Satisfaction and Need Frustration Scale (BPNSFS) (Chen et al. 2015; Tóth-Király et al. 2018). The results showed that relatedness frustration (i.e. needs not met by affection and care from relevant others) predicted the motivation of self-esteem enhancement which was found to be one of the motivations associated with problematic use of Tinder, together with the sex motive.

Overall, the studies presented in this section are not sufficient in terms of quantity to consider online dating addiction as an entity. However, the studies are of general interest to researchers considering the widespread use of dating apps and provide insight in relation to factors such as self-esteem and sex-searching that may be related to the development of problematic patterns of use. Even though there is a scarcity of literature examining problematic use of online dating, there is some research that appears to support the findings presented in this section. Further study is needed to consider the relevant factors that have been suggested as predictors of problematic use, self-esteem and sex-searching motives, with a cross-cultural approach in order to inform of possible cultural differences in relation to problematic use. Also, other dating apps could be subject of study to examine if there are any differences in terms of motives that could lead to problematic use.

Discussion

The present paper reviewed the literature concerning the use of online dating focusing on problematic online dating (computer-based and smartphone apps), characteristics of users (e.g. personality correlates, users' motivations), and consequences of use (e.g. risks associated with

the use of online dating, impulsivity, use of drugs in conjunction to online dating). Due to the lack of previous literature on problematic use of online dating, socio-demographic and psychological characteristics (e.g. gender, age and personality) are informative with regard to which specific individual characteristics relate to greater use of online dating. Even though longer-time use cannot be considered as problematic or addictive *per se*, it could be a reference point for future research in the field.

In terms of use, two of the reviewed studies pointed out that between 29% and 43% of their samples had used online dating services. However, these studies were published in 2007 and 2008, and in one decade, the usage of online dating platforms (including dating sites and dating apps) has been extended reaching up to 8000 different dating sites in the world, representing a business worth almost US$2 billion per year (Matthews 2018). The growth in this service may be due to different reasons, and as with other forms of internet use (e.g. social media use, online gaming, online shopping, etc.), much of this use may have nothing to do with addictive patterns, but with passing time and being a pleasurable activity.

Nevertheless, online dating developers have acknowledged that design is made to engage the user and increase monetisation of the business (Jung et al. 2014). Even though the design of dating apps has not been studied in the field of addiction, previous literature examining SNS use suggests that user interaction such as scrolling, tapping, and typing is related to smartphone addiction (Noë et al. 2019). Considering that dating apps have a similar user interaction design (i.e. typing, scrolling/swiping, and liking), comparable associations with addictive patterns of use may exist. Further research is needed to confirm such a speculation.

In terms of personality correlates, reviewed studies pointed out that sociability, anxious attachment style, social anxiety, lower conscientiousness, higher sensation-seeking, and sexual permissiveness were associated with higher use of online dating (sexual permissiveness and lower conscientiousness have also been related to sex-searching in the context of online dating) (Blackhart et al. 2014; Chin et al. 2019; Kim et al. 2009; Peter and Valkenburg 2007; Zlot et al. 2018). Likewise, SNS research has suggested that higher extraversion, social anxiety, loneliness, and lower self-efficacy are related to Facebook addiction (Atroszko et al. 2018), higher extraversion and neuroticism to SNSs (Wang et al. 2015), and higher sensation-seeking to smartphone addiction (Wang et al. 2018). Neurotic correlates (i.e. social anxiety, neuroticism, and anxious attachment style) of SNS and online dating research have been found, with these characteristics having been associated with higher use, operationalising the definition of neuroticism as being highly anxious, depressed, and low in self-esteem (Eysenck 1965), and it could be argued that some of the motives of use claimed for these individuals could work as a form of avoidance or escapism from distress (e.g. distraction), leading to a negative reinforcement of the behaviour (i.e. online dating) that could heighten the chances of developing any kind of misuse or excessive usage pattern. Furthermore, the relationship between anxiety traits and neuroticism has been upheld by a great body of research in behavioural addictions (Andreassen et al. 2013; Atroszko et al. 2015; Balta et al. 2018; Kuss et al. 2013, 2014). Therefore, considering this association, it is recommended that future research should study this relationship with the problematic use of online dating.

To date, only one study has related self-esteem enhancement to problematic use of Tinder (Orosz et al. 2018). Considering that anxious attachment, and generally anxiety-tendency correlates (i.e. neuroticism) are associated with lower measures of self-esteem (Lee and Hankin 2009), it could be argued that anxious users find online dating a form of validation, which can serve as positive social reinforcement that can increase the chances of continuing the use of

online dating for longer periods of time, and potentially developing addictive-like patterns of use (e.g. craving for the use/validation, salience of use and mood modification).

Another form of problematic use of dating apps, more specifically Tinder, is sex-search use (Orosz et al. 2018). As previously discussed, sex-search use of online dating has been related to higher measures of sexual permissiveness, sensation-seeking, and lower conscientiousness. Furthermore, in one study, sex addiction was related to greater use of online dating sites (Zlot et al. 2018). Being a homosexual man has also been related to sex-search motives (Clemens et al. 2015), which may explain the bias towards homosexual men samples examining risky sexual behaviours in the context of online dating.

The reviewed studies supported an association between dating app use and condomless sex in comparison to non-dating app users, even though there are some studies that did not find this association (Heijman et al. 2016; Hospers et al. 2005; Whitfield et al. 2017). Nonetheless, homosexual men may be at higher risk of problematic use of online dating due to the prominent sex-search motive for online dating. Finding casual sexual partners in online dating services is facilitated by some apps that show how far users are from each other (i.e. geographical distance). This structural characteristic (GPS-based service) may be related to higher impulsive decisions and problematic use of online dating. Arguably, by showing up walking-distance profiles, it is easier to engage in casual dates and this may serve as a self-esteem enhancement mechanism, as previously discussed, which may increase engagement and usage of online dating services. However, further research is needed to support this association and how the different structural mechanisms of the respective dating apps affect measures of well being in users. Drawing upon chatting via online dating sites and apps (one of the structural characteristics of online dating is the possibility of engaging in online chatting with other users), it may be relevant to consider the act of 'sexting' (the act of sending sexual content or explicit nude pictures or videos via text messages) (Gordon-Messer et al. 2013) as a potential factor for increasing sex-motive search. Previous research has associated sexting with risky sexual behaviour (Klettke et al. 2014) Consequently, chatting (one structural characteristic of dating apps) may facilitate the appearance of sexting, in turn increasing the chances of risky sexual behaviours. Sexting through dating applications may as well increase the sex-search motive of users (i.e. casual sex dates) which has been found to be a predictor of problematic use of dating apps. However, further study is needed to provide evidence in order to relate chatting through dating apps and sexting, and how this may influence the appearance of sexual behaviour (e.g. risky sexual behaviour and/or heightened sex-search motive).

Some of the reviewed studies concerning associated risks converge on the findings that generally online dating users find online dating to have specific risks, including deceit, fear of physical harassment, and financial exploitation. Additionally, there is a body of research that points to the objectifying environment that emerges in online dating (e.g. through using market-like vocabulary and filtering through numerous profiles). It is of concern that objectification of other users may increase self-objectification (Koval et al. 2019), whose mental health consequences have been noted in previous literature including clinical symptoms of depression and eating disorders (Jones and Griffiths 2014; Register et al. 2015). Therefore, further research should study the emotional experience of users and consider how longer time of use may influence wellbeing measures and clinical mental health symptoms through self-objectification.

Regarding methodology, some weaknesses limit the strength of the findings in the reviewed studies. First, cross-sectional design prevents from making causality inferences and to know the directionality of the results (e.g. condomless sex leads to using dating apps or using dating apps leads to having condomless sex). Second, some of the

measures present limitations which may bias the results (e.g. use of non-validated items, lack of categorisation, and specificity). Third, some samples limit the external validity of the findings (i.e. convenience samples and specific-population samples). Therefore, it is recommended for further study to (i) use more diverse samples, (ii) consider methodologies that can establish causality, and (iii) collect data using self-reports together with interviews to increase internal validity. In addition to the latter, it could be useful to collect real-life measures of online dating use which assess the temporal stability of usage and may provide some insightful objective data that self-report measures cannot facilitate, such as using the experience sampling method (ESM), which is defined as a research procedure by which participants respond to a series of questions multiple times a day during a specific period of time (Larson and Csikszentmihalyi 2014). All of these proposals would help to overcome the present limitations of these studies and provide more robust insights in the field of online dating utilising the highest standards of empirical research.

This current systematic review presents a number of limitations. First, there are some studies that do not specify whether their findings are based on online dating sites, mobile applications, or both. This is necessary in order to differentiate the distinctive phenomena of each service. Second, online dating services include a great variety of apps and sites; therefore, including all of them under the term online dating services may be reductionist and ignore different processes (i.e. psychological and behavioural) that may arise from their use. Third, due to the paucity in previous research in the field of online dating, some conclusions are based on a limited amount of studies, and further study will be needed in order to support current findings and conclusions. Lastly, considering that the field of online dating research is growing over time, it is likely that studies under the process of submission or publication have been not included in this review.

Conclusions

Online dating has become an extended service across technological societies. The present review is the first attempt to gather empirical findings regarding the use of online dating services (sites and smartphone applications) and problematic use of online dating. Findings in this this review indicate that there are personality correlates such as sociability, sensation-seeking, sexual permissiveness, and anxious attachment that correlate to greater use of online dating. Self-esteem enhancement and sex-search motives have been related to problematic use of online dating (more specifically of the dating app Tinder). Other results indicate that users consider online dating as more dangerous than offline (i.e. traditional) dating, as well as more objectifying. Additionally, online dating services facilitate casual encounters (i.e. hook-up dates) which represent a public health concern in terms of sexually transmitted infections (STIs) and substance use (alcohol and recreational drugs).

Compliance with Ethical Standards

Conflict of Interest The authors declare that they do not have any interests that could constitute a real, potential or apparent conflict of interest with respect to their involvement in the publication. The authors also declare that they do not have any financial or other relations (e.g. directorship, consultancy or speaker fee) with companies, trade associations, unions or groups (including civic associations and public interest groups) that may gain or lose financially from the results or conclusions in the study. The first author's university is currently receiving funding from Doctoral Training Alliance under the Marie-Curie program, Horizon 2020 (sources of funding are acknowledged).

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