

**THE RELATIONSHIP BETWEEN EXPOSURE TO RISK-RELATED
CONTENT ON SOCIAL MEDIA AND ADULT ONLINE AND OFFLINE
RISK-TAKING**

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ABSTRACT

Background: There have been recent governmental efforts to introduce regulation to ameliorate the harm caused by the influence of social media on risky behaviour. However, little empirical research exists supporting this association.

Aims: This study first aimed to investigate if there was a relationship between exposure to social media content encouraging risk behaviours and participants' own engagement in these behaviours in a sample of 18-24-year olds. Four offline and two online behaviours were investigated in a replication and extension of a previous study (Branley & Covey, 2017). The second aim was to investigate the relationship between exposure to risk-related social media content and participants' behaviour in a sample of adults aged 18-84.

Method: This study employed a cross-sectional quantitative design, with data collected at a single time point through an online questionnaire. A sample of 684 participants completed the measures on own risk behaviour, perceptions of the risk behaviour of peers, exposure to risk-promoting social media content, risk propensity, age and gender. A two-step binary logistic regression was conducted for each of the six behaviours across three research questions to test the associations between the variables of interest, and to examine the contributions of individual variables to each model.

Results: A strong positive relationship was found between exposure to risk-related social media content and risk-taking behaviour across a diverse range of offline and online behaviours and for all age groups. The strength of the relationship varied across individual behaviours and according to gender and age groups.

Conclusion: The relationship between risk-related social media content and risk-taking behaviour is complex, behaviour-specific, and dependent on a number of demographic factors. In order to be effective, policy and mental health interventions to reduce risk of harm will need to consider the many factors that influence the relationship between risk-promoting social media content and risk behaviour.

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1. INTRODUCTION

1.1. Overview

This study aims to investigate the relationship between exposure to social media content encouraging a range of risk behaviours and adult participants' own risk-taking behaviour. This chapter first discusses the relationship between digital technology and harm in the context of government and media concern about the negative consequences of harmful internet-based content. The ubiquity of social media use is discussed, along with the identified benefits and harms. Social media, risk and risk behaviour are defined, and some of the risky behaviours associated with social media use are considered. Risk propensity, perceived peer behaviour and social norms are introduced as factors related to engagement in risky behaviour and the literature relating to these is briefly discussed. The chapter concludes with a summary of the rationale for the current study and a statement of the research questions.

1.2. Technology, Internet Use And Harm

The recent launch of the Online Harms White Paper (Department for Digital, Culture, Media & Sport & Home Office, 2019) has drawn public attention to the potential for internet-based content to cause harm and negatively impact mental health and wellbeing. The White Paper is the first step in an attempt to establish a regulatory framework which tackles a range of online harms, both illegal and legal. However, despite widespread public concerns and media attention in recent years (e.g. British Youth Council, 2017; Ofcom 2018a; Ofcom 2018b; UK Commons Science and Technology Committee, 2019), little empirical research has investigated the specific relationship of online content to harm.

Much of the previous work examining the relationship between digital technology and harm has investigated screen time, the amount of time people spend using digital devices, as the main determinant of the effects of technology. Results of these studies have been inconclusive, finding negative (Twenge, Joiner, Rogers, & Martin, 2018), positive (Przybylski & Weinstein, 2017), mixed effects (Parkes, Sweeting, Wight, & Henderson, 2013) or no effect (Daly, 2018) of screen time on wellbeing. This is complicated further by the fact that studies often assess different outcomes, such as mood (Herman, Hopman & Sabiston, 2015), sleep (Hale & Guan, 2017; Twenge, Krizan, & Hisler, 2017), or suicidal ideation and behaviour (Twenge, Joiner, Rogers, & Martin, 2018), and screen time can encompass a diverse range of activities such as time spent on social media, reading digital books, playing video games or engaging in digital activism (Blum-Ross & Livingstone, 2016).

A large amount of the empirical evidence for an association between digital technology use and risk of psychological harm is also based on secondary analysis of extant household panel surveys and large-scale datasets focusing on general assessments of wellbeing (Orben & Przybylski, 2019). The use of such datasets is fraught with difficulty, as the many possible analysis options may give rise to subjective decisions which affect the results (Silberzahn et al., 2018). Furthermore, sample sizes are often large enough to detect very small differences between groups which may be statistically significant but inconsequential in practical terms (Kaplan, Chambers, & Glasgow, 2014). Taking into account these limitations, a recent re-analysis of the data across three large-scale social datasets (n=355,358) assessing adolescent wellbeing found a small association between digital technology use and lowered levels of wellbeing, accounting for a maximum of .4% of the variance in wellbeing (Orben & Przybylski, 2019).

Due to the diversity of experiences that can be covered by the term screen time, it has been suggested that researchers instead focus on specific online

activities, behaviours or experiences as potential determinants of wellbeing. As internet users report that engaging with social media is one of the most common activities using screens (Ofcom, 2018a) and social media is the most commonly reported source of online harm (Ofcom, 2018c), this study focuses on social media use as a possible predictor of potentially harmful outcomes.

1.3. Social Media

1.3.1. Definition

Social media can be defined as Web 2.0 internet-based applications which host user-generated content and facilitate the development of online social networks through user-specific profiles on sites or applications (apps) maintained by a social media service (Obar & Wildman, 2015).

Kaplan and Haenlein (2010) identified the following categories of social media: collaborative projects (e.g. Wikipedia), blogs (e.g. Blogspot, LiveJournal), content communities (e.g. YouTube and Instagram), social networking sites (e.g. Facebook and LinkedIn), virtual game worlds (e.g. World of Warcraft) and virtual social worlds (e.g. Second Life). Following Branley (2015), the current study has taken these categories as a starting point, applying the Obar & Wildman (2015) definition and updating examples to include platforms that are currently popular. Collaborative projects and virtual game and social worlds, although sometimes considered social media, have been omitted from this study. Although collaborative projects such as Wikipedia comprise user-generated content, they do not facilitate the development of online social networks as a primary objective. Virtual game and social worlds such as World of Warcraft and Second Life have been excluded as they involve elements of role-play which makes them distinct from other social media, which emphasise identities connected to user-specific profiles.

For the purpose of this study an additional category of social media has been added: online communities and forums such as Reddit and Slashdot. Online communities and forums meet the Obar and Wildman (2015) definition of social media and they have been considered social media in previous research (e.g. Haralabopoulos, Anagnostopoulos, & Zeadally, 2015; Olson & Neal, 2015; Van Dijck & Poell, 2013).

1.3.2. Prevalence Of Social Media Use

Social media sites, such as YouTube, Facebook, Twitter and others, have become a key part of the lives of many adults in the UK, with 77% of adults having a social media account, 70% of adults using social media regularly and over 66% of social media-using adults in England doing so at least once a day (Department for Culture, Media and Sport, 2016; Ofcom, 2018a). These figures are consistent with social media users worldwide – a global survey of advanced, emerging and developing economies has found that across 40 countries, 76% of adult internet users use social media sites (Poushter & Stewart, 2016).

Prevalence of social media use in the UK differs across age cohorts – in 2017, internet users aged 16-24 (95%), 25-34 (96%) and 35-44 (86%) were more likely to have a social media account than the average user. This was in contrast to internet users aged 55-64 (60%), 65-74 (43%) and 75 and over (32%). Social media use among adolescents was lower than for adults, with 20% of 8-11-year olds and 70% of 12-15-year olds in the UK using social media (Ofcom, 2018b). Although adults are more likely to report viewing upsetting content on social media (55% of people aged 16+ versus 16% of people aged 12-15), the majority of research on online harm has focused on children and adolescents (e.g. Orben & Przybylski, 2019; Twenge, Joiner, Rogers, & Martin, 2018).

Although women in the UK are more likely than men to have a social media profile (81% vs 76%; Ofcom 2018a) and make up the majority of users on YouTube, Facebook, Pinterest, Instagram and Snapchat, there is a slight majority of male users on Twitter, Reddit, Tumblr and LinkedIn (We Are Flint, 2018). Studies have shown that, in adolescent and young adult samples, while male participants tended to use social media to gain information, be entertained and make new social connections, female participants were more likely to use social media to maintain relationships with people whom they had already met in person, or “offline” (Barker, 2009; Muscanell & Guadagno, 2012).

As 91% of adult social media users in the UK have a Facebook account, it remains the most commonly used social media site. However, the number of adults who consider Facebook to be their main social media profile is falling, from 80% in 2016 to 70% in 2018 (Ofcom, 2018a).

There are a wide range of reasons why people use social media, including social interaction, self-expression, entertainment and information seeking (e.g., Hunt, Atkin, & Krishnan, 2012; Whiting & Williams, 2013). Usage patterns and motivations for use tend to differ across social media sites (Rösner, 2018) and also change over time as new social media sites become available and the functionality of specific sites changes (Alhabash & Ma, 2017; Boyle, Earlie, LaBrie, & Ballou, 2017). Across demographic groups, younger adults tend to use a wider range of social media sites than older people. A 2016 survey of 989 18-24-year olds found that only 3% of respondents used zero or one social media site while 85% used six or more social media sites regularly (Villanti, Johnson, Ilakuvan, Jacobs, Graham, & Rath, 2017).

There is evidence that use of social media can have a significant positive impact on individuals, contributing to feelings of social connectedness, enhancing learning and improving wellbeing (O’Keeffe & Clarke-Pearson,

2011). However, social media use is also associated with a number of risks of harm, including cyberbullying, harassment, sexting and sharing information that may put one's privacy, reputation and safety at risk (O'Keeffe & Clarke-Pearson, 2011).

1.4. Risk Behaviour

The Online Harms White Paper draws a link between lowered psychological wellbeing and risky behaviour and aims to create "rules and norms for the internet that discourage harmful behaviour" (Department for Digital, Culture, Media & Sport & Home Office, 2019, p 6). It proposes to do this partly through the creation of an independent regulator for online safety, which "will take a risk-based approach, prioritising action to tackle activity or content where there is the greatest evidence or threat of harm" (p 9).

Harmful or risky behaviour can be defined as any and all behaviours involving potentially negative consequences for the self and/or others (Boyer, 2006). These negative consequences can be physical, psychosocial, ethical, or economic (Trimpop, 1994). In experimental research, risk behaviour is often measured using games or hypothetical scenarios involving specific risks, such as the Iowa Gambling Task (Bechara et al. 1994) or the Multi-Outcome Risky Decision Task (Lopes & Oden, 1999). However, the relationship between performance on these tests and "real-world" decision making is still uncertain, and recent evidence suggests that behavioural tasks perform poorly compared to questionnaires measuring personality traits and frequency of risk-taking (Frey, Mata, Pedroni, Rieskamp, & Hertwig, 2017; Palminteri & Chevallier, 2018). The research evidence suggests that while risk behaviour is found to differ across domains, there is also evidence for a general risk-taking disposition (Highhouse, Nye, Zhang, & Rada, 2017). There is some evidence suggesting that when differences in risk perception are controlled for, risk-taking is not domain specific, and people who take risks in one domain are more likely to take risks in others

(Hardman, 2009). An individual's general tendency to take risks can be measured using the Risk Propensity Scale (Meertens & Lion, 2008), which can be applied across a wide range of risk behaviours.

The definition of risky behaviour can encompass a broad range of behaviours and consequences, and so a wide range of normative and non-normative behaviours can be considered risky. It is important to note that risk is socially constructed, and the definition of risky behaviour is likely to differ across individuals, age cohorts and cultures (Adam, Beck & Loon, 2000; Haight, 1986). For example, while children and young people may consider making friends online as a low risk, high opportunity behaviour, parents and law enforcement agencies may view the behaviour as far more risky (Palmer & Stacey, 2004; Wolak, Mitchell, & Finkelhor, 2003).

Historically, "risky" behaviours have largely been labelled as such by dominant social groups and can encompass behaviours that are non-normative but objectively carry less risk of harm than more socially acceptable behaviours (Nutt, 2009). An assessment of the literature must take into account that researchers' active choices about how questions about risk and risk behaviour are defined, selected and tested affect the understanding of the "problem" and potential solutions (Bacchi, 2009, 2015; Ritter, 2015).

Risk-taking is not a discrete trait of the individual, but a behaviour influenced by external circumstances, the individual qualities of the person involved and the interaction between the two (Trimpop, 1994). Previous research has found that risky behaviour is affected by cognitions and feelings (Hardman, 2009), attitude to risk and personality traits such as sensation seeking and extraversion (Killianova, 2013). The social amplification of risk framework (SARF; Pidgeon, Kasperson, & Slovic, 2003) provides an integrated theoretical system accounting for the many processes involved in risk perception and behaviour, and maintains that risks and risk events themselves lack relevance until they are observed and communicated to others. As part of the communication process, psychological, social, cultural

and organisational factors interact to amplify and/or attenuate individual's perceptions of risk.

There are two ways in which the SARF is relevant to studies of risk-related material on social media. Firstly, social media can act as a conduit in the communication process, amplifying or attenuating social media users' perceptions of risk. The amplification of perception of risk through social media has been observed in the public perception of risk of harm from the HPV vaccine (Luisi, 2017), and the risks associated with the Ebola and Zika viruses (Strekalova, 2017; Wirz, Xenos, Brossard, Scheufele, Chung, & Massarani, 2018). Secondly, the risks of using social media can be amplified through the communication process, which can involve sources such as personal and community experiences, news media reports, and input from opinion leaders and government agencies. The social amplification of risk has been observed to contribute to a sense of "media panic" where social media is considered as having an almost entirely negative impact on individuals and society (Livingstone, 2008). It has been noted that objectively small risks which occur in an unfamiliar system (such as social media) may elicit significant public concern due to the sense that the risk is not well understood or controllable (Kasperson et al., 1988). Conducting and disseminating research on risk and social media may help to ameliorate public concern through increasing a sense that the risks are understandable and therefore manageable.

1.4.1. Gender Differences In Risk-Taking

Gender differences have been found in experimental and observational studies across decision making trials and a range of risk behaviours, including drinking alcohol, drug use, offline sexual risk-taking and suicidal behaviour, with males reporting higher levels of all risk behaviours and greater likelihood of engaging in risk behaviours even when the potential gains are low (Bloor, 2006; Castro, 2015; Dohmen, Falk, Huffman, Sunde, Schupp, & Wagner, 2011; Hawton, 2000; Lauriola & Levin, 2001; Nolen-Hoeksma, 2004). Male participants have also been found to be more likely to

engage in some online risky behaviours such as disclosing personal information online and posting risky photos (Notten & Nikken, 2016; Peluchette & Karl, 2008; Sasson & Mesch, 2014). Research to date on the prevalence of gender differences in sending sexually explicit text messages and photos has been mixed. Some studies have reported women send sexts more often than men (e.g. Englander, 2012; Wysocki & Childers, 2011), others report that men send sexts more often (e.g. Dir, Coskunpinar, Steiner, & Cyders, 2013; Gordon-Messer, Bauermeister, Grodzinski, & Zimmerman, 2013), and a slight majority of studies reporting no gender differences in sexting (e.g. Benotsch, Snipes, Martin, & Bull, 2013; Dir, Cyders, & Koskupinar, 2013; Drouin & Landgraff, 2012; Weisskirch & Delevi, 2016; see Klettke, Halford, & Mellor, 2014, for meta-analysis).

Male participants have been found to score higher on risk propensity, a general measure of risk-taking tendency, by a small but statistically significant margin (Meertens & Lion, 2008). A meta-analysis of gender differences in general risk-taking has shown that although gender difference findings are reasonably robust, the magnitude of the effect is small to medium, the differences reduce with age and also appear to be getting smaller over time (Byrnes, Miller, & Schafer, 1999).

Many reasons for the observed gender differences in risk-taking have been hypothesised, including higher levels of sensation seeking in men (Zuckerman, 1990), evolutionary forces leading to psychological differences between male and female behaviour (Wilson & Daly, 1985), boys and girls being socialised differently (Arnett & Jensen, 1994) or the greater social acceptability of risk behaviour in men (Kelling, Zirkes & Myerowitz, 1976).

1.4.2. Age Differences In Risk-Taking

The majority of research on age differences in risk-taking has investigated children, adolescents or young adults, yet a small number of studies have investigated changes in risk-taking behaviour beyond young adulthood.

While the emphasis is often on risk-taking in adolescence (e.g. Reyna & Rivers, 2008; Steinberg 2005; 2007; 2008) a review of census and large-scale datasets has found that many risk behaviours peak in young adulthood (Park, Mulye, Adams, Brindis, & Irwin, 2006).

Cross-sectional and longitudinal studies have found that although individual risk-taking propensity is moderately stable across the adult lifespan, it tends to peak in adolescence or early adulthood and then decline over time (Bonem, Ellsworth, & Gonzalez, 2015; Dohmen, Falk, Huffman, Sunde, Schupp, & Wagner, 2011; Josef, Richter, Samanez-Larkin, Wagner, Hertwig, & Mata, 2016). Slight differences in the magnitude but not direction of these trends have been observed across domains as varied as career, social and health-related risk (e.g. Rolison, Hanoch, Wood & Liu, 2013).

Research in the UK has found that younger people are currently more likely to engage in offline risk behaviour than older people, although young people's participation in risky behaviours such as drinking, drug use, suicide and smoking is declining (Cabinet Office, 2014). However, the same report hypothesises that new technology may be causing reconfiguration of pathways to risk, leading young people to engage in "emerging" risk behaviours such as online sexual behaviour and cyberbullying rather than more traditional offline risk behaviours. This hypothesis appears to be supported by findings that total adolescent risk-taking has not risen since the advent of social media (Madge & Barker, 2007; Maughan, Collishaw, Meltzer, & Goodman, 2008), and emerging evidence that online and offline risk behaviours can be explained by a general propensity to take risks (Görzig, 2016).

Previous research has found that young people are more likely than older people to engage in online sexual activity (Cooper, Månsson, Daneback, Tikkanen, & Ross, 2003). The authors have hypothesised that younger people may integrate sexual online behaviour more easily into their lives than older people due to familiarity with the medium, and this may make them more likely to engage in the behaviours. However, further research is needed

to investigate the predictors and correlates of sexual online behaviour across the lifespan.

1.5. Social Media And Risk Behaviour

1.5.1. Social Media And Offline Risk Behaviour

Previous research has found frequent and prolonged social media use to be associated with risk behaviours such as drinking alcohol, using drugs and engaging in risky sexual behaviours (e.g. Gebremeskel, Sessoms, Krehnbrink, Haney, & Coyne-Beasley, 2014; Ohannessian, Vannucci, Flannery, & Khan, 2017; Sampasa-Kanyinga & Chaput, 2016). However, these associations do not seem to be found with moderate social media use (Orben & Przybylski, 2019), and the relationship between higher levels of social media use and increased risk behaviour is unclear.

The relationship between higher social media use and increased risk-taking may possibly be explained with reference to exposure to risk-related material on social media. Recent literature indicates that material relating to engagement in risky behaviour such as alcohol and drug use are common on social media (Meng, Kath, Li & Nguyen, 2017). Evidence suggests that viewing risk-taking behaviour on social media is associated with a wide range of offline risk-taking behaviour, such as alcohol misuse (Moreno, Briner, Williams, Walker, & Christakis, 2009), exposure to sexually transmitted diseases (Bobkowski, Brown, & Neffa, 2012), eating disorder behaviour (Borzekowski, Schenk, Wilson, & Peebles, 2010) and risky pranks and bullying (Branley & Covey, 2017).

1.5.1.1. Risky substance use behaviour: A review of the literature on social media and risk behaviour among university students found that 60-85% of students' Facebook profiles included alcohol related content, and up to 72% of Facebook posts featuring alcohol are approving in tone (Groth, Longo, &

Martin, 2017). Previous studies have found that self-created, peer-created and marketing company-generated alcohol content are all related to increased alcohol consumption among university students (Hoffman, Pinkleton, Weintraub Austin, & Reyes-Velázquez, 2014; Moreno, Cox, Young, & Haaland, 2015; Robertson, McKinney, Walker, & Coleman, 2017). A recent meta-analysis found a statistically significant relationship and moderate effect sizes for the relationships between engaging with alcohol-related social media content and higher levels of both alcohol consumption and alcohol related problems (Curtis, Lookatch, Ramo, McKay, Feinn, & Kranzler 2018).

The majority of studies investigating the relationship between alcohol related content on social media and participants' own behaviour has been cross-sectional, and so causal inferences cannot be drawn. However, one longitudinal study conducted with high school students found that students who perceived that their peers posted a high number of alcohol or partying-related pictures subsequently showed an increase in smoking and drinking alcohol (Huang et al. 2014). In this study, exposure to risk-related images was correlated with drinking alcohol and smoking, but the frequency of social media use was not. This suggests that it is exposure to risky social media content rather than social media use itself that is linked to increased odds of risky behaviour.

Compared to alcohol use, far less research has been conducted on the relationship between drug-related social media content and drug-taking behaviour, and results are more equivocal.

Drug-related content appears to be far less common on social media than alcohol-related content; for example, a review of university students' social media found that 10% of profiles contained drug-related content, whereas 99% of profiles referred to alcohol (van Hoof, Bekkers, & van Vuuren, 2014). This difference may be related to both drug-taking being less prevalent than alcohol use among university students and reluctance to post content due to the criminalisation of drug use in many jurisdictions. However, studies have

shown that despite their low prevalence, the majority of cannabis-related posts on social media are approving in tone or normalise cannabis use (Cavazos-Rehg, Krauss, Grucza, & Bierut, 2014; Krauss, Grucza, Bierut, & Cavazos-Rehg, 2015; Thompson, Rivara, & Whitehill, 2015).

One study found that while viewing content promoting alcohol use on social media was associated with participants' own alcohol use, there was no such association between cannabis content and use (Stoddard, Bauermeister, Gordon-Messer, Johns, & Zimmerman, 2012). This may be related to a difference in how alcohol and cannabis-related content is perceived. In a study of young adults' attitude to alcohol and drug-related content on social media, young people reported having a positive attitude toward alcohol-related content posted on social media, while cannabis-related posts were considered more negatively (Morgan, Snelson, & Elison-Bowers, 2010). However other studies have found that both alcohol and cannabis-related content on social media were associated with increased use of both substances (Cabrera-Nguyen, Cavazos-Rehg, Krauss, Bierut, & Moreno, 2016).

1.5.1.2. Risky sexual offline behaviour: There is evidence suggesting an association between viewing online risk content and risky sexual behaviour. One study of men who have sex with men found that engaging in anal sex was associated both with the frequency of viewing sexually explicit material and viewing a higher percentage of sexually explicit material featuring condomless anal sex (Whitfield, Rendina, Grov, & Parsons, 2018). A number of other studies found that mere frequency and quantity of sexually explicit material viewed was not associated with engaging in more condomless anal sex; however, viewing a higher percentage of material featuring condomless anal sex (as a total of sexually explicit material viewed) was associated with participants' reporting engaging in the same behaviour (Schrimshaw, Antebi-Gruszka, & Downing, 2016; Stein, Silvera, Hagerty, & Marmor, 2012; Rosser et al. 2013).

Research into the association between social media-based risk content and behaviour is less common. In a sample of university students, Young and Jordan (2013) found that viewing sexually suggestive photo content on social media was associated with self-assessed decreased likelihood of using condoms in a future sexual encounter, and increased likelihood of having sex with strangers. However, this study investigated willingness rather than actual behaviour, and the authors recommended future research investigating the link between social media content and actual risk behaviour. The only study published to date examining this relationship reported a borderline but not statistically significant relationship between viewing risk content on social media and participants' engagement in unprotected sex or sex with a stranger (Branley & Covey, 2017).

1.5.2. Social Media And Online Risk Behaviour

Nine main risky online behaviours have been identified by Ybarra, Mitchell, Finkelhor, & Wolak (2007):

- posting personal information online
- sending personal information to someone only known online
- making rude or nasty comments to others
- harassing or embarrassing others
- meeting someone after initial online contact
- having social media connections to people not personally known
- deliberately accessing online pornography
- talking about sex with people only known online
- downloading from file-sharing sites

Each of these behaviours was associated with negative consequences for the risk-taker (e.g. harassment or unwanted sexual solicitation), indicating that despite several of these behaviours being normative they still carried risk of harm.

1.5.2.1. Risky sexual online behaviour: Risky sexual online behaviour has been defined as “the exchange of intimate, implicitly or explicitly sexual information or material with someone exclusively known online”

(Baumgartner, Valkenburg, & Peter, 2010). Risky sexual online behaviour may lead to unwanted sexual communication and harassment from others, as well as non-consensual sharing of intimate details and reputational risk (Wolak, Finkelhor, & Mitchell, 2008, Wolak, Finkelhor, Mitchell, & Ybarra, 2008).

Sexting, a term combining the words “sex” and “texting”, is the most common form of risky sexual online behaviour. Sexting can be defined as sharing texts, images or videos of a sexually explicit nature through the internet or mobile phone technology (Van Ouytsel, Walrave, Ponnet, & Temple, 2019). Estimates of sexting prevalence vary widely depending on the definition used. Broad definitions of sexting in past studies have led to a large variance in estimates of sexting prevalence, from .9% to 60% (Barrense-Dias, Berchtold, Suris, & Akre, 2017). Recent studies have found sexting rates to be in the 40%-60% range for young adults (Van Ouytsel, Walrave, Ponnet, & Temple, 2019), but studies on adults over 24 years of age are rare, despite sexting being more common in adults than adolescents (Courtice & Shaughnessy, 2017; Klettke, Hallford, & Mellor, 2014).

To date, most of the research on sexting has focused on adolescent participants (for meta-analysis and review, see Madigan, Ly, Rash, Van Ouytsel, & Temple, 2018; Van Ouytsel, Walrave, Ponnet, & Temple, 2019). Within adolescent sexting research, the majority of studies have positioned sexting as an inherently problematic behaviour (Kosenko, Luurs, & Binder, 2017). In a review of 50 studies of sexting, Döring (2014) found that 66% framed sexting as unhealthy and deviant. Although the evidence suggests that sexting, like many behaviours, carries risks, consensual sexting can also be a vehicle for sexual self-expression and a healthy part of a person’s sexual repertoire (Döring, 2014). It has been suggested that sexting may prevent more risky offline sexual behaviours that may result in pregnancy or disease (Lippman & Campbell, 2014).

Research on sexting has tended to focus on its prevalence and the link between sexting and offline sexual risk behaviours. A meta-analytic and

critical review of the research found that sexting and offline sexual behaviour commonly co-occur, and there was a relatively weak but present correlation between sexting and risky sexual offline behaviour (Kosenko, Luurs, & Binder, 2017). A recent study of sexting in an adult sample found that online sexual activities and sexting in particular were perceived by sexters as positive behaviours, and the benefits were believed to outweigh the risks (Döring & Mohseni, 2019).

Little research has been conducted on the relationship between sexting behaviour and exposure to sexting content on social media, although research has found sexting behaviour to be associated with general media exposure. Van Ouytsel, Ponnet, and Walrave (2014) found that viewing pornography was linked to sexting behaviour for both male and female adolescents, and viewing music videos was linked to requesting and receiving sext messages for male adolescents.

The only study to date investigating the relationship between sexting and exposure to sexting content on social media found that exposure to sexual images of others on social media was not associated with a greater willingness to sext for adolescents or young adults (van Oosten & Vandebosch, 2017). However, this study investigated behavioural willingness rather than actual sexting behaviour.

1.6. Social Norms

Social learning theory posits that people (especially children) can learn from others through observation, imitation and modelling (Bandura, 1986; Bandura & Walters, 1977). The action of observing the behaviour of others contributes to the individual's impression of what behaviour is normative and what constitutes a social norm (Rimal & Real, 2005). Social norms can be defined as "rules and standards that are understood by members of a group, and that guide or constrain social behaviours without the force of law" (Cialdini and Trost, 1998, p. 152). The importance of social norms in

predicting human behaviour has been recognised in theories such as the Theory of Reasoned Action (Fishbein, 1979), the Theory of Planned Behaviour (Ajzen, 1985), the Prototype Willingness Model (Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008), Social Cognitive Theory (Bandura, 1986) and the Social Norms Approach (Perkins & Berkowitz, 1986). Across these theories, it is perceived rather than actual social norms about how others think and behave that are associated with individual behaviour (Berkowitz, 2005; 2011). Previous research has found that attending events where others drink alcohol is associated with perceiving drinking alcohol as being more popular (Rui & Stefanone, 2017), and university students are more likely to engage in risky drug and alcohol use if they perceive such behaviour as a social norm (Perkins, 2007; Perkins & Craig, 2006; Testa, Kearns-Bodkin, & Lingston, 2009).

Social norms have been associated with conformity in individuals acting on social media. Viewing prejudiced or aggressive comments on a blog is associated with subsequently posting more aggressive or prejudiced comments, while viewing thoughtful comments has been linked to then posting more thoughtfully (Hsueh, Yogeewaran & Malinen, 2015; Rösner & Krämer, 2016; Sukumaran, Vezich, McHugh, & Nass, 2011).

The observation of a risk behaviour on social media may have a similar effect to observing it in-person. An experimental study on university students by Fournier, Hall, Ricke, and Storey (2013) found that university students who viewed alcohol-related content on a fictitious Facebook profile estimated higher college drinking norms than students who did not. Similarly, adolescents have reported interpreting displayed alcohol references on social media as representing actual alcohol use and increasing their willingness to drink alcohol (Litt & Stock, 2011; Moreno, Briner, Williams, Walker, & Christakis, 2009). Whereas previously the behaviour of others was primarily discerned through direct observation, the advent of social media has meant that internet users can now construct an impression of social norms remotely and at any time, without being directly exposed to the

opposite environment. The accessibility of social media content and the frequency with which it is accessed may cause social media to have a disproportionate influence on social media users' impression of socially normative behaviour. One longitudinal study found that adolescents whose friends did not drink alcohol were more likely to be affected by social media images of alcohol-related content (Huang et al., 2014), and another found that exposure to alcohol-related content on social media was more predictive of university students own drinking behaviour than offline interpersonal influences (Boyle, LaBrie, Froidevaux, & Witkovic, 2016).

Cross-sectional studies of adolescent and university student samples have found that participants who viewed more alcohol-related content posted by peers on social media believed that drinking behaviour was more common, and this belief was associated with consuming more alcohol (Beullens & Vandebosch, 2016; Brunelle & Hopley, 2017). The link between peer behaviour on social media, perceived social norms and participants' own alcohol use has been supported by longitudinal studies on adolescents (Nesi, Rothenberg, Hussong, & Jackson, 2017) and university students (Boyle, LaBrie, Froidevaux, & Witkovic, 2016). In the latter study it was found that the relationship was stronger among male students, indicating that for this group in particular, exposure to alcohol content on social media was a much stronger predictor of drinking behaviour one year later.

Social norms acquired through social media also appear to have an impact on participants' own online risk behaviour. A study of adolescents found that peer norms around sexual self-presentation had a significant influence on whether or not they posted sexual photos of themselves online (Baumgartner, Sumter, Peter, & Valkenburg, 2015). Similarly, a longitudinal study of adolescents found that perceived peer norms was a significant predictor of participants' engagement in risky sexual online behaviour (Baumgartner, Valkenburg, & Peter, 2011)

1.7. Summary And Rationale For The Present Study

1.7.1. Summary of research literature

Thus far, many of the studies investigating the link between digital technology use and wellbeing have been beset by problems of being overly broad in scope, examining expansive concepts such as screen time, psychological wellbeing and online harm. This lack of conceptual clarity may be a contributor to the equivocal results of investigations of relationships between these variables.

Additionally, extant research on online content and social media has primarily focused on adolescents, and to a lesser degree young adult university students. This focus on such a narrow segment of the population raises questions about the generalisability of the findings to the wider population. This lack of information about the relationship between online content and harm to adults is a notable gap in the literature, as comprehensive studies of UK-based adults have found that 55% of respondents had encountered upsetting content on social media over the past year, and 45% of adults had reported experiencing online harm (Ofcom 2018a; 2018c).

Recent research has identified associations between viewing content promoting risk behaviours on social media and participants' own tendency to take risks, which may be explained with reference to social norms. However, in addition to the limited samples as described above, the majority of studies in this area have focused on specific social media platforms, most commonly Facebook (e.g. Frost and Rickwood, 2017; Moreno, Cox, Young, & Haaland, 2015; Young & Jordan, 2013). Recent research has found that the majority of social media users have accounts across multiple social media sites, and it is now far more common for university students to encounter material encouraging risky behaviour such as alcohol use on Instagram or Snapchat

rather than Facebook (Boyle, Earlie, LaBrie & Ballou, 2017). As the popularity and purposes of specific social media sites can change rapidly, recent studies have recommended investigating a range of behaviours across multiple platforms (Egan & Moreno, 2011; Young & Jordan, 2013).

1.7.2. Rationale for current study

The current study begins with a partial replication of an exploratory study of 18-24-year olds conducted by Branley & Covey (2017) investigating the relationship between exposure to content encouraging risky offline behaviour on social media and participants' own risk behaviour, controlling for gender, perceived peer behaviour and risk propensity. The study is then extended by applying the same analysis to two online behaviours, sending sexually explicit text messages and sending sexually explicit photos or videos of oneself.

Previous research has shown peer behaviour to be an important predictor of risk behaviour in adolescents and young adults (e.g. Cruz, Emery, & Turkheimer, 2012; MacLean, Geier, Henry, & Wilson, 2013; Simons-Morton & Farhat, 2010; Trucco, Colder, & Wieczorek, 2011). Perceived peer behaviour, (defined as the number of friends that participants believe engage in the behaviour) is controlled for during the analysis to discern how much of the variance in risk behaviour can be attributed to social media exposure (the independent variable) independent of the influence of perceived peer behaviour.

Following Branley & Covey (2017), general tendency to take risks as measured by the Risk Propensity Scale will also be controlled for in the analysis. Including perceived peer behaviour and risk propensity in the model will help to clarify the strength of the relationship between social media exposure and participants' own behaviour, disentangling its effects from the effects of perceived peer behaviour and risk propensity. Due to previously observed gender differences in both social media use and risk taking (Egan

& Moreno, 2011; Hardman & Hardman, 2009; Ofcom 2018a; We Are Flint, 2018) gender is included in the model as a potential moderating variable. Previous research also indicates that male and female participants tend to interact differently with social media (Moreno, Briner, Williams, Walker, & Christakis, 2009), and so a gender by social media exposure term was included in the model.

1.7.2.1. Replication of Branley and Covey (2017): Replication evidence has been called the gold standard by which scientific claims are evaluated (Bonett, 2012), but such studies are rare in psychology, comprising approximately 1% of articles published in high-impact journals (Makel, Plucker, & Hegarty, 2012). It has been argued that replication and reproducibility are particularly important in research on screen time and other controversial subjects where there are policy implications and high levels of political and public interest exist (Chambers, 2018).

Although often inadvertent, subjective researcher decisions about data analysis options in online harm research have been found to affect results, potentially inflating effect sizes and contributing to false positive findings (Orben & Przybylski, 2019). Direct replication of a previous study reduces researcher degrees of freedom, making these methodological and analytical errors less likely (Wicherts, Veldkamp, Augusteijn, Bakker, Van Aert, & Van Assen, 2016).

The study by Branley and Covey (2017) investigated the relationship between social media content and the following eight risky offline behaviours:

- drug use
- drinking alcohol to excess
- disordered eating behaviour
- self-harm
- violence to others

- unprotected sex
- sex with a stranger
- dangerous pranks
- bullying

For the purposes of the current study, four of these behaviours were selected for investigation: drug use, drinking alcohol to excess, unprotected sex and sex with a stranger. The decision to investigate four rather than eight behaviours was made in an attempt to keep the survey from becoming overly lengthy, considering that an additional two behaviours were investigated as part of the extension. These specific behaviours were selected as they are relatively common in the general adult population and content encouraging these behaviours are less likely to be explicitly prohibited by the community standards of social media sites (e.g. Facebook, 2019; Twitter, 2019). In the original study (Branley & Covey, 2017), a statistically significant relationship was found between participants' risky behaviour and social media exposure to risk-promoting content for the behaviours of drug use and drinking alcohol to excess. The authors described the relationship between participants' risky behaviour and social media exposure to risk-promoting content as "borderline" significant for the behaviours of having sex with a stranger and unprotected sex ($p < .01$).

1.7.2.2. Extension of Branley and Covey (2017): The behaviours selected to extend the study, sending sexually explicit text messages and sending sexually explicit photos or videos of oneself, were chosen as they are relatively common in the general adult population and are recognised to carry some risk (Klettke, Hallford & Mellor, 2014). Research to date on sexting in adults has focused on the prevalence of sexting behaviours (e.g. Englander & McCoy, 2018; Gordon-Messer, Bauermeister, Grodzinski, & Zimmerman, 2013) and recent reviews have noted the lack of research into predictors, risk and protective factors and moderators of the behaviour (Klettke, Hallford & Mellor, 2014; Van Ouytsel, Walrave, Ponnet, & Temple, 2019). Sending text and image/video-based sexts have been considered as

separate behaviours for this study, as text and images are different forms of communication and may be differentially related to behaviour (Groth, Longo, & Martin, 2017). Precision in definition is also important to aid comparison with previous research, as overly broad definitions of sexting in past studies have led to the aforementioned large variance in estimates of sexting prevalence (Barrense-Dias, Berchtold, Suris, & Akre, 2017).

The final part of the study examines the relationship between social media exposure and participants' own risk behaviour in a sample of adults aged 18-84, investigating if age and/or gender act as moderators in the relationship. The dearth of research on risk behaviours in this population has been previously noted, particularly in the area of sexting (Klettke, Hallford, & Mellor, 2014; Van Ouytsel, Walrave, Ponnet, & Temple, 2019). As this part of the study is exploratory in nature and not driven by established theory, no additional explanatory variables are included. There is also experimental evidence that perceived peer behaviour may be less valid as a predictor of behaviour in adults aged 24 and above (Gardner & Steinberg, 2005) and so would be unsuitable to include as a predictor for this population. As previous research has identified age differences in social media use across age cohorts (Ofcom, 2018a), an age by social media exposure interaction term was included in the model.

An additional effect of including only demographic variables, social media exposure and risk behaviour in the model without controlling for other variables is that the results provide an estimated magnitude of the "real world" association between social media exposure and participants' behaviour for specific age and gender groups.

1.8. Research Questions

Research Question 1a: In young people aged 18-24, is exposure to social media content encouraging an offline risk behaviour associated with users'

own engagement in that behaviour, independent of what can be accounted for by perceived peer behaviour and risk propensity?

Research Question 1b: Is the magnitude of the association different between the genders?

Research Question 2a: In young people aged 18-24, is exposure to social media content encouraging an online risk behaviour associated with users' own engagement in that behaviour, independent of what can be accounted for by perceived peer behaviour and risk propensity?

Research Question 2b: Is the magnitude of the association different between the genders?

Research Question 3: Is the magnitude of the association between social media exposure and risk behaviour different across age groups across the adult lifespan?

2. METHODOLOGY

2.1. Overview

This chapter first describes the epistemological approach and ethical considerations of this study. Information about the study design, procedure and research measures follows, and finally the data analysis strategy is presented.

2.2. Epistemology

This research takes a pragmatist epistemological position. Pragmatism as a philosophical perspective maintains that “what is true of beliefs, right of actions and worthwhile in appraisal is what works out most effectively in practice” (Rescher, 2005, p. 83). Pragmatism takes the position that the “truth” of a concept is less important than its utility, practical consequences and problem-solving power (Dewey, 2007). Pragmatism does not take a single position on truth or ontology and is pluralist in its acceptance of different forms of knowledge – social constructionist and realist epistemologies may make assertions about truth, but a pragmatist would measure these claims against their utility. Qualitative and quantitative methodologies and data are of equal worth within a pragmatist framework.

From a pragmatic perspective, the practical consequences of the research define the questions asked and so define the methods (Jones-Chesters, 2007). The goal of this research is to clarify the some of the associations between social media and online and offline risk behaviours, and the results can then be used to develop practical strategies to promote wellbeing and help people make more informed choices. To investigate these mechanisms, this study draws upon concepts such as risk propensity, observational learning and peer pressure. These concepts may or may not have an external reality, but they may be useful as tools to aid in understanding the observed behaviour. A quantitative methodology was chosen for this study

as this methodology can be more easily used to understand the relationships between variables using data gathered from a large sample of participants.

2.3. Ethics

2.3.1. Ethical Approval

This study was designed in accordance with the British Psychological Society's (BPS) Code of Human Research Ethics (2014) and the BPS Ethics Guidelines for Internet Mediated Research (2017) and received full ethical approval from the University of East London School of Psychology Research Ethics Committee (Appendix A). The minor amendments requested by the Research Ethics Committee were completed before recruitment commenced. As the study recruited from a general rather than a clinical population no additional ethical approval was required.

2.3.2. Informed Consent

Prior to completing the questionnaires, potential participants were provided with a downloadable information sheet and consent form which outlined key information about the study and detailed the risks and benefits of taking part (Appendix B). It was not possible to proceed to the questionnaire without ticking a box to provide consent (Appendix C). Participants were made aware that they were free to withdraw their data up until the point of data analysis. No deception was involved in this study. Participants were encouraged to make contact if they had any questions about the research and were provided with the contact details of the principal researcher, the Director of Studies supervising the research, and the Chair of the School of Psychology Research Ethics Committee.

2.3.3. Confidentiality And Data Protection

All responses were collected anonymously through the Qualtrics survey platform and were held on EU servers in accordance with domestic and EU data protection legislation. Participants were asked to generate and take note of a four- to six-character alphanumeric identifier after completing the consent form and before beginning the questionnaire. If participants chose to

withdraw their responses from the dataset, they could email the researcher with this alphanumeric identifier, enabling her to identify and withdraw the data related to that individual.

Once the study questionnaire had been completed, participants who chose to enter the prize draw for Amazon vouchers were directed to a separate questionnaire where they could enter their email address. Questionnaire and participant contact information were stored in separate files and it was not possible to match these data. Participant responses were stored on a password protected computer that was accessible only to the researcher and were scheduled for deletion following the completion of data analysis.

2.3.4. Potential Distress And Support

As the questionnaire included questions about participants' own recent risky behaviour, life satisfaction and sensitive demographic information, it was possible that participants might feel distressed following completion. Contact details for the Samaritans charity were provided in the end of survey message (Appendix D) and participants were invited to contact the researcher if they would like to be directed to other organisations that could provide assistance.

2.4. Design

In accordance with the epistemology and research questions, a cross-sectional quantitative design was used, with data collected from each user at a single time point through an online questionnaire hosted by the Qualtrics survey platform. As this is a relatively new area of research, validated questionnaires on social media use and the specific risk behaviours under investigation have not yet been devised. Previous studies have called for consistency in the use of self-report measures in social media research in the interest of developing a body of knowledge to help inform such a measure (e.g. Westgate, Neighbors, Heppner, Jahn, & Lindgren, 2014). Accordingly, the questionnaire used in this study is reproduced from Branley

(2015). After piloting, the questionnaire (Appendix E) was estimated to take approximately 8-12 minutes to complete.

For Research Questions One and Two (investigating the relationship between social media exposure and online and offline behaviour), the dependent variable was past engagement in the risk behaviour, and the independent variables were past exposure to risk content on social media, perceived past behaviour of peers, gender and score on the Risk Propensity Scale (Meertens & Lion, 2008). For Research Question Three (investigating age and the relationship between social media exposure and behaviour), the dependent variable was unchanged and the independent variables were past exposure to risk content on social media, age category and gender.

The specific risk behaviours considered were illegal drug use, drinking alcohol to excess, having sex with a stranger, unprotected sex, sending sexually explicit text messages and sending sexually explicit photos or videos of oneself.

2.5. Measures and Scoring

2.5.1. Screening Questions

Participants were first asked to confirm that they were over 18 years of age and that they had used social media within the previous three months. As per Branley (2015) and Kaplan and Haenlein (2010), the following definition of social media was given, with examples of some of the most commonly used social media platforms included (Villanti, Johnson, Ilakuvan, Jacobs, Graham & Rath, 2017).

“Social Media includes all of the following:

- Social Networking Sites, e.g. Facebook, Google+, LinkedIn
- Blogging and Microblogging platforms, e.g. Twitter, Tumblr,
- WordPress, LiveJournal
- Photo and video-sharing platforms, e.g. Snapchat, Instagram,

- Pinterest, YouTube
- Online communities/forums, e.g. Reddit, Slashdot

For the purpose of this research the following sites/applications are not included:

- Email
- Chat rooms (e.g. Google Hangouts, Chatroulette)
- Instant messaging (e.g. Skype, WhatsApp, Viber, Kik, Messenger)
- Online games and virtual worlds (e.g. Fortnite, Minecraft, SecondLife, World of Warcraft)

2.5.2. Demographics

Participants completed a demographic questionnaire requesting participants' age, gender, relationship status, country of birth and country of residence.

2.5.3. Social Media Exposure

Past exposure to risk content on social media was measured by asking the question "Whilst using Social Media over the past 12 months, how often have you come across material that encourages the following behaviours? This can include material that: is supportive of these behaviours, encourages and/or provides instruction on how to partake in these behaviours or simply portrays these behaviours in a positive light for example by portraying the behaviour as 'fun', 'enjoyable', 'cool', 'fashionable' etc." For this study, participants answered the question with reference to six risk behaviours, four offline and two online: illegal drug use; drinking alcohol to excess; sex with a stranger; unprotected sex; sending sexually explicit text messages; and sending sexually explicit photographs or videos of oneself. Participants answered on a Likert-type scale from 0 (never) to 4 (very frequently). Data were initially collected for the additional behaviours of online and offline gambling, but a preliminary inspection of the data indicated a very low incidence of these behaviours in the sample and complete separation of variables, precluding logistic regression analysis. These behaviours were therefore not included in the analysis.

2.5.4. Perceived Peer Behaviour

Perceptions of peers' past behaviour was measured by asking the question "To the best of your knowledge, have any of your friends engaged in the following behaviours over the past 12 months?" with reference to each of the aforementioned risk behaviours. Participants selected from the options "I am not aware of any of my friends who have done this", "I know of one friend who has done this" and "I know of more than one friend who has done this".

2.5.5. Risk Propensity Scale

The Risk Propensity Scale (Meertens & Lion, 2008) was used to measure participants' risk orientation, or tendency to make risky rather than safer choices. The Risk Propensity Scale has seven items, the first six of which are rated from 1 (totally disagree) to 9 (totally agree). On the seventh item participants place themselves along a 9-point scale from risk avoider to risk seeker. The Risk Propensity Scale has been shown to have good internal consistency with a Cronbach's α of 0.77 and adequate test-retest reliability ($r=.75$, $p<.001$; Meertens & Lion, 2008). The scale is reproduced in its entirety in Appendix E.

2.5.6. Participants' Own Past Risk Behaviour

Past risk behaviour (the dependent variable) was measured by asking the question "Over the past 12 months, how often have you engaged in the following behaviours?" with reference to each of the aforementioned risk behaviours. Participants answered on a Likert-type scale from 0 (never) to 4 (very frequently).

2.6. Participants

2.6.1. Inclusion And Exclusion Criteria

The target population for this study was adults who have used social media on at least one occasion within the past three months. Potential participants who were under the age of 18 or had not used social media within the past three months were excluded from the study. As the questionnaire was in

English and was posted exclusively on websites and social media within an English-language context, it was assumed that participants would be proficient in English.

2.6.2. Recruitment

Convenience and purposive sampling were used in this study. As the study investigated online risk behaviour and risk behaviour related to social media, participants accessed the study via an electronic link and the majority of participant recruitment took place online across a wide range of social media and websites. Participation was invited across the following sites:

- Reddit
- Twitter
- Facebook
- LinkedIn
- Instagram
- Craigslist
- Gumtree
- SurveyCircle
- Online university psychology noticeboard
- Physical university noticeboards
- Research-related mailing lists

Across all sites, the advertisement consisted of a brief description of the aims and nature of the study, the contact details of the researcher and the web address of the study on the Qualtrics platform. Study participation was anonymous and identifiable data was not collected on any participants. All participants were asked to generate and take note of an alphanumeric code of four to six characters at the beginning of the questionnaire, which they could later use to request to withdraw their data up to the point of data analysis.

Potential participants were offered the opportunity to enter a draw for one of four £25 Amazon vouchers as an incentive to take part. The value of this

incentive was considered appropriate recognition of participants' time and effort without being large enough to constitute coercion. No paid advertising was used, and no participants were paid or otherwise compensated for their involvement in the study. The questionnaire remained open for a three-month period from December 2018 to February 2019 inclusive. After the questionnaire had closed, the winners of the Amazon vouchers were chosen using a random number generator.

2.6.3. Sample

A total of 962 participants completed the questionnaire. Demographic information and descriptive statistics on the sample are presented in the Results chapter.

2.7. Procedure

Participants accessed the questionnaire via clicking a web address posted online, by typing in a web address or by using a QR code that had been included on a poster. After reading and downloading the information sheet, participants proceeded to the main questionnaire which took approximately 8-12 minutes to complete. Participants were presented with an end of survey message thanking them for their time, inviting them to complete another survey to enter the prize draw, and giving the contact details of the researcher and the Samaritans charity. Participants' responses were downloaded as an SPSS data file in March 2019 when recruitment had finished and were stored on a password-protected computer accessible only to the researcher.

2.8. Applications

Statistical analyses were completed using IBM Statistical Package for the Social Sciences (SPSS) Version 25 (IBM, 2017).

2.9. Data Analysis

2.9.1. Descriptive Statistics

Descriptive statistics were calculated for all demographic variables and for the variables of participants' own risk behaviour, social media exposure, perceived peer behaviour and Risk Propensity Scale score across each of the six behaviours.

2.9.2. Correlations

A range of bivariate correlations were performed to provide an initial overview of relationships between past behaviour and past exposure on social media across each of the six behaviours. Bivariate correlations were then calculated on the same variables with the sample split by age group. As the data were ordinal level, Spearman's rho (r_s) was determined to be the most appropriate measure of correlation. As Spearman's rank correlation coefficient is computationally identical to Pearson's product-moment coefficient, the required sample size was calculated using G*Power for Mac software to estimate the sample size for a Pearson correlation (version 3.1.9.3; Faul, Erdfelder, Buchner, & Lang, 2009). A minimum sample size of 84 was found to be necessary with parameters set at an alpha level of 0.05, a power of 0.80 and a medium effect size of 0.3 for a two-tailed test.

2.9.3. Binary Logistic Regression

A two-step binary logistic regression was conducted for each of the six behaviours across three research questions to test the associations between the dependent and predictor variables in each case, and to examine the contributions of individual predictors to each model. A power analysis for a binary logistic regression was conducted using G*Power for Mac, version 3.1.9.3 (Faul, Erdfelder, Buchner, & Lang, 2009), using the presence or absence of risk behaviour over the previous 12 months as the categorical dependent variable. As incidence for the six risk behaviours differ significantly across the population, ranging from 8.5% of adults reporting drug use (NHS Digital, 2018) to approximately 48.5% of adults reporting sending sexual photographs of themselves (Klettke, Hallford & Mellor, 2014), the mean 12-month incidence across all behaviours (25%) was used to

estimate an adequate sample size. A minimum sample size of 620 was found to be necessary with parameters set at an alpha level of 0.05, a power of 0.80 and a small effect size (odds ratio of 1.3) for a two tailed test.

3. RESULTS

3.1. Overview

This chapter details the sample characteristics and methods of data screening used in this study and is followed by the outcome of data analysis for each research question. Further details can be found in Appendix F.

Throughout this chapter the term “social media exposure” will be used to refer to exposure to content on social media that encourages a specific named risk behaviour.

3.2. Sample Characteristics

3.2.1. Missing And Excluded Data

By the end of the recruitment period data had been collected from 962 participants. As it was necessary to answer all questions in order to progress to the next page of the online questionnaire, there was no missing data for individual items.

Although 962 people began the survey, 124 people did not complete the survey in its entirety. Those who exited the survey before completion were assumed to have withdrawn their consent and so their data were excluded from this analysis.

As the study was open to adults only, participants were asked if they were over the age of 18 as part of the initial exclusion criteria. Those who responded in the negative were redirected to an exit page. However, in a more specific question about age, two people subsequently gave their age as under 18; their data have been excluded from the analysis as they did not meet eligibility criteria.

Due to an initial issue with survey logic, age data failed to be recorded from the first 146 respondents. Their data was not included in this analysis.

As just six of the 690 respondents identified their gender as non-binary, their responses have not been included in the analysis. Due to the size and heterogeneity of the group it would not be possible to make valid inferences about non-binary people based on this information. Their data were removed before the computation of descriptive statistics, correlations and logistic regression models, reducing the analysed sample size to 684.

The age, gender and country of origin demographic data for the 684 people whose data were analysed are listed in Tables 1 and 2.

Table 1

Participant Characteristics

Age	N	% of sample
18-24	271	39.6
25-34	233	34.1
35-44	119	17.4
45-54	43	6.3
55-64	12	1.8
65-74	5	<1
75-84	1	<1
85+	0	0
Gender	N	% of sample
Female	488	71.3
Male	196	28.7

Table 2

Country of Origin Characteristics

Country of origin	N	% of sample
United Kingdom	207	30
United States of America	183	26.8
Ireland	63	9.2
Canada	28	4.1
Australia	13	1.9
India	13	1.9
Germany	11	1.6
Netherlands	9	1.3
FYRO Macedonia	8	1.2
Poland	8	1.2
Italy	8	1.2
Mexico	7	1
Other (64 countries, each >1% of sample)	126	18.6

3.3. Data Distribution

As the data collected are of ordinal level, percentiles, frequencies, the median and the mode are the most appropriate measures to describe the data (Pett, 2016). Descriptive statistics for the sample are included in Tables 3 and 4 and Figures 1 and 2.

Table 3

Descriptive Statistics for Own Risk Behaviour

	Drug use	Excessive Alcohol	Sex with a stranger	Unprotected sex	Sexual texts	Sexual photos or videos
N	684	684	684	684	684	684
Median	1	2	1	1	1	1
Mode	1	1	1	1	1	1
Range	1–5	1–5	1–5	1–5	1–5	1–5
Percentiles 25	1	1	1	1	1	1
50	1	2	1	1	1	1
75	2	3	1	3	2	2

Note: Responses to question *Over the past 12 months, how often have you engaged in the following behaviours?* on a five-point Likert scale from 1 (Never) to 5 (Very Frequently).

Table 4

Descriptive Statistics for Social Media Exposure to Risk Behaviours

	Drug use	Excessive Alcohol	Sex with a stranger	Unprotected sex	Sexual texts	Sexual photos or videos
N	684	684	684	684	684	684
Median	2	3	2	1	2	1
Mode	1	4	1	1	1	1
Range	1–5	1–5	1–5	1–5	1–5	1–5
Percentiles						
25	1	2	1	1	1	1
50	2	3	2	1	2	1
75	3	4	3	2	3	3

Note: Responses to question *Whilst using Social Media over the past 12 months, how often have you come across material that encourages the following behaviours? This can include material that: is supportive of these behaviours, encourages and/or provides instruction on how to partake in these behaviours or simply portrays these behaviours in a positive light for example by portraying the behaviour as 'fun', 'enjoyable', 'cool', 'fashionable' etc.* on a five-point Likert scale from 1 (Never) to 5 (Very Frequently).

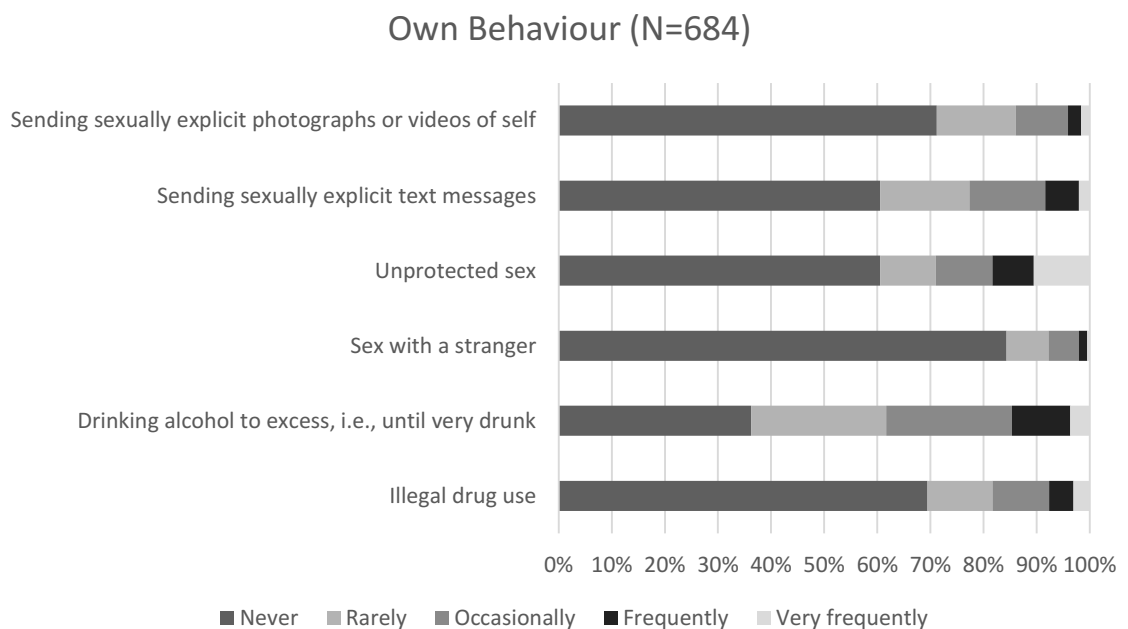


Figure 1. Frequency of reported own behaviour on six risk behaviours over the previous 12 months

Social Media Exposure (N=684)

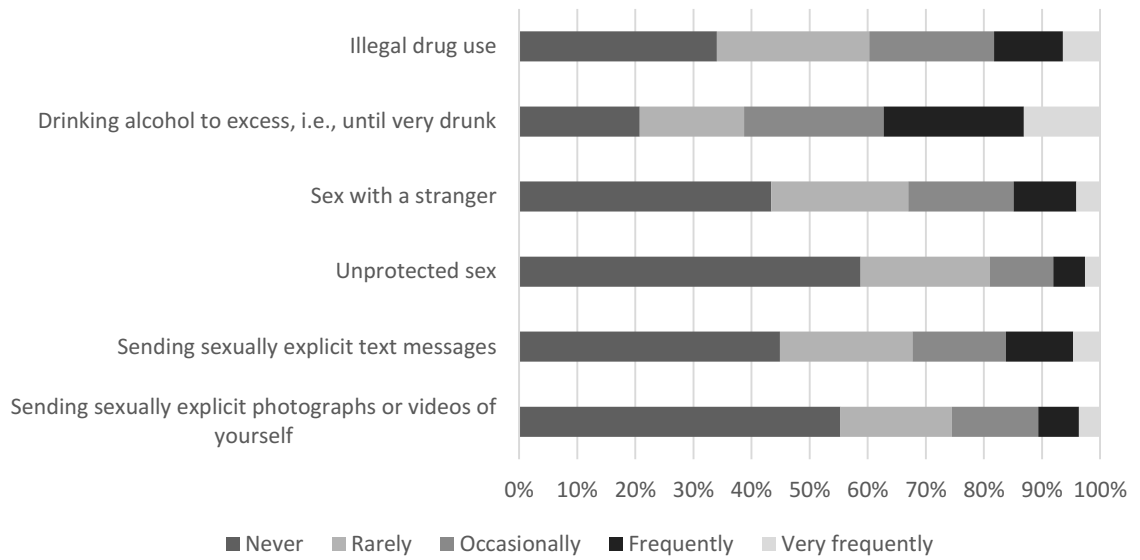


Figure 2. Frequency of reported exposure to social media encouraging the risk behaviour over the previous 12 months

Across all six behaviours, the median Likert scale score for participants' own engagement in the behaviours of drug use, sex with a stranger, unprotected sex, sending sexually explicit text messages and sending sexually explicit photos or videos of oneself was 1 (I have never done this within the past 12 months). The median score for drinking alcohol to excess was 2 (rarely).

In terms of participants' exposure to social media encouraging the behaviours, the median score for drinking alcohol to excess was highest at 3 (occasionally) and was lowest for social media content encouraging unprotected sex and sending sexually explicit photos or videos of oneself, with most participants responding that they had never encountered this material on social media. Participants reported median scores of 2 (rarely) for encountering material on social media promoting illegal drug use, sex with a stranger and sexually explicit text messages.

Reported 12-month incidence of participants' own behaviour differed across risk behaviours, from 15.6% of the sample reporting having had sex with a stranger within the past twelve months to 63.7% reporting having drunk alcohol to excess. Similarly, incidence of social media exposure varied

across risk behaviours, from 41.2% for unprotected sex to 79.2% for drinking to excess. Data for all six risk behaviours are detailed in Figure 3.

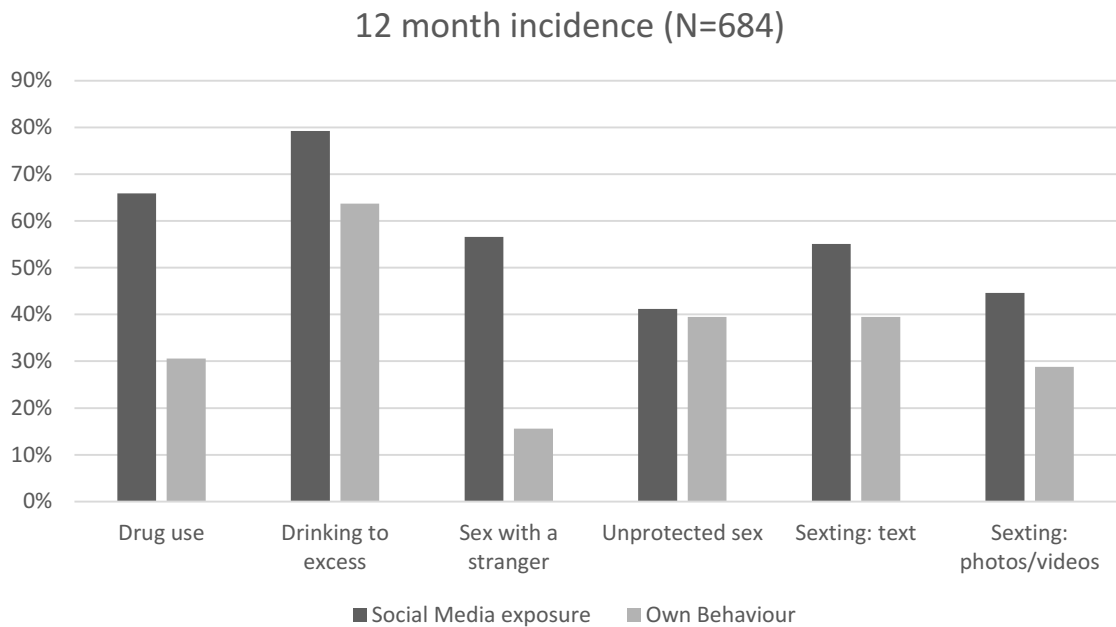


Figure 3. Percentage of sample who reported exposure to social media content and engaging in the risk behaviour over the past 12 months

Participants disclosed their age based on the eight age categories listed in Table 1. Due to low participant numbers in the older age categories, for the purposes of data analysis the categories 45-54, 55-64, 65-74 and 75-84 were combined. The reduced number of respondents in the older age categories is congruent with statistics about overall social media users – among internet using 25-34-year olds in the UK, the incidence of having a social media profile is over 96%, whereas incidence for internet users aged over 45 ranges from approximately 32% to 75% (Ofcom, 2018a). The behaviour with the highest median score across all age groups was drinking alcohol to excess (range 2-4, rarely to frequently) and low median scores of 1 (never) were reported across most age categories for both online sexual behaviours and both offline behaviours (Table 5). Median scores for all behaviours tended to be lower in older age groups.

Table 5

Descriptive Statistics for Own Risk Behaviour Split by Age

Age		Drug use	Excessive Alcohol	Sex with a stranger	Unprotected sex	Sexual texts	Sexual photos or videos
Age 18-24	N	271	271	271	271	271	271
	Median	1	2	1	1	1	1
	Mode	1	1	1	1	1	1
	Range	1-5	1-5	1-5	1-5	1-5	1-5
	Percentiles						
	25	1	1	1	1	1	1
50	1	2	1	1	1	1	
75	2	3	1	3	3	2	
Age 25-34	N	233	233	233	233	233	233
	Median	1	2	1	1	1	1
	Mode	1	2	1	1	1	1
	Range	1-5	1-5	1-4	1-5	1-5	1-5
	Percentiles						
	25	1	1	1	1	1	1
50	1	2	1	1	1	1	
75	2	3	1	3	2	2	
Age 35-44	N	119	119	119	119	119	119
	Median	1	2	1	1	1	1
	Mode	1	1	1	1	1	1
	Range	1-5	1-5	1-5	1-5	1-5	1-5
	Percentiles						
	25	1	1	1	1	1	1
50	1	1	1	1	1	1	
75	1	3	1	2	1	1	
Age 45-84	N	61	61	61	61	61	61
	Median	1	1	1	1	1	1
	Mode	1	1	1	1	1	1
	Range	1-5	1-5	1-3	1-5	1-4	1-3
	Percentiles						
	25	1	1	1	1	1	1
50	1	1	1	1	1	1	
75	1	1	1	1	1	1	

Note: Responses to question *Over the past 12 months, how often have you engaged in the following behaviours?* on a five-point Likert scale from 1 (Never) to 5 (Very Frequently).

Similarly, for social media exposure, median scores were highest for drinking alcohol to excess (range 2-4, rarely to frequently). Median scores for social media exposure tended to be higher than median scores for participants'

own behaviour, and social media exposure to all behaviours tended to be lower in older age groups (Table 6).

Table 6

Descriptive Statistics for Social Media Exposure to Risk Behaviours Split by Age

Age	Sex						
	Drug use	Excessive Alcohol	with stranger	Unprotected sex	Sexual texts	Sexual photos or videos	
Age 18-24	N	271	271	271	271	271	271
	Median	3	4	2	2	2	2
	Mode	2	4	1	1	1	1
	Range	1-5	1-5	1-5	1-5	1-5	1-5
	Percentiles						
	25	2	2	1	1	1	1
	50	3	4	2	2	2	2
	75	4	4	3	3	4	3
Age 25-34	N	233	233	233	233	233	233
	Median	2	3	2	1	2	1
	Mode	1	3	1	1	1	1
	Range	1-5	1-5	1-5	1-5	1-5	1-5
	Percentiles						
	25	1	2	1	1	1	1
	50	2	3	2	1	2	1
	75	3	4	3	2	3	3
Age 35-44	N	119	119	119	119	119	119
	Median	2	2	1	1	1	1
	Mode	1	1	1	1	1	1
	Range	1-5	1-5	1-5	1-4	1-5	1-4
	Percentiles						
	25	1	1	1	1	1	1
	50	2	2	1	1	1	1
	75	3	3	2	2	2	2
Age 45-84	N	61	61	61	61	61	61
	Median	1	2	1	1	1	1
	Mode	1	1	1	1	1	1
	Range	1-5	1-5	1-5	1-5	1-4	1-3
	Percentiles						
	25	1	1	1	1	1	1
	50	1	2	1	1	1	1
	75	2	3	2	2	2	1

Note: Responses to question Whilst using Social Media over the past 12 months, how often have you come across material that encourages the following behaviours? This can include material that: is supportive of these behaviours, encourages and/or provides instruction on

how to partake in these behaviours or simply portrays these behaviours in a positive light for example by portraying the behaviour as 'fun', 'enjoyable', 'cool', 'fashionable' etc. on a five-point Likert scale from 1 (Never) to 5 (Very Frequently).

Full frequency and percentage breakdown for the sample split by age group can be found in Figures 1-12 in Appendix F.

The reliability of the Risk Propensity Scale (RPS) for the sample was assessed using Cronbach's alpha (α) as a measure of internal consistency. The RPS demonstrated high internal consistency ($\alpha=.80$), indicating reliability of the scale (Field, 2018). Mean RPS scores for male and female participants aged 18-24 are displayed in Table 7.

Table 7

<i>Risk Propensity Score</i>				
Gender	N	Age	Mean	Std. Deviation
Male	85	18-24	4.35	1.36
Female	186	18-24	3.33	1.38

3.3.1. Assumptions For Analysis

Logistic regression analyses do not require normal distribution in the independent or dependent variables but do assume that continuous independent variables are linear with the logit of the dependent variable (Tabachnick & Fidell, 2013). The Box-Tidwell procedure (Box & Tidwell, 1962) was used to assess linearity of the one continuous independent variable, the Risk Propensity Scale, with the logit of the dependent variable across each of the six risk behaviours. In each case linearity with the logit was confirmed.

3.4. Outliers

Standardised residuals, DF Beta values, Cook's distance and leverage values were used to detect outliers and influential cases. As different ways of

handling outliers have been found to substantively alter research conclusions, outliers were considered carefully and not automatically eliminated (Aguinis, Gottfredson, & Joo, 2013). Exclusion of outliers can also cause artificial range restriction (McNamara, Aime, & Vaaler, 2005). Outliers and influential cases were considered on a case-by-case basis, and in line with the recommendations of Field (2018) were retained where they were considered to reflect genuine scores from the population. As a general rule, outliers were retained when Cook's distance statistics and DF Beta values indicated that they did not influence the regression model, as per Stevens (2002) and Howell (2010). The implications of the presence of outliers and the influence of outliers on each analysis and model is described where appropriate for each behaviour later in this chapter and in the Discussion chapter.

3.5. Multicollinearity

Data multicollinearity was initially assessed by visually inspecting a correlation matrix of the predictors for each model. All correlations were within acceptable limits (Tabachnick & Fidell, 2013).

Variance Inflation Factor (VIF) and Tolerance scores were inspected to determine the index and percentage of variance not attributable to independent variables (Midi, Sarkar, & Rana, 2010). Across all six behaviours and all logistic regression analyses, Tolerance values ranged from .857 to .995 and VIF values ranged from 1.005 to 1.197. These values fall well within the acceptable limits of Tolerance values of less than one (Bowerman, O'Connell, & Dickey, 1986) and VIF of less than 10 (Myers, 1990). Furthermore, the highest Condition Index score on collinearity diagnostics was 15.999, which is substantially lower than the suggested value of 30 indicating multicollinearity (Belsey, Kuh & Welsch, 1980).

3.6. Inferential Statistics

3.6.1. Research Question 1a And 1b: Social Media Exposure And Offline Risk Behaviour In 18-24-Year Olds

In young people aged 18-24, is exposure to social media content encouraging an offline risk behaviour associated with users' own engagement in that behaviour, independent of what can be accounted for by perceived peer behaviour and risk propensity?

Is the magnitude of the association different between the genders?

Participants aged 18-24 (N=271) were entered into the first analysis and Spearman's rank correlation coefficients (r_s) were calculated between social media exposure and participants' own behaviour for each risk (Table 8). For all four behaviours the correlations were highly statistically significant at the $p < .001$ level. High levels of statistical significance are to be expected with a large sample, and so the direction of the correlation and the effect size are more meaningful indicators of the relationships between the variables. In all cases, r_s was positive and ranged from .20 to .35.

Table 8

Bivariate correlations between social media exposure and past offline behaviour in 18-24-year-old participants (N=271)

Behaviour	Spearman's rho (r_s)
Illegal drug use	.33***
Drinking alcohol to excess	.35***
Sex with a stranger	.20***
Unprotected sex	.32***

Note: *** $p < .001$

The relationships between social media exposure and participants' own offline behaviour were investigated further using logistic regression. Binary logistic regression analyses were run for each of the four offline behaviours of drug use, drinking alcohol to excess, sex with a stranger and unprotected sex. Exposure to social media content encouraging the behaviour, gender, perceived peer behaviour and risk propensity and a gender by social media exposure interaction term were included in each model as predictors as per

the rationale in Section 1.7.2. The predictors were entered in two blocks, with gender by social media exposure as the only predictor in the second block, following Branley and Covey (2017).

3.6.1.1. Drug use: A statistically significant positive relationship was found between the participant's own drug use and social media exposure, risk propensity, and all levels of perceived peer behaviour (Table 9). Participants who had been exposed to social media encouraging drug use were found to have 9 times higher odds of engaging in drug use than participants who had not had social media exposure, holding constant other variables in the model. A significant gender difference in drug use behaviour was not found. Block 1 was found to be a good fit to the data as assessed by the Hosmer and Lemeshow test ($p=.453$). Block 1 was a significant improvement over the null model and accounted for 50.2% of the variance (Nagelkerke R^2 , $p<.001$). A significant interaction between social media exposure and gender was not found, and Block 2 did not significantly add to the model.

Table 9

Logistic regression analysis for drug use

		B	S.E.	Wald	Odds Ratio	95% C.I. for Odds Ratio
Block 1: Nagelkerke $R^2 = .502$ Block $\chi^2(5)$ = 124.05 $p<.001$	Exposure: Drug use	2.20	.63	12.27***	9.00	2.63-30.76
	Gender	-.17	.36	.23	.84	.42-1.71
	RPS	.71	.13	28.61***	2.03	1.57-2.63
	Peer behaviour			22.10***		
	Peers: 0 v 1	1.48	.65	5.24*	4.38	1.24-15.51
	Peers: 0 v 1+	2.49	.57	19.16***	12.07	3.96-36.82
	Constant	-6.87	1.02	45.78	.00	
Block 2: Nagelkerke $R^2 = .502$ Block $\chi^2(1)$ = .138 $p>.05$	Exposure: Drug use	2.44	.93	6.96**	11.48	1.87-70.40
	Gender	.25	1.18	.044	1.28	.13-12.90
	RPS	.71	.13	28.71***	2.04	1.57-2.64
	Peer behaviour			22.16***		
	Peers: 0 v 1	1.47	.65	5.20*	4.36	1.23-15.44
	Peers: 0 v 1+	2.50	.57	19.24***	12.19	3.99-37.25
	Exposure*Gender	-.46	1.22	.14	.63	.06-7.02
Constant	-7.10	1.21	34.18	.00		

Note: N=271; * $p<.05$, ** $p<.01$, *** $p<.001$
RPS=Risk Propensity Scale score

Standardised residuals, leverage values, DF Beta values and Cook's distance statistics were calculated to assess if individual cases may have had an inordinate influence on the regression model. Investigation of the standardised residuals indicated 12 cases (4.4%) outside the range of ± 2 ; 2 cases (<1%) outside ± 2.58 and 4 cases (1.5%) outside ± 3.29 . Leverage statistics were higher than expected and all other values were within acceptable limits (Cook's distance <1; all DF Betas <1). Despite the existence of outliers, low Cook's distance values for all cases indicate that no cases were exerting a strong influence on the regression model and so all cases were included.

3.6.1.2. Drinking alcohol to excess: For the behaviour of drinking alcohol to excess, a statistically significant positive relationship was found between the behaviour and social media exposure, risk propensity, and all levels of perceived peer behaviour (Table 10). Participants who had been exposed to social media encouraging drinking alcohol to excess were found to have 6.24 higher odds of having engaged in the behaviour than participants who had not had social media exposure, holding constant other variables in the model. A significant gender difference in drinking to excess was not found. Block 1 was found to be a good fit to the data as assessed by the Hosmer and Lemeshow test ($p = .592$). Block 1 was a significant improvement over the null model and accounted for 33.4% of the variance (Nagelkerke R^2 , $p < .001$). A significant interaction between social media exposure and gender was not found, and Block 2 did not significantly add to the model.

Table 10

Logistic regression analysis for drinking to excess

		B	S.E.	Wald	Odds Ratio	95% C.I. for Odds Ratio
Block 1:	Exposure: Alcohol	1.83	.49	14.08***	6.24	2.40-16.23
Nagelkerke R²	Gender	.56	.35	2.63	1.75	.89-3.44
=.334	RPS	.31	.12	6.73**	1.36	1.08-1.72
Block $\chi^2(5) =$	Peer behaviour			26.94***		
74.939	Peers: 0 v 1	1.30	.54	5.86*	3.66	1.28-10.48
p<.001	Peers: 0 v 1+	2.18	.43	25.35***	8.84	3.79-20.66
	Constant	-4.10	.79	27.26	.017	
Block 2:	Exposure: Alcohol	2.81	1.15	5.94*	16.59	1.73-158.84
Nagelkerke R²	Gender	1.72	1.25	1.93	5.71	.490-66.44
=.338	RPS	.32	.12	7.01**	1.38	1.09-1.74
Block $\chi^2(1) =$	Peer behaviour			27.28***		
1.134	Peers: 0 v 1	1.27	.54	5.64*	3.57	1.25-10.21
p>.05	Peers: 0 v 1+	2.19	.43	25.53***	8.95	3.82-20.93
	Exposure *Gender	-1.28	1.28	.99	.28	.023
	Constant	-5.06	1.30	15.14	.01	

Note: N=271; *p<.05, **p<.01, ***p<.001
RPS=Risk Propensity Scale score

Standardised residuals, leverage values, DF Beta values and Cook's distance statistics were calculated to assess if individual cases may have had an inordinate influence on the regression model. Investigation of the standardised residuals indicated 16 cases (5.9%) outside the range of ± 2 ; 7 cases (2.6%) outside ± 2.58 and 1 case (<1%) outside ± 3.29 . Leverage statistics were higher than expected and all other values were within acceptable limits (Cook's distance <1; all DF Betas <1). Despite the existence of outliers, low Cook's distance values for all cases indicate no cases were exerting a strong influence on the regression model and so all cases were included.

3.6.1.3. Sex with a stranger: For the behaviour of sex with a stranger, the association between social media exposure and participants' own risk behaviour was found to differ by gender (Table 11). Including the social media exposure by gender interaction term in the model found that gender, RPS score and perceived peer behaviour were significant predictors of the

behaviour, but social media exposure was not a significant predictor of own engagement in the behaviour for male participants. A one unit increase in RPS score was associated with 1.91 times greater odds of having had sex with a stranger, holding other variables constant. Knowing of one friend having had sex with a stranger within the past 12 months was not associated with a statistically significant increase in the behaviour over having none, but having more than one friend who had had sex with a stranger was associated with 3.99 times greater odds of engaging in the behaviour. The model which included the interaction term was found to be a significant improvement over the null model (Nagelkerke $R^2=.337$, $\chi^2(6)=63.951$, $p<.001$).

Table 11

Logistic regression analysis for sex with a stranger

		B	S.E.	Wald	Odds Ratio	95% C.I. for Odds Ratio
Block 1:	Exposure: Sex with a stranger	.52	.44	1.36	1.68	.70-3.99
Nagelkerke R^2 =.307	Gender	.02	.38	.00	1.03	.49-2.16
	RPS	.66	.14	23.35***	1.94	1.48-2.53
Block $\chi^2(5) = 57.535$	Peer behaviour			10.09**		
	Peers: 0 v 1	.26	.57	.20	1.29	.43-3.91
p<.001	Peers: 0 v 1+	1.30	.49	7.03**	3.65	1.40-9.52
	Constant	-5.22	.79	43.73***	.01	
Block 2:	Exposure: Sex with a stranger	-.61	.62	.97	.55	.16-1.83
Nagelkerke R^2 =.337	Gender	-1.75	.88	3.99*	.17	.03-.97
	RPS	.65	.14	22.31***	1.91	1.46-2.50
Block $\chi^2(1) = 6.416$	Peer behaviour			10.66**		
	Peers: 0 v 1	.31	.58	.29	1.36	.44-4.25
p<.05	Peers: 0 v 1+	1.38	.50	7.55**	3.99	1.49-10.70
	Exposure*Gender	2.28	.97	5.55*	9.76	1.47-64.93
	Constant	-4.44	.81	30.35	.012	

Note: As an Exposure*Gender interaction term is added in Block 2, the odds ratio for the Exposure: Sex with a stranger predictor in this block is for the baseline group only, i.e. male participants.

Note: $N=271$; * $p<.05$, ** $p<.01$, *** $p<.001$

RPS=Risk Propensity Scale score

For male participants, the association between social media exposure and own behaviour was not found to be statistically significant. For female participants, exposure to social media content encouraging sex with a

stranger was statistically significant and associated with 5.37 times higher odds of engaging in the behaviour (i.e. .55 multiplied by the interaction parameter, 9.76¹). However, the 95% confidence interval for the interaction term is wide (1.47 to 64.93), so the magnitude of the effect may range from moderate to very strong.

Standardised residuals, leverage values, DF Beta values and Cook's distance statistics were calculated to assess if individual cases may have had an inordinate influence on the regression model. Investigation of the standardised residuals indicated 11 cases (4%) outside the range of ± 2 ; 2 cases (<1%) outside ± 2.58 and 4 cases (1.5%) outside ± 3.29 . Leverage statistics were higher than expected and all other values were within acceptable limits (Cook's distance <1; all DF Betas <1). Despite the existence of outliers, low Cook's distance values for all cases indicate no cases were exerting a strong influence on the regression model and so all cases were included.

3.6.1.4. Unprotected sex: For the behaviour of unprotected sex, a statistically significant positive relationship was found between the behaviour and social media exposure, risk propensity, and all levels of perceived peer behaviour when the Block 1 predictors were included (Table 12). Participants who had been exposed to social media encouraging unprotected sex were found to have 2.18 higher odds of having engaged in the behaviour than participants who had not had social media exposure. A significant gender difference in unprotected sex was not found. Block 1 was found to be a good fit to the data as assessed by the Hosmer and Lemeshow test ($p=.190$). Block 1 was a significant improvement over the null model and accounted for 37% of the variance (Nagelkerke $R^2, p < .001$). A significant interaction between social media exposure and gender was not found, and Block 2 did not significantly add to the model.

¹ Odds ratios for the effect of the exposure amongst female participants are calculated by multiplying the odds ratio for the effect of the exposure in the baseline group (i.e. male participants) by the odds ratio for the interaction parameter (see Clayton & Hills, 2013, pp. 269; Kirkwood & Sterne, 2010, pp. 207).

Table 12

Logistic regression analysis for unprotected sex

		B	S.E.	Wald	Odds Ratio	95% C. I. for Odds Ratio
Block 1:	Exposure: Unprotected sex	.78	.31	6.72**	2.18	1.21-3.93
Nagelkerke	Gender	.14	.33	.18	1.15	.60-2.20
R² =.370	RPS	.39	.11	12.02***	1.48	1.19-1.85
Block $\chi^2(5) =$	Peer behaviour			30.70***		
87.484	Peers: 0 v 1	.95	.38	6.25*	2.58	1.23-5.42
p<.001	Peers: 0 v 1+	2.01	.37	30.19***	7.50	3.65-15.38
	Constant	-3.30	.61	29.65	.04	
Block 2:	Exposure: Unprotected sex	.03	.52	.00	1.03	.37-2.85
Nagelkerke	Gender	-.51	.49	1.07	.60	.23-1.57
R² =.381	RPS	.41	.12	12.53***	1.50	1.20-1.88
Block $\chi^2(1) =$	Peer behaviour			30.08***		
3.101	Peers: 0 v 1	.97	.38	6.48**	2.64	1.25-5.58
p>.05	Peers: 0 v 1+	2.01	.37	29.70***	7.46	3.62-15.37
	Exposure*Gender	1.11	.63	3.11	3.04	.88-10.50
	Constant	-2.92	.63	21.38	.05	

Note: N=271; *p<.05, **p<.01, ***p<.001
RPS=Risk Propensity Scale score

Standardised residuals, leverage values, DF Beta values and Cook's distance statistics were calculated to assess if individual cases may have had an inordinate influence on the regression model. Investigation of the standardised residuals indicated 19 cases (7%) outside the range of ± 2 ; 6 cases (2.2%) outside ± 2.58 and 2 cases (<1%) outside ± 3.29 . Leverage statistics were higher than expected and all other values were within acceptable limits (Cook's distance <1; all DF Betas <1). Despite the existence of outliers, low Cook's distance values for all cases indicate no cases were exerting a strong influence on the regression model, and so all cases were included.

3.6.1.5. Summary: For the behaviours of drug use, drinking to excess and unprotected sex, social media exposure was found to have a significant positive association with participant's own engagement in the behaviours

independent of that which can be accounted for by perceived peer behaviour and participants' own risk propensity. Neither gender nor the gender by social media exposure term were found to be significant predictors across these three behaviours. RPS score and perceived peer behaviour were independently found to be significant predictors of engagement in all three risk behaviours.

For one behaviour, sex with a stranger, no relationship was found between exposure to social media content encouraging the behaviour and participants' own engagement in the behaviour. RPS score was a significant predictor of engagement in sex with a stranger. Although perceived peer behaviour was found to be statistically significant, this was only for participants who reported having more than one friend who had previously had sex with a stranger. The relationship between exposure to social media content and the behaviour sex with a stranger was found to differ between the genders, but this should be interpreted with caution in the absence of a main effect of social media exposure.

A comparison of the results found by Branley and Covey (2017) and the results of this study are displayed in Table 13. Both studies found that across the majority of offline behaviours under consideration, the predictors social media exposure, risk propensity and perceived peer behaviour had a significant positive relationship with participants' own engagement in the behaviour. The gender by social media exposure interaction term was only significant for the behaviour sex with a stranger in the current study; it was not significant for any other behaviour across both studies. Measures of Nagelkerke's R^2 were similarly high across both studies.

This study found a significant relationship between gender and sex with a stranger, which is congruent with the results of the previous study. However, in contrast to the previous study, an association between gender and drug use was not found.

Table 13

A comparison of odds ratios from Branley and Covey (2017) and the current study (N=271)

	Drug use		Drinking to excess		Sex with a stranger		Unprotected sex	
	Branley & Covey (2017)	Replication (Model 1)	Branley & Covey (2017)	Replication (Model 1)	Branley & Covey (2017)	Replication (Model 2)	Branley & Covey (2017)	Replication (Model 1)
Social Media Exposure	1.64**	9.00***	3.03***	6.24***	1.25 [↑]	.55 (male) 5.37 (female)	1.28 [↑]	2.18**
Age	1.04	-	1.15*	-	1.00	-	1.02	-
Gender (male v female)	.07**	.84	.84	1.75	.61***	.17*	.82	1.15
RPS score	1.03**	2.03***	1.05***	1.36**	1.04**	1.91***	1.01	1.48***
Peers: 0 v 1	20.3***	4.38*	3.24**	3.66**	3.46**	1.36	9.56***	2.58*
Peers: 0 v 1+	30.2***	12.07***	18.8***	8.84***	3.72**	3.99**	8.78***	7.50***
Exposure*Gender	Not significant	Not significant	Not significant	Not significant	Not significant	9.76**	Not significant	Not significant
Nagelkerke R²	37.4%	50.2%	38.5%	33.4%	21.6%	33.7%	30.3%	37.0%

Notes: *p<.05, **p<.01, p***<.001. In Branley study only: [↑]p<.10

As per Branley and Covey (2017), odds ratios for the interaction term were included only if significant.

Branley & Covey (2017) included age as a predictor; granular age data was not collected for this study and so was not included in the model.

3.6.2. Research Question 2a And 2b: Social Media Exposure And Online Risk Behaviour In 18-24-Year Olds

In young people aged 18-24, is exposure to social media content encouraging an online risk behaviour associated with users' own engagement in that behaviour, independent of what can be accounted for by perceived peer behaviour and risk propensity?

Is the magnitude of the association different between the genders?

Spearman's rank correlation coefficients between each online risk behaviour and exposure to social media content encouraging the behaviour are displayed in Table 14. The correlations were highly statistically significant at the $p < .001$ level for both behaviours. For both behaviours, r_s was positive and ranged from .32 to .37.

Table 14

Bivariate correlations between social media exposure and past online behaviour in 18-24-year-old participants (N=271)

	Spearman's rho
Sexually explicit text messages	.32***
Sexually explicit photos or videos	.37***

*** $p < .001$

Following the same procedure as with offline behaviours, binary logistic regression analyses were run for the behaviours of sending sexually explicit text messages and sending sexually explicit photos or videos of oneself. Exposure to social media content encouraging the behaviour, gender, perceived peer behaviour and risk propensity were entered in the first block of predictors and a gender by social media exposure term was included as a second block.

3.6.2.1. Sending sexually explicit text messages: For the behaviour of sending sexually explicit text messages a statistically significant positive relationship was found between the behaviour and social media exposure, risk propensity, and all levels of perceived peer behaviour when the Block 1 predictors were included (Table

15). Participants who had been exposed to social media encouraging sending sexually explicit texts were found to have 3.40 higher odds of having engaged in the behaviour than participants who had not had social media exposure. A significant gender difference in the behaviour was not found. Block 1 was found to be a good fit to the data as assessed by the Hosmer and Lemeshow test ($p=.878$). Block 1 was a significant improvement over the null model and accounted for 23.7% of the variance (Nagelkerke R^2 , $p < .001$). A significant interaction between social media exposure and gender was not found, and Block 2 did not significantly add to the model.

Table 15

Logistic regression analysis for sending sexually explicit text messages

		B	S.E.	Wald	Odds Ratio	95% C. I. for Odds Ratio	
Block 1:	Exposure: Sext texts	1.22	.31	15.34***	3.40	1.84	6.26
Nagelkerke	Gender	.02	.31	.01	1.02	.56	1.87
$R^2 = .237$	RPS	.23	.10	5.06*	1.26	1.03	1.54
Block $\chi^2(5) =$	Peer behaviour			14.56***			
53.017	Peers: 0 v 1	.96	.34	8.03**	2.61	1.34	5.06
$p < .001$	Peers: 0 v 1+	1.17	.33	12.93***	3.24	1.71	6.14
	Constant	-2.51	.57	19.59	.08		
Block 2:	Exposure: Sext texts	.99	.53	3.50	2.69	.95	7.60
Nagelkerke	Gender	-.24	.57	.17	.79	.26	2.43
$R^2 = .238$	RPS	.23	.10	5.07*	1.26	1.03	1.54
Block $\chi^2(1) =$	Peer behaviour			13.88***			
.288	Peers: 0 v 1	.94	.34	7.71**	2.57	1.32	4.99
$p > .05$	Peers: 0 v 1+	1.15	.33	12.35***	3.17	1.67	6.04
	Exposure*Gender	.35	.66	.29	1.43	.39	5.17
	Constant	-2.32	.65	12.61	.10		

Note: N=271; * $p < .05$, ** $p < .01$, *** $p < .001$

RPS=Risk Propensity Scale score

Standardised residuals, leverage values, DF Beta values and Cook's distance statistics were calculated to assess if individual cases may have had an inordinate influence on the regression model. Investigation of the standardised residuals indicated 2 cases (<1%) outside the range of ± 2.58 , which is within acceptable limits. Leverage statistics were slightly higher than expected and all other values were within acceptable limits (Cook's distance <1; all DF Betas <1). Despite the existence

of outliers, low Cook's distance values for all cases indicate no cases were exerting a strong influence on the regression model, and so all cases were included.

3.6.2.2. Sending sexually explicit photos or videos of oneself: For the behaviour of sending sexually explicit photos or videos of oneself a statistically significant positive relationship was found between the behaviour and social media exposure and risk propensity when the Block 1 predictors were included (Table 16). Having one friend that one knew of as having sent sexual photos or videos of themselves within the past 12 months was not associated with an increase in the behaviour over having none, but having more than one friend who had engaged with the behaviour was associated with having almost four times higher odds of engaging in the behaviour. Participants who had been exposed to social media encouraging sending sexually explicit photos or videos were found to have 4.156 higher odds of having engaged in the behaviour than participants who had not had social media exposure. A significant gender difference in the behaviour was not found. Block 1 was found to be a good fit to the data as assessed by the Hosmer and Lemeshow test ($p=.520$). Block 1 was a significant improvement over the null model and accounted for 28.3% of the variance (Nagelkerke $R^2, p < .001$). A significant interaction between social media exposure and gender was not found, and Block 2 did not significantly add to the model.

Table 16

Logistic regression analysis for sending sexually explicit photos or videos of oneself

		B	S.E.	Wald	Sig.	Odds Ratio	95% C. I. for Odds Ratio
Block 1:	Exposure: Exposure: Sext photos or videos	1.43	.31	21.42	.000	4.16	2.27-7.60
Nagelkerke							
$R^2 = .283$	Gender	.11	.32	.13	.721	1.12	.60-2.09
Block $\chi^2(5) = 63.763$	RPS	.23	.11	4.96	.026	1.26	1.03-1.55
p<.001	Peer behaviour			16.86	.000		
	Peers: 0 v 1	.33	.36	.86	.353	1.39	.69-2.80
	Peers: 0 v 1+	1.33	.34	15.71	.000	3.79	1.96-7.31
	Constant	-2.74	.57	23.34	.000	.07	
Block 2:	Exposure: Exposure: Sext photos or videos	1.70	.54	9.88	.002	5.48	1.90-15.85
Nagelkerke							
$R^2 = .284$	Gender	.39	.55	.51	.475	1.48	.51-4.32
Block $\chi^2(1) = .404$	RPS	.23	.11	4.73	.030	1.26	1.02-1.54
p>.05	Peer behaviour			17.15	.000		
	Peers: 0 v 1	.35	.36	.98	.323	1.43	.71-2.88
	Peers: 0 v 1+	1.37	.34	16.02	.000	3.93	2.01-7.69
	Exposure by Gender	-.42	.66	.40	.528	.66	.18-2.41
	Constant	-2.92	.65	20.45	.000	.05	

Note: N=271; *p<.05, **p<.01, ***p<.001
RPS=Risk Propensity Scale score

Standardised residuals, leverage values, DF Beta values and Cook's distance statistics were calculated to assess if individual cases may have had an inordinate influence on the regression model. Investigation of the standardised residuals indicated 13 cases (4.8%) outside the range of ± 2 and 7 cases (2.6%) outside ± 2.58 . Leverage statistics were higher than expected and all other values were within acceptable limits (Cook's distance <1; all DF Betas <1). Despite the existence of outliers, low Cook's distance values for all cases indicate no cases were exerting a strong influence on the regression model, and so all cases were included.

3.6.2.3. Summary: Across both online risk behaviours, social media exposure and risk propensity were found to have a significant relationship with participants' own risk behaviour (Table 17). Neither gender nor the gender by social media interaction

term were found to be statistically significant. In both behaviours, having more than one friend whom one knew had engaged in the risk behaviour was associated with participants' own engagement in the risk behaviours.

Table 17

Odds ratios for online risk behaviours

	Sending sexually explicit texts (Model 1)	Sending sexually explicit photos or videos (Model 1)
Social Media Exposure	3.40***	4.16***
Gender	1.02	1.12
RPS score	1.26*	1.26*
Peer behaviour 1 v2	2.61**	1.39
Peer behaviour 1 v 3	3.24***	3.79***
Exposure*Gender	Not significant	Not significant
Nagelkerke R²	23.7%	28.3%

Note: *p<.05, **p<.01, p***<.001.

As per Branley and Covey (2017), odds ratios for the interaction term were included only if significant.

3.6.3. Research Question 3: Social Media Exposure And Offline And Online Risk Behaviour In 18-84-Year Olds

Research Question 3: Is the magnitude of the association between social media exposure and risk behaviour different across age groups across the adult lifespan?

All six risk behaviours, four offline and two online, were considered for this part of the study. The sample (N=684) was split into four age groups and Spearman's rank correlation coefficients (r_s) between each risk behaviour and exposure to social media content encouraging the behaviour are displayed in Table 18. For all six behaviours the correlations were highly statistically significant at the p<.001 level for the age categories 18-24 and 25-34. Significance values of p<.001 to p<.05 were found for five behaviours (excepting unprotected sex) for the next age group, 35-44. For the age group 45-84, a statistically significant correlation was found between social media exposure and the behaviours of sending sexually explicit text messages (p<.001) and photos or videos of oneself (p<.01), but correlations for the other four behaviours were not found to be significant. Across all behaviours and ages, r_s was positive and ranged from .08 to .51.

Table 18

Bivariate correlations between social media exposure and participants' behaviour (N=684)

	Age	Spearman's rho (r_s)
Illegal drug use	18-24	.40***
	25-34	.25***
	35-44	.38***
	45-84	.17
Drinking alcohol to excess	18-24	.37***
	25-34	.38***
	35-44	.35***
	45-84	.09
Sex with a stranger	18-24	.22***
	25-34	.32***
	35-44	.21*
	45-84	.20
Unprotected sex	18-24	.33***
	25-34	.31***
	35-44	.08
	45-84	.22
Sexually explicit text messages	18-24	.37***
	25-34	.35***
	35-44	.18*
	45-84	.51***
Sexually explicit photos or videos	18-24	.41***
	25-34	.35***
	35-44	.30***
	45-84	.36**

Note: * $p < .05$, ** $p < .01$ *** $p < .001$

The relationships between social media exposure and participants' own offline and online behaviour were investigated further using logistic regression. Binary logistic regression analyses were run for each of the four offline behaviours of drug use,

drinking alcohol to excess, sex with a stranger and unprotected sex, and for the two online behaviours of sending sexually explicit text messages and sexually explicit photos or videos of oneself. As per the rationale set out in the Introduction chapter the predictors chosen for Block 1 were exposure to social media content encouraging the behaviour, age group and gender. An age group by social media exposure interaction term was added as Block 2. Where an interaction effect was found, the main effects are reported on in the context of this interaction. Summary tables are included below.

3.6.3.1. Drug use: The interaction term of age group by social media exposure was found to be statistically significant in Block 2 of this analysis (Table 19). With the interaction term included in the model, age group, gender and social media exposure were found to each have a significant association with participants' own drug use. The relationship between social media exposure and participants' drug use was found to vary by age. The odds ratios for each age group have been calculated according to Kirkwood and Sterne (2010) and are listed in Table 20. Participants in the 18-24 age group who had been exposed to social media encouraging drug use were found to have 11.53 times higher odds of using drugs themselves than 18-24-year olds who had not had social media exposure. For participants aged 25-34 who had experienced social media exposure, their odds of engaging in the behaviour were approximately 2.08 times higher than the odds for 25-34-year olds without social media exposure, a difference which was statistically significant. For social media exposed 35-44-year olds and 45-84-year olds respectively, their odds ratios were 8.99 and 2.31 times greater than for their non-exposed peers.

Male participants were found to have approximately twice the odds of engaging in drug use compared to female participants ($p < .001$). The model (including the interaction term) was found to be a good fit for the data as assessed by the Hosmer and Lemeshow test ($p = .885$). It was a significant improvement over the null model and accounted for 19.9% of the variance (Nagelkerke $R^2 = .199$, $\chi^2(8) = 103.641$, $p < .001$).

Table 19

Logistic regression analysis for drug use

		B	S.E.	Wald	Odds Ratio	95% C. I. for Odds Ratio
Block 1:	Exposure: Drug use	1.46	.23	39.62***	4.31	2.74-6.80
Nagelkerke R²	Age			8.37*		
=.180	Age 18-24 v Age 25-34	-.02	.20	.01	.98	.66-1.45
Block $\chi^2(5) =$	Age 18-24 v Age 35-44	-.46	.27	2.90	.63	.37-1.07
92.982	Age 18-24 v Age 45-84	-1.06	.44	5.84*	.35	.15-.81
p<.001	Gender	-.78	.19	17.3***	.46	.32-.66
	Constant	-1.22	.27	19.88	.30	
Block 2:	Exposure: Drug use*	2.45	.54	20.60***	11.53	4.01-33.14
Nagelkerke R²	Age			10.72*		
=.199	Age 18-24 v Age 25-34	1.41	.59	5.71*	4.09	1.29-12.98
Block $\chi^2(3) =$	Age 18-24 v Age 35-44	-.15	.79	.04	.86	.18-4.05
10.659	Age 18-24 v Age 45-84	.20	.80	.06	1.22	.25-5.81
p<.05	Gender	-.78	.19	16.85***	.46	.32-.67
	Age*Exposure: Drug use			9.54*		
	Age 25-34 by Exposure: Drug use	-1.69	.63	7.24**	.18	.05-.63
	Age 35-44 by Exposure: Drug use	-.25	.85	.09	.78	.15-4.08
	Age 45-84 by Exposure: Drug use	-1.60	.98	2.65	.20	.03-1.39
	Constant	-2.11	.53	15.69	.12	

*Note:

As an Age*Exposure interaction term is added in Block 2, the odds ratio for the Exposure: Drug use predictor in this block is for the baseline group only, i.e. male participants.

Note: N=271; *p<.05, **p<.01, ***p<.001

RPS=Risk Propensity Scale score

Table 20

Calculated odds ratios for drug use per age group (odds of exposed over unexposed)

Age	Odds Ratio
18-24	11.53
25-34	2.08**
35-44	8.99
45-84	2.31

Standardised residuals, leverage values, DF Beta values and Cook's distance statistics were calculated to assess if individual cases may have had an inordinate influence on the regression model. Investigation of the standardised residuals indicated 21 cases (3.1%) outside the range of ± 2 ; 2 cases (<1%) outside ± 2.58 and 8 cases (1.2%) outside ± 3.29 . Leverage statistics were higher than expected and all other values were within acceptable limits (Cook's distance <1; all DF Betas <1). Despite the existence of outliers, low Cook's distance values for all cases indicate no cases were exerting a strong influence on the regression model, and so all cases were included.

3.6.3.2. Drinking alcohol to excess: The interaction term of age group by social media exposure was found to be statistically significant in Block 2 of this analysis (Table 21). With the interaction term included in the model, gender and the main effect of age group were not found to have a significant association with drinking alcohol to excess. The relationship between social media exposure and participants' own behaviour was found to vary by age but this effect was statistically significant for the 45-84 age group only. The odds ratios for each age group have been calculated according to Kirkwood and Sterne (2010) and are listed in Table 22.

The odds of drinking alcohol to excess for participants aged 18-24 who had experienced social media exposure were 9.50 times higher than for participants of the same age who had not had the social media exposure. Risk content-exposed participants in the 25-34 and 35-44 age categories were found to have 4.28 and 3.71

times higher odds of engaging in the behaviour than non-exposed people in their age groups; however, this difference was not statistically significantly different to the odds for the 18-24 age group. The odds of drinking alcohol to excess for media-exposed 45-84-year olds were 1.24 times the odds for non-media exposed 45-84-year olds, a statistically significant difference to the odds of the 18-24-year-old group. The model (including the interaction term) was found to be a good fit for the data as assessed by the Hosmer and Lemeshow test ($p=.265$). It was a significant improvement over the null model and accounted for 16.5% of the variance (Nagelkerke $R^2=.165$, $\chi^2(8)=87.700$, $p<.001$).

Table 21

Logistic regression analysis for drinking alcohol to excess

		B	S.E.	Wald	Odds Ratio	95% C. I. for Odds Ratio
Block 1:	Exposure: Alcohol	1.44	.21	47.54***	4.233	2.81-6.38
Nagelkerke R^2	Age			14.53**		
=.149	Age 18-24 v Age 25-34	.41	.20	4.03*	1.500	1.01-2.23
Block $\chi^2(5) =$	Age 18-24 v Age 35-44	-.07	.24	.08	.936	.58-1.50
79.032	Age 18-24 v Age 45-84	-.78	.32	6.10*	.458	.25-.85
p<.001	Gender	.01	.19	.01	1.008	.70-1.46
	Constant	-.61	.27	5.19*	.545	
Block 2:	Exposure: Alcohol*	2.25	.45	25.05***	9.50	3.93-22.92
Nagelkerke R^2	Age			4.39		
=.165	Age 18-24 v Age 25-34	1.11	.53	4.34*	3.03	1.07-8.59
Block $\chi^2(3) = 8.668$	Age 18-24 v Age 35-44	.73	.54	1.81	2.07	.72-5.99
p<.05	Age 18-24 v Age 45-84	.62	.58	1.16	1.86	.60-5.75
	Gender	.03	.19	.03	1.03	.71-1.50
	Age * Exposure: Alcohol			8.42*		
	Age 25-34 by Exposure: Alcohol	-.80	.58	1.90	.45	.15-1.40
	Age 35-44 by Exposure: Alcohol	-.94	.61	2.35	.39	.12-1.30
	Age 45-84 by Exposure: Alcohol	-2.02	.70	8.35**	.13	.03-.52
	Constant	-1.34	.45	8.88	.263	

*Note: For Block 2, the odds ratio for the Exposure: Alcohol variable is for male participants only.

Note: N=271; *p<.05, **p<.01, ***p<.001

RPS=Risk Propensity Scale score

Table 22

Calculated odds ratios for drinking alcohol to excess per age group (odds ratios of exposed over unexposed)

Age	Odds Ratio
18-24	9.50
25-34	4.28
35-44	3.71
45-84	1.24**

Standardised residuals, leverage values, DF Beta values and Cook's distance statistics were calculated to assess if individual cases may have had an inordinate influence on the regression model. All values were found to lie within an acceptable range.

3.6.3.3. Sex with a stranger: For the behaviour of sex with a stranger a statistically significant relationship was found between the behaviour and both social media exposure and gender (Table 23). Neither age group nor the age group by social media exposure interaction term were found to be statistically significant.

Participants who had been exposed to content encouraging the behaviour on social media had approximately four times higher odds of having engaged in the behaviour ($p < .001$), and male participants had approximately 2.28 (i.e. $1 \div .44$) times the odds of engaging in the behaviour of female participants. Block 1 was found to be a good fit to the data as assessed by the Hosmer and Lemeshow test ($p = .328$). Block 1 was a significant improvement over the null model and accounted for 12.8% of the variance (Nagelkerke $R^2, p < .001$). Block 2 did not significantly add to the model.

Table 23

Logistic regression analysis for sex with a stranger

		B	S.E.	Wald	Odds Ratio	95% C. I. for Odds Ratio
Block 1:	Exposure: Sex with a stranger	1.36	.27	25.34***	3.90	2.30-6.63
Nagelkerke R²	Age			2.44		
=.128	Age 18-24 v Age 25-34	-.27	.25	1.19	.76	.47-1.24
Block $\chi^2(5) = 52.857$	Age 18-24 v Age 35-44	-.26	.32	.63	.77	.41-1.46
p<.001	Age 18-24 v Age 45-84	-.64	.51	1.58	.53	.20-1.43
	Gender	-.81	.22	13.32***	.44	.29-.69
	Constant	-1.91	.30	39.54***	.15	
Block 2:	Exposure: Sex w stranger	1.22	.40	9.47**	3.37	1.56-7.31
Nagelkerke R²	Age			1.65		
=.130	Age 18-24 v Age 25-34	-.75	.62	1.46	.47	.14-1.60
Block $\chi^2(3) = 962$	Age 18-24 v Age 35-44	-.26	.63	.17	.77	.23-2.65
p>.05	Age 18-24 v Age 45-84	-.58	.81	.51	.56	.12-2.74
	Gender	-.81	.22	13.04***	.45	.29-.69
	Age * Exposure: Sex w stranger			.90		
	Age 25-34 by Exposure: Sex w stranger	.58	.68	.73	1.79	.47-6.78
	Age 35-44 by Exposure: Sex w stranger	-.01	.73	.00	.99	.24-4.14
	Age 45-84 by Exposure: Sex w stranger	-.14	1.04	.02	.87	.11-6.64
	Constant	-1.80	.37	23.33	.17	

Note: N=271; *p<.05, **p<.01, ***p<.001
RPS=Risk Propensity Scale score

Although Cook's distance and DF Beta statistics were within acceptable limits for this behaviour, leverage statistics were higher than expected and standardised residual scores of 67 cases (9.8%) lay outside ± 2 . The large amount of deviance unaccounted for in the model implies the existence of one or more important factors that have not been accounted for in this modelling framework but are predictive of the outcome. The exploration of what these may be is outside the scope of the current study.

3.6.3.4. Unprotected sex: For the behaviour of unprotected sex, a statistically significant relationship was found between the behaviour and both social media

exposure and gender (Table 24). Neither age group nor the age group by social media exposure interaction term were found to be statistically significant. Participants who had been exposed to content encouraging the behaviour on social media had 3.18 times higher odds of having engaged in the behaviour ($p < .001$), and male participants had approximately 1.5 (i.e. $1 \div .65$) times higher odds of engaging in the behaviour than female participants. Block 1 was found to be a good fit to the data as assessed by the Hosmer and Lemeshow test ($p = .745$). Block 1 was a significant improvement over the null model and accounted for 12.5% of the variance (Nagelkerke R^2 , $p < .001$). Block 2 did not significantly add to the model.

Table 24

Logistic regression analysis for unprotected sex

		B	S.E.	Wald	Odds Ratio	95% C. I. for Odds Ratio
Block 1:	Exposure: Unprotected sex	1.16	.17	46.99***	3.18	2.28-4.42
Nagelkerke R^2	Age			4.63		
=.125	Age 18-24 v Age 25-34	.04	.19	.04	1.04	.72-1.51
Block $\chi^2(5) =$	Age 18-24 v Age 35-44	.05	.24	.05	1.05	.66-1.69
66.067	Age 18-24 v Age 45-84	-.67	.34	3.88*	.51	.26-1.00
p<.001	Gender	-.43	.18	5.80*	.65	.46-.92
	Constant	-.60	.20	8.80**	.55	
Block 2:	Exposure: Unprotected sex	1.36	.26	26.46***	3.88	2.32-6.51
Nagelkerke R^2	Age			3.46		
=.127	Age 18-24 v Age 25-34	.17	.27	.40	1.19	.70-2.03
Block $\chi^2(3) =$	Age 18-24 v Age 35-44	.28	.31	.85	1.33	.73-2.41
1.474	Age 18-24 v Age 45-84	-.51	.44	1.35	.60	.25-1.42
p>.05	Gender	-.44	.18	5.95*	.65	.45-.92
	Age * Exposure: Unprotected sex			1.47		
	Age 25-34 by Exposure: Unprotected sex	-.24	.39	.40	.78	.37-1.67
	Age 35-44 by Exposure: Unprotected sex	-.59	.50	1.39	.55	.21-1.48
	Age 45-84 by Exposure: Unprotected sex	-.32	.70	.21	.73	.18-2.87
	Constant	-.71	.24	9.13	.49	

Note: N=271; * $p < .05$, ** $p < .01$, *** $p < .001$ RPS=Risk Propensity Scale score

Standardised residuals, leverage values, DF Beta values and Cook's distance statistics were calculated to assess if individual cases may have had an inordinate influence on the regression model. Investigation of the standardised residuals indicated 6 cases (<1%) lay outside the range of ± 2 which is within acceptable limits. Leverage statistics were slightly higher than expected and all other values were within acceptable limits (Cook's distance <1; all DF Betas <1). Despite the existence of outliers, low Cook's distance values for all cases indicate no cases were exerting a strong influence on the regression model, and so all cases were included.

3.6.3.5. Sending sexually explicit text messages: For the behaviour of sending sexually explicit text messages, a statistically significant relationship was found between the behaviour and social media exposure (Table 25). Gender, age group and the age group by social media exposure interaction term were not found to be statistically significant. Participants who had been exposed to content encouraging the behaviour on social media had approximately 3.5 times higher odds of having engaged in the behaviour ($p < .001$). Block 1 was found to be a good fit to the data as assessed by the Hosmer and Lemeshow test ($p = .575$). Block 1 was a significant improvement over the null model and accounted for 14.6% of the variance (Nagelkerke R^2 , $p < .001$). Block 2 did not significantly add to the model.

Table 25

Logistic regression analysis for sending sexually explicit text messages

		B	S.E.	Wald	Odds Ratio	95% C. I. for Odds Ratio
Block 1:	Exposure: Sext: text	1.27	.176	51.85***	3.56	2.52-5.02
Nagelkerke R² = .146	Age			7.64		
Block $\chi^2(5) = 78.147$	Age 18-24 v Age 25-34	-.19	.191	1.01	.83	.57-1.20
p<.001	Age 18-24 v Age 35-44	-.26	.243	1.11	.77	.48-1.25
	Age 18-24 v Age 45-84	-1.00	.369	7.33**	.37	.18-.76
	Gender	-.07	.182	.15	.93	.65-1.33
	Constant	-.94	.223	17.87	.39	
Block 2:	Exposure: Sext texts	1.50	.30	25.48***	4.46	2.50-7.96
Nagelkerke R² = .156	Age			6.46		
Block $\chi^2(3) = 5.855$	Age 18-24 v Age 25-34	.01	.34	.00	1.01	.52-1.96
p>.05	Age 18-24 v Age 35-44	.23	.37	.41	1.26	.61-2.60
	Age 18-24 v Age 45-84	-1.43	.65	4.80*	.24	.07-.86
	Gender	-.09	.18	.26	.91	.64-1.30
	Age * Exposure: Sext texts			5.67		
	Age 25-34 by Exposure: Sext texts	-.27	.41	.44	.76	.34-1.71
	Age 35-44 by Exposure: Sext texts	-.91	.49	3.39	.40	.15-1.06
	Age 45-84 by Exposure: Sext texts	.88	.82	1.15	2.41	.48-12.00
	Constant	-1.10	.29	14.60	.33	

Note: N=271; *p<.05, **p<.01, ***p<.001
RPS=Risk Propensity Scale score

Standardised residuals, leverage values, DF Beta values and Cook's distance statistics were calculated to assess if individual cases may have had an inordinate influence on the regression model. Although leverage statistics were slightly higher than expected all other values were within acceptable limits. Low Cook's distance values for all cases indicate that the high leverage statistics did not have a significant influence on the regression coefficients, and therefore cases were not removed.

3.6.3.6 Sending sexually explicit photos or videos of oneself: For the behaviour of sending sexually explicit photos or videos of oneself, a statistically significant relationship was found between the behaviour and both social media exposure and age group (Table 26). Neither gender nor the age group by social media exposure

interaction term were found to be statistically significant. Participants who had been exposed to content encouraging the behaviour on social media had almost five times higher odds of having engaged in the behaviour ($p < .001$), and younger participants had higher odds of engaging in the behaviour than older participants. Block 1 was found to be a good fit to the data as assessed by the Hosmer and Lemeshow test ($p = .955$). Block 1 was a significant improvement over the null model and accounted for 22.8% of the variance (Nagelkerke R^2 , $p < .001$). Block 2 did not significantly add to the model.

Table 26

Logistic regression analysis for sending sexually explicit photos or videos

		B	S.E.	Wald	Odds Ratio	95% C. I. for Odds Ratio
Block 1: Nagelkerke $R^2 = .228$ Block $\chi^2(3) = 118.624$ $p < .001$	Exposure: Sext photos/videos	1.59	.20	66.67***	4.90	3.34-7.17
	Age			17.47***		
	Age 18-24 v Age 25-34	-.50	.21	5.96*	.61	.40-9.1
	Age 18-24 v Age 35-44	-.90	.30	9.17**	.41	.23-.73
	Age 18-24 v Age 45-84	-1.48	.50	8.79**	.23	.09-.61
	Gender	.01	.20	.01	1.01	.68-1.51
	Constant	-1.38	.24	33.53	.25	
Block 2: Nagelkerke $R^2 = .229$ Block $\chi^2(3) = 875$ $p > .05$	Exposure: Sext photos/videos	1.65	.29	33.12***	5.20	2.97-9.12
	Age			7.48		
	Age 18-24 v Age 25-34	-.41	.35	1.39	.66	.34-1.31
	Age 18-24 v Age 35-44	-.75	.43	3.11	.47	.21-1.09
	Age 18-24 v Age 45-84	-1.79	.76	5.55*	.17	.04-.74
	Gender	.01	.20	.00	1.00	.67-1.49
	Age * Exposure: Sext photos or videos			.86		
	Age 25-34 by Exposure: Sext photos or videos	-.14	.43	.11	.87	.37-2.03
	Age 35-44 by Exposure: Sext photos or videos	-.28	.60	.22	.76	.24-2.43
	Age 45-84 by Exposure: Sext photos or videos	.70	1.04	.46	2.02	.26-15.46
	Constant	-1.41	.28	26.10	.24	

Note: N=271; * $p < .05$, ** $p < .01$, *** $p < .001$
RPS=Risk Propensity Scale score

Standardised residuals, leverage values, DF Beta values and Cook's distance statistics were calculated to assess if individual cases may have had an inordinate influence on the regression model. Investigation of the standardised residuals indicated 50 cases (7.3%) lay outside the range of ± 2 ; 9 cases (1.3%) outside ± 2.58 and 2 cases (<1%) outside ± 3.29 . Leverage statistics were slightly higher than expected and all other values were within acceptable limits (Cook's distance <1; all DF Betas <1). Despite the existence of outliers, low Cook's distance values for all cases indicate no cases were exerting a strong influence on the regression model, and so all cases were included.

3.6.3.7. Summary: Exposure to social media encouraging a behaviour was associated with significantly higher odds of engaging in that behaviour across all six risk behaviours. Age group was found to be a moderator of the relationship between social media exposure and the behaviours of drug use and drinking alcohol to excess (Table 27). Female participants were found to have lower odds of reporting engaging in the behaviours of drug use, having unprotected sex and having sex with a stranger (Table 28).

Table 27

Odds ratios for behaviours with a significant interaction term

	Drug use (Model 2)	Drinking to excess (Model 2)
Social Media Exposure (age 18-24)	11.529***	9.495***
Gender (male v female)	.460***	1.032
Age*Social Media Exposure		
18-24 v 25-34	.184**	.451
18-24 v 35-44	.776	.393
18-24 v 45-54	.203	.132**
Nagelkerke R²	19.9%	16.5%

Note: *p<.05, **p<.01, p***<.001

Interaction term only included in the model if it was significant, i.e. for drug use and drinking alcohol to excess.

Table 28

Odds ratios for behaviours without a significant interaction term

	Sex with a stranger (Model 1)	Unprotected sex (Model 1)	Sext text (Model 1)	Sext photo/video (Model 1)
Social Media Exposure	3.901***	3.177***	3.556***	4.896***
Gender (male v female)	.444***	.649*	.931	1.014
Age				
18-24 v 25-34	.761	1.039	.826	.605*
18-24 v 35-44	.774	1.054	.774	.408**
18-24 v 45-54	.529	.511	.368**	.227**
Age*Social Media Exposure	Not significant	Not significant	Not significant	Not significant
Nagelkerke R²	12.8%	12.5%	14.6%	22.8%

4. DISCUSSION

4.1. Chapter Overview

This chapter will briefly review the aims and results of the research and the characteristics of the final sample. The results and implications of each research question will then be discussed in more detail, considering them in the context of existing literature. The strengths and limitations of the current study will then be presented and recommendations for future research will be made.

4.2. Summary Of Aims

This thesis aimed to explore the relationship between specific risk behaviours and exposure to content encouraging these risk behaviours on social media. This was done through replicating a study of social media exposure and risk behaviour in 18-24-year olds for four offline risk behaviours (Branley & Covey, 2017) and extending the study by applying the same analysis to two online risk behaviours. In order to address the lack of research on the relationship between social media exposure and risk behaviour across the lifespan, the relationship between these two variables was evaluated in an exploratory analysis of a sample of adults aged 18-84.

4.3. Consideration Of The Sample Characteristics

4.3.1. Demographics

The final sample comprised 684 adult participants taken from a non-clinical international population of social media users. Participants reported 76 countries of origin in total, with the majority (494 participants, 72% of the total sample) coming from one of five majority white, western countries where English is the first language of the majority of residents. This not unexpected, as the study was advertised exclusively on English-language platforms and websites and was not available in translation. As the majority of participants were from English-speaking and western countries, it is important to note that these participants, though international, may not be representative of the worldwide population and caution should be exercised when

making inferences about non-English speaking societies (Henrich, Heine, & Norenzayan, 2010).

The total sample comprised 196 male participants and 488 female participants, 28.7% and 71.3% of the sample respectively. For the 271 18-24-year olds who comprised the sample for Research Question One and Research Question Two, 186 (68.6%) reported being female and 85 (31.4%) reported being male. The gender difference in response rate is similar to that found by Branley & Covey (2017), where 28.9% of participants were male and 71.1% of participants were female. Although previous research has shown that women were more likely to use social media (Kimbrough, Guadagno, Muscanell, & Dill, 2013), more recent reports have shown that approximately 49% of male and 51% of female internet users in the UK report recent use of social media (Ofcom, 2018). Similarly, 65% of men and 73% of women in the US report using at least one social media site (Pew Research Center, 2018). The disparity between the gender of social media users and the gender of participants in this study may be explained by previous research that has found a significant gender difference in online survey response rates, with women statistically more likely to respond (Smith, 2008).

Although there were participants in all age groups from 18-24 to 75-84, 39.6% of the sample were aged 18-24 and 73.7% of the sample were under the age of 34. Although there is some evidence that younger people are more likely to respond to surveys than older people (Moore & Tarnai, 2002), this weighting toward the lower age groups is also congruent with recent research on the age distribution of adult social media users in the UK and US (Duggan, Ellison, Lampe, Lenhart, & Madden, 2015; Ofcom, 2018) and so is not considered problematic.

In summary, with reference to large-scale studies in the US and UK, this large international sample was broadly representative of the age range of social media users but was not representative in terms of gender.

4.3.2. Risk Propensity Scale

RPS scores were used for participants aged 18-24 in the investigation of Research Questions 1 and 2. The mean Risk Propensity Scale scores for 18-24-year-old male and female participants were 4.35 and 3.33 respectively, lower than the mean scores of 4.90 and 4.40 reported by Meertens and Lion (2008) in a study of 17-32-year-old university students. The lower tendency to take risks in this sample may have occurred due to specific differences in this sample, potentially due to decreased risk propensity over time, as studies of trends in risk behaviour have found a reduction in risk-taking in recent years (Cabinet Office, 2014). Alternatively, it may indicate that social media users are generally more risk averse than the original RPS sample.

4.4. Research Question One: Social Media Exposure And Offline Risk Behaviour In 18-24-Year Olds

Research Question 1a: In young people aged 18-24, is exposure to social media content encouraging an offline risk behaviour associated with users' own engagement in that behaviour, independent of what can be accounted for by perceived peer behaviour and risk propensity?

Research Question 1b: Is the magnitude of the association different between the genders?

4.4.1. Risky Substance Use Behaviours

4.4.1.1. Drug use: Replicating Branley and Covey (2017), social media exposure, RPS and peer behaviour were all found to be statistically significant predictors of participants' drug use. The statistically significant positive association between social media exposure (to content encouraging drug use) and participants' reported drug use was found independent of what can be accounted for by the variables of risk propensity and perceived peer risk behaviour. The results of the current study add to the research evidence for an association between social media exposure and drug use in an area where results to date have been inconclusive (e.g. Cabrera-Nguyen, Cavazos-Rehg, Krauss, Bierut, & Moreno, 2016; Stoddard, Bauermeister, Gordon-Messer, Johns, & Zimmerman, 2012).

The odds ratio for the relationship between social media exposure and participants' behaviour reported by Branley and Covey (2017) fell slightly outside the lower limit of the 95% confidence interval in the current study. However, as the previous researchers did not report confidence intervals for their results it is difficult to interpret this discrepancy. It is possible that the 95% confidence intervals for both studies overlap and so the results may be consistent.

The current study found that male and female participants did not have significantly different odds of engaging in drug use. In contrast, Branley and Covey (2017) found that female participants were much less likely to have used illegal drugs in the previous 12 months.

4.4.1.2. Drinking alcohol to excess: A statistically significant positive association was found between social media exposure to content encouraging drinking alcohol to excess and participants' own behaviour, independent of what can be accounted for by the variables of risk propensity and perceived peer risk behaviour. The 95% confidence interval of the odds ratio for the relationship between social media exposure and participants behaviour contained the odds ratio reported by Branley and Covey (2017), indicating that the results are consistent across the studies.

Exposure to content on social media promoting drinking alcohol to excess was associated with 6.24 times greater odds of engaging in the behaviour, which is consistent with previous research on alcohol consumption and social media in adolescents and young adults (Curtis, Lookatch, Ramo, McKay, Feinn, & Kranzler, 2018).

In accordance with the results of Branley and Covey (2017), social media exposure, RPS and peer behaviour were all found to be statistically significant predictors of participants reporting drinking alcohol to excess. A significant effect of gender on drinking alcohol to excess was not found in either study.

4.4.2. Risky Offline Sexual Behaviours

4.4.2.1. Sex with a stranger: For the behaviour of sex with a stranger, the gender by social media exposure interaction term was significant, indicating that a gender difference in the association between social media exposure to content encouraging sex with a stranger and participants' own behaviour had been found. In line with previous research on high-risk sexual practices, it was found that female participants were overall less likely to report engaging in sex with a stranger than male participants (e.g. Romero-Estudillio, González-Jiménez, Mesa-Franco, & García-García, 2014). In the current study, female participants who had been exposed to social media content encouraging sex with a stranger were found to have 5.37 times greater odds of engaging in the behaviour than unexposed female participants.

In contrast, there was some evidence that for men who had been exposed to social media content encouraging sex with a stranger, there were slightly reduced odds of engaging in the behaviour. However, the association between social media exposure and reduced odds of the behaviour in males did not reach statistical significance.

While exposure to sexual material through the mainstream media has been associated with increased engagement in risky sexual behaviour, a meta-analysis has concluded that the effects are stronger for males than females (Coyne et al., 2019). This is in contrast to the results of the current study. As sex with a stranger was more common for males than females across both the exposed and unexposed conditions in the current study, it may be that any difference was more difficult to detect in male participants. It is possible that a relationship between social media exposure and having sex with a stranger exists for males but was not found due to the study being underpowered to detect this effect – male participants comprised just 31.4% of the sample (85 individuals), and within-group analyses may have had low statistical power.

Perceived peer behaviour and risk propensity were each found to have significant positive relationships with participants' own engagement in sex with a stranger across both Branley and Covey (2017) and the current study. In both studies, female participants were found to be significantly less likely to report having had sex with a stranger than male participants. The current study's finding of a gender difference in the relationship between own behaviour and exposure to social media content

encouraging sex with a stranger was not found by Branley and Covey (2017). However, it is possible that the interaction effect was present but not detected. Interaction effects frequently remain undetected due to low statistical power; the required sample size to detect an interaction effect will be at least four times larger than when the aim is to detect an overall association, and the required sample size can be much larger (Kirkwood & Sterne, 2010, pp. 423).

4.4.2.2. Unprotected sex: For the behaviour of unprotected sex, social media exposure to material encouraging unprotected sex was found to be statistically significantly associated with engaging in the behaviour, independent of what can be accounted for by the variables of risk propensity and perceived peer behaviour. Participants who were exposed to such content were found to have 2.18 times greater odds of engaging in the behaviour. Gender differences in whether or not participants engaged in the behaviour were not found, and the association between social media exposure and the behaviour was not found to differ across genders. The 95% confidence interval of the odds ratio for the relationship between social media exposure and participants' behaviour contained the odds ratio reported by Branley and Covey (2017), indicating that the results are consistent across both studies.

The majority of studies to date investigating the association between media exposure and risky sexual behaviour has focused on the specific population of men who have sex with men and condomless anal sex as the specific risky sexual behaviour (e.g. Schrimshaw, Antebi-Gruszka, & Downing, 2016; Whitfield, Rendina, Grov, & Parsons, 2018). The results of the current study suggest that the association may be found in a general population with unprotected sex more broadly defined.

4.5. Research Question Two: Social Media Exposure And Online Risk Behaviour In 18-24-Year Olds

Research Question 2a: In young people aged 18-24, is exposure to social media content encouraging an online risk behaviour associated with users' own engagement in that behaviour, independent of what can be accounted for by perceived peer behaviour and risk propensity?

Research Question 2b: Does this association differ across gender?

4.5.1. Risky Online Sexual Behaviours

4.5.1.1. Sending sexually explicit text messages and photos or videos of oneself: For both the behaviours of sending sexually explicit text messages and sending sexually explicit photos or videos of oneself, exposure to social media content encouraging the behaviour was found to have a statistically significant association with participants own engagement in the behaviour independent of what can be accounted for by the other variables ($p < .001$). In the case of sending sexually explicit text messages, social media exposure was associated with 3.40 times greater odds of engaging in the behaviour, and in the case of sending sexually explicit photos or videos social media exposure was associated with 4.16 times greater odds of engaging in the behaviour. This result is in contrast to the findings of van Oosten and Vandebosch (2017), who did not find a link between viewing sexually suggestive photos of others on social media and participants' own willingness to sext. One possible reason for this discrepancy is the use of behavioural willingness in the van Oosten and Vandebosch paper, which as an attitudinal variable may not be as valid as a predictor of actual behaviour. Additionally, viewing sexually suggestive photos on social media may not be equivalent to being exposed to social media content *encouraging* sending sexual photos, which was the focus of the current study.

Across both behaviours, risk propensity and believing that more than one peer has engaged in the behaviour were also associated with participants' own risk behaviour. Having one friend who was believed to have engaged in the behaviour was also associated with increased odds of sending sexually explicit text messages but not photos and videos. Male and female participants did not differ in their odds of engaging in either behaviour, and the relationship between social media exposure and participants' own behaviour did not differ by gender.

In the current study, gender differences were not observed in sending sexually explicit texts or photos/videos. These results are congruent with some previous research which investigated sending both sexually explicit text messages and photos (e.g. Henderson & Morgan, 2011, Drouin, Coupe, & Temple, 2017; Drouin & Landgraff, 2011, Weisskirch & Delevi, 2016). Although older literature has shown gender gaps in sexual risk behaviour, these gaps were also found to be narrowing over time (Byrnes, Miller, & Schafer, 1999). More recent research on risky sexual online behaviour across the lifespan has found that while gender gaps were found for adults aged over 30, they were not found for adolescents and younger adults (Baumgartner, 2013). The lack of gender differences found in the current study may indicate changing social norms for sexual behaviour in younger cohorts. However, the rate of change is likely to differ across cultures, and previous research has found risky sexual online behaviour to be less common in cultures with more traditional gender norms (Chiou & Wan, 2006).

Research Question Two applied a logistic regression model developed for offline risk behaviour to two online risk behaviours. In both cases a model including social media exposure, gender, risk propensity and perceived peer behaviour as predictors was found to be a good fit for the data and a significant improvement over the null model. The applicability of a model of offline behaviour to the online environment suggests that similar processes and pathways may be involved in both online and offline risk behaviour, but further research is necessary to investigate this further.

4.6. Research Question Three: Social Media Exposure And Offline And Online Risk Behaviour In 18-84-Year Olds

Research Question Three: Is the magnitude of the association between social media exposure and risk behaviour different across age groups across the adult lifespan?

4.6.1. Risky Substance Use Behaviours

4.6.1.1. Drug use: The age by social media exposure interaction term was significant for drug use behaviour, meaning that the strength of the association between social media exposure and risk behaviour differed across age groups. For participants aged 18-24, exposure to social media content encouraging drug use was associated

with 11.53 times greater odds of using drugs compared to 18-24-year-olds who had not viewed such social media content. Participants aged 25-34 who had been exposed to drug use content on social media were found to have 2.08 times greater odds than their non-exposed peers, a statistically significant difference compared to the 18-24-year-old group. Social media exposure for the 35-44-year-old and 45-84-year-old groups was associated with 8.99 and 2.31 times higher odds over others in the same age groups who had not been exposed to drug use content on social media.

For all age groups, exposure to material encouraging drug use is associated with participants' own drug use, however, the association is weaker for participants aged over 24. The current study found that the association was lowest for the 25-34 age group, for whom social media exposure was associated with 2.08 times higher odds of using drugs over participants who had not viewed drug use content on social media. There is little previous research on drug use and social media, and that which exists has primarily concentrated on the relationship between these variables for adolescents and young adults under the age of 25 (e.g. Cabrera-Nguyen, Cavazos-Rehg, Krauss, Bierut, & Moreno, 2016; Morgan, Snelson, & Elison-Bowers, 2010; Stoddard, Bauermeister, Gordon-Messer, Johns, & Zimmerman, 2012). As a result, there is a lack of similar or comparable previous research to aid in interpretation of the current results. It is possible that the association is highest for participants aged 18-24 as they are less risk averse than older age groups due to their developmental stage (Reyna & Rivers, 2008); in comparison, 25-34-year-old participants may be more circumspect in their decision-making.

It is possible that 25-34-year-old participants may engage in drug use behaviour but this is not associated with viewing related content on social media, perhaps due to changing patterns in social media use. Research has found that adults aged 18-25 tend to use Facebook to meet new people and develop new relationships, while adults aged 25-40 are more likely to use social media to maintain offline relationships (Van den Broeck, Poels, & Walrave, 2015). As drug use behaviour by participants aged 25-34 is similar to that reported by 18-25 year olds (see Figure 1, Appendix F), it may be that drug use among 25-34 year olds is more related to their offline relationships than exposure to content on social media.

The results of the current research indicate that research to date on the relationship between social media exposure and drug use may not be generalisable to older age groups. Future studies may examine the relationship between these variables in older cohorts, or may investigate if changes occur in one cohort through a longitudinal study.

4.6.1.2. Drinking alcohol to excess: The relationship between social media exposure and drinking alcohol to excess was found to be strongest for 18-24-year-old participants and the strength of the association was found to lessen across older age groups. For participants aged 18-24, social media exposure to content promoting drinking alcohol to excess was associated with 9.50 times higher odds of engaging in the behaviour. In contrast, social media exposure was associated with 4.28 times greater odds of engaging in the behaviour for 25-34-year olds over their non-exposed peers, 3.71 times higher odds for 35-44-year olds, and 1.24 higher odds for 45-84-year-old participants.

According to these results, each step up in age group is associated with a weaker relationship between social media exposure to content encouraging drinking to excess and participants' own drinking to excess. This difference may occur for a number of reasons. It may be that exposure to the risk content precedes and increases the likelihood of engagement in the risk behaviour for younger social media users, and older social media users may be less easily influenced than younger social media users. Research has found that peer influence on risk-taking tends to decline with age (Gardner & Steinberg, 2005); perhaps younger people are also more vulnerable to influence from other sources. Alternatively, young people who drink to excess may be more likely to seek out social media content encouraging the risk behaviour in order to validate and support their own choices, and seeking out this material for validation may become less common as people get older. Another possibility is that the variation observed may reflect differences in how different age cohorts engage with social media. The concept of a digital native/digital immigrant divide (Prensky, 2001) has been suggested, positing that people who have grown up as internet users may think and act differently to older people as a result of exposure to new technology. However, while age has been found to be a

contributing factor, evidence suggests that education, inequality and forms of social exclusion may be more closely linked with how people use the internet (Bennett, Maton, & Kervin, 2008). There is evidence of generational differences in how people use social media, in terms of sites used, for what purpose and for how long (Ofcom 2018a; 2018b). It is possible that an unaccounted-for third variable linked to these differences may be impacting the relationship between age group and alcohol-related social media exposure in this study.

In studies of samples of young adults, social media exposure to alcohol content has been associated with higher alcohol consumption and reporting more alcohol related problems (Curtis, Lookatch, Ramo, McKay, Feinn, & Kranzler 2018; Groth, Longo, & Martin, 2017). The current study suggests that the strength of this relationship may decrease for older age groups.

4.6.2. Risky Offline Sexual Behaviours

4.6.2.1. Sex with a stranger: For the behaviour of sex with a stranger, a positive relationship between social media exposure and participants' own behaviour was found ($p < .001$). Across the lifespan, participants who had been exposed to content encouraging sex with a stranger had approximately four times higher odds of engaging in the behaviour than participants who had not been exposed to such online content, and male participants had approximately three times higher odds of engaging in the behaviour than female participants. Differences between the age groups were not found in terms of odds of engaging in the behaviour, and the relationship between social media exposure and participants' own behaviour was not found to differ across the age groups. Although there is little published literature on prevalence and correlates of this specific behaviour, previous large-scale social surveys have found that the behaviour having sex with strangers becomes less common as people get older (e.g. Anderson & Dahlberg, 1992).

4.6.2.2. Unprotected sex: For the behaviour of unprotected sex, a positive relationship between social media exposure and participants' own behaviour was found ($p < .001$). Participants who had been exposed to content encouraging unprotected sex had approximately three times higher odds of engaging in the behaviour than participants who had not been exposed to such online content, and

male participants had approximately 1.5 times higher odds of engaging in the behaviour than female participants. There was an absence of evidence for an overall significant difference between the age groups in terms of odds of engaging in the behaviour, though there was borderline evidence of a difference between the 18-24-year-old and 45-84-year-old age groups. The relationship between social media exposure and participants' own behaviour was not found to differ across the age groups. As with the behaviour sex with a stranger, there has been little research on the relationship between unprotected sex and exposure to risk-related material on any form of media. Apart from Branley and Covey (2017), the extant research on unprotected sex and media exposure has focused on men who engage in condomless anal sex with men (e.g. Schrimshaw, Antebi-Gruszka, & Downing, 2016; Whitfield, Rendina, Grov, & Parsons, 2018). Although not directly comparable, the results of the current study are in accordance with the previous research, which also did not find evidence of an age difference in terms of engagement in unprotected sex or engagement with sexually explicit media.

4.6.3. Risky Online Sexual Behaviours

4.6.3.1. Sending sexually explicit text messages: A positive association was found between social media exposure and participants' engagement in sending sexually explicit text messages ($p < .001$). Participants who had viewed social media content encouraging sending sexually explicit text messages had approximately 3.5 times higher odds of engaging in the behaviour than participants who had not viewed such content. Gender differences in the odds of sending sexually explicit text messages were not found, which is consistent with the results of previous studies, all of which focused on undergraduate students (Drouin & Landgraff, 2012; Henderson & Morgan, 2011). For participants aged 25-34 and 35-44, the odds of sending sexually explicit text messages were not significantly different to the odds for participants aged 18-24. However, participants aged 45-84 had significantly lower odds of sending sexually explicit text messages than 18-24-year-old participants.

The relationship between social media exposure and participants' own behaviour did not differ across the age groups – that is, although participants in the oldest age group had lower odds of engaging in the behaviour than younger participants, participants in the oldest age group who had viewed risk-related content on social

media were found to have similar odds of engaging in the behaviour to participants in younger age groups. There is a lack of published literature on adult age differences in sending sexually explicit text messages, as the majority of studies have focused on adolescents or young adults as the population and sending sexually explicit photographs as the behaviour of interest (Klettke, Hallford, & Mellor, 2014).

4.6.3.2. Sending sexually explicit photos or videos of oneself: A positive association was found between social media exposure and participants' engagement in sending sexually explicit photos or videos of themselves ($p < .001$). Participants who had viewed social media content encouraging the behaviour had approximately five times higher odds of engaging in the behaviour than participants who had not viewed such content. No difference was found between male and female participants in terms of their odds of sending sexual photos or videos of themselves. Although conclusions from studies on gender differences in sending sexual photos and videos have been mixed, this result is consistent with the majority of previous studies as detailed in a meta-analysis by Klettke, Hallford, & Mellor (2014) and more recent studies of sexting behaviour (Weisskirch & Delevi, 2016).

All three older age groups were less likely to send sexually explicit photos and videos than the 18-24-year-old group. This is consistent with the single study to date investigating prevalence of sexting across the lifespan (Wysocki & Childers, 2011), which found that there was a significant linear decrease in the prevalence of sending nude photos of oneself across age groups, with 19-24 and 25-29-year-olds most likely to send nude photos. This was followed by a sharp decrease for the 30-39, 40-49, and 50+ year old age groups.

As with the behaviour of sending sexually explicit text messages, the relationship between social media exposure and participants' own sending of sexually explicit photos and videos did not differ across the age groups. Participants who had viewed content encouraging sending sexual photos or videos of oneself had similar odds of engaging in the behaviour across all ages, but participants in older age groups were less likely to engage in the behaviour. This may be because older people are less likely to use social media in the first place (Ofcom, 2018a) or older people's patterns of social media use may make them less likely to encounter the material.

4.7. Implications Of Findings

4.7.1. Theoretical Implications

4.7.1.1. Research Questions One and Two: Replication and extension of Branley and Covey (2017): The current study replicated the study of Branley and Covey (2017), investigating the relationship between exposure to content encouraging risk behaviour on social media and participants' own engagement in the behaviour. The study was then extended to apply the same logistic regression model to two online behaviours. The replicating and extension study found that there was a significant positive association between social media exposure and participants' own behaviour for five of the six behaviours investigated, three of the four offline behaviours and both of the online behaviours. For the sixth behaviour, a significant positive association was found for female participants. For all behaviours, the model adjusted for risk propensity and perceived peer behaviour, so the unadjusted association between social media exposure and participants' behaviour is likely to be higher. Although causality cannot be inferred from the results of the present study, the relationship is clearly strong enough to merit further investigation, as public concerns over the influence of social media may have merit.

The results of the current study disagree with and so cast doubt on some assumptions that have been made about the nature of the relationship between social media and risk behaviour. Firstly, a gender difference was not found across five of the six risk behaviours in the sample of 18-24-year olds, running contrary to established findings on females being more risk averse than men (Byrnes, Miller, & Schafer, 1999). Secondly, for five of the six behaviours the interaction variable was not significant, indicating that for these behaviours the association between social media use and behaviour did not differ across gender. Media discourse around the subject has tended to centre on alarm about young people's experiences and behaviour, especially for young women and teenage girls (Albury & Crawford, 2012).

4.7.1.2. Research Question Three: Social media exposure and participants' behaviour across the adult lifespan: Across all analyses relating to Research

Question Three, a statistically significant positive relationship was found between social media exposure and participants' behaviour, suggesting that social media exposure to risk content may be associated with risky behaviour across the lifespan. This runs counter to media, governmental and researcher focus on the specific vulnerability of young people to online harm (Van Ouytsel, Walrave, Ponnet, & Temple, 2019).

No difference was found in the strength of the relationship between social media exposure and participants' behaviour across age groups for the online and offline risky sexual behaviours. However, for the risky substance use behaviours, the relationship between social media exposure and participants' risk behaviour was found to be strongest for 18-24-year-old participants. If there is a causal relationship between the variables and if social media exposure precedes engagement in risk behaviour, this may indicate that young adults are more easily influenced by drug and alcohol-related content (but not sexual risk-related content) than older cohorts.

4.7.2. Practical Implications

4.7.2.1. Implications for clinical psychology: The results of this study show that people who have high levels of social media exposure to specific risk content tend to have higher levels of related risk behaviour. Clinicians may gain additional insight into clients' experience by asking questions about social media use and social media content as part of routine assessment. Responses to these questions may then guide further questions, and inform risk assessments and treatment plans.

4.7.2.2. Implications for public health and policy: The results of this study show that the relationship between social media exposure and risk behaviour is complex, and may differ across age, gender and behaviours. Considering "social media" or "risk behaviour" as unitary constructs and considering vulnerable people as one homogenous group may lead to unfocused and ineffective public health interventions. Future legislation and public health interventions should be research-informed and evidence-based.

4.7.2.3. Implications for wider society: Evidence of a strong relationship between exposure to risk content on social media raises questions about how social media

content may be used to infer risk patterns in the general population. For example, aggregate data about risk content collected from a widely used social media site may potentially be used to estimate the prevalence of a risk behaviour in the general population. It may also be possible to segment social media users into high and low risk groups by combining information about the magnitude of a known relationship between social media exposure and a certain behaviour with descriptive data on the prevalence of the behaviour. It may even be conceivable for public health organisations to use this information to estimate the burden of particular risky behaviours (e.g. alcohol or drug use) in the population and use this to inform planning of health services. Using social media data in this way raises a host of ethical questions about commercial versus public health uses of data, whether social media users can or should be able to consent to their data being used in this way, and whether identifying risk patterns or at-risk groups could contribute to stigmatisation of already marginalised groups.

4.8. Strengths And Limitations Of The Current Study

4.8.1. Strengths Of The Study

The large international sample and the wide age range in participants recruited is a strength of this study. Previous research has shown that there is an overrepresentation of undergraduates and people from western cultures in psychology and behavioural science literature (Henrich, Heine & Norenzayan, 2010). For example, a systematic literature review on sexting research found that 92% of the studies eligible for review were conducted with residents of the United States, and 69% of samples consisted solely of undergraduate students (Klettke, Hallford, & Mellor, 2014). In contrast, 73.2% of the sample in this study were from outside the United States and 180 of the participants in this study (26.3% of the total sample) were aged 35-84. While still not representative of the global population of social media using-adults, it is hoped that the increased diversity of this sample will prove a useful addition to the literature.

There were a number of advantages to the online recruitment strategy used in this study. Recruitment for this study was conducted online across a wide range of websites and social media to ensure that the sample was drawn from the intended

population, adults who had used at least one social media site within the previous three months. Previous studies have found that online samples tend to be more geographically, socio-economically and ethnically diverse than samples recruited in-person (Berinsky, Huber, & Lenz, 2012). Furthermore, the anonymity offered by this online questionnaire is an additional strength, as previous research has found that participants report lower social anxiety and less need for social desirability when completing anonymous online surveys (Joinson, 1999). It is thought that this may reduce bias in survey responses, as participants feel less pressure to give answers that are perceived as socially acceptable. Studies comparing identical surveys administered either via computer or pen-and-paper found administering the survey via computer increased data quality and improved respondents' likelihood of reporting sensitive behaviour (Turner, Ku, Rogers, Lindberg, Pleck, & Sonenstein, 1998; Weeks, 1992).

4.8.2. Limitations Of The Study

The cross-sectional nature of the study design enabled data collection from a large sample but also limited the causal inferences that could be made about the relationships between variables. Previous research informed the hypotheses of Branley and Covey (2017), who assumed that social media exposure, perceived peer behaviour and risk propensity are all causally upstream from participants' own risk behaviour. As the first part of the current study is a replication and extension of this work, Research Questions One and Two tentatively make the same causal assumptions. However, the relationships between variables may be more complex – for example, social media users who engage in risk behaviours may seek out content encouraging these behaviours to affirm their beliefs about social norms. The design of the current study does not allow the direction or sequence of relationships between variables to be inferred.

In surveys investigating sexual behaviour, difference in understandings of key terms is a perennial methodological challenge, increasing systematic error in survey measurement (Fowler, 1992). For example, studies have shown that the term “unprotected sex” is culturally constructed and differs across population groups (Sewell, McGarrity, & Strassberg, 2017; Wynn, Foster, & Trussell, 2010). Previous research has found that in a survey of university students, 60% of participants did

not consider the term “having sex” to include oral sex, in contrast to definitions used by most large-scale surveys (Sanders & Reinisch, 1999). In the current study, it is possible that heterogeneity in respondents’ personal definitions of sex-related terms may have meant that participants were accessing different constructs, affecting results. Similarly, questions about having “sex with a stranger” did not define the term stranger, and may have been interpreted differently by different participants. Differences in interpretation may partially explain the heterogeneity of responses to questions on this specific behaviour. Face to face or telephone surveys may give more opportunity to explain these concepts, probe ambiguous responses and make sure there is a shared understanding of the concepts used. However, social desirability bias is common in survey research into sensitive topics such as sexual behaviour, and is more common in non-anonymous data collection procedures (Fenton, Johnson, McManus, & Erens, 2001).

As with the majority of research in this area, this study relied on participants retrospectively self-reporting on their social media exposure and behaviour. However, recent literature has cast doubt on the accuracy of self-reported internet use data, and both under and overreporting of internet use is common due to such factors as faulty recall and social desirability effects (Scharnow, 2016; Andrews, Ellis, Shaw & Piwek, 2016; Ellis, Davidson, Shaw, & Geyer, 2018; Ellis, 2019). Future research should take advantage of recent technological developments enabling the direct tracking of internet activity (Andrews, Ellis, Shaw, & Piwek, 2015; David, Roberts, & Christenson, 2018) and increase use of time-use diaries as a self-report measure (Hanson, Drumheller, Mallard, McKee, & Schlegel, 2010). However, these methods are likely to be more labour intensive and may be difficult to use at scale (Junco, 2013).

The age and gender imbalance in the study can be considered a limitation. While over 200 participants fell into each of the 18-24 or 25-34-year-old age groups, the 35-44 age group contained 119 participants and the 45-84 age group contained 61 participants. Similarly, just under one-third of participants were male. Analyses involving the older age groups and men may be underpowered, and sparse data may result in effects remaining undetected. This may be a particular issue for analyses involving interaction effects, where the necessary sample size to detect an

interaction effect will be at least four times larger than required for analyses where the aim is to detect an overall association (Kirkwood & Sterne, 2010, pp. 423).

4.9. Future Research

The results of this study indicate a number of future avenues of enquiry. Firstly, longitudinal research on the link between exposure to risk content on social media and participants' own behaviour at multiple time points would help to uncover any developmental or sequential changes in the experiences and behaviours of interest. This may help to provide evidence of possible causal relationships between variables, and possibly distinguish cohort effects from changes that occur within one cohort over time. This future research could also investigate the processes and pathways involved in online and offline risk behaviour, possibly exploring the roles of social norms and participant attitudes as per the Prototype Willingness Model (Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008),

The behavioural differences found between age groups in the current study indicate that studies of these variables conducted with university students may not be generalisable to a wider population. Future research could focus on adults over the age of 25 to add to the scant literature investigating their experiences.

Qualitative research may help in understanding how social media and behaviour are subjectively experienced by individuals. It may be of particular use in elucidating possible reasons for findings of the current study that are more difficult to explain with reference to the quantitative literature to date, e.g. why social media exposure may be associated with higher engagement in sex with a stranger for female participants, or why social media exposure is associated with different levels of drug use for different age groups.

Future research could build upon the findings of the current study by investigating if the association between social media and risk behaviour differs depending on whether the social media content is generated by known peers, wider networks, or commercial/marketing organisations. The role of self-generated content could also

be explored, as there is some research suggesting a link between posting alcohol-related content and alcohol misuse among adolescents (Geusens & Beullens, 2018).

Although risk propensity and perceived peer behaviour were not of primary interest in this study, the results show that their association was consistently strong and positive across all behaviours and models. Future research could investigate these relationships in more depth.

Finally, while the current research has found evidence for an association between social media exposure and risk behaviour across a range of online and offline behaviours, this association may be moderated by the effects of other variables linked to risk behaviour. Future researchers may wish to investigate if the association between social media exposure and participants' own behaviour varies according to factors such as relationship status, sexual orientation, intensity of social media use or most-used social media platform.

4.10. Summary Of Findings And Conclusion

The current study aimed to investigate if there was a relationship between exposure to social media content encouraging a range of risk behaviours and participants' own engagement in these risk behaviours. Across a diverse range of online and offline behaviours, a strong association was found between social media exposure and risk behaviour, and this effect was seen across all age groups. For all but one of the risk behaviours investigated in the replication and extension of a previous study of 18-24-year olds (Branley & Covey, 2017), gender was not found to be a significant predictor of risk behaviour, in contrast to earlier studies on gender and risk-taking. However, in the investigation of the relationship between social media exposure and risk behaviour in adults aged 18-84, female participants were found to be significantly less likely to engage in both risky offline sexual behaviours and drug use.

For investigations of age differences in adult risk behaviour, the association between social media exposure and participants' own behaviour tended to be strongest for participants in the 18-24 age group, but the difference between age groups was not

significant for the two risky offline sexual behaviours. The difference was statistically significant for the two risky online sexual behaviours. A strong relationship was found between social media exposure and participants' own behaviour for the two substance use behaviours, but this relationship was found to be weaker for older age groups.

The results of this study indicate that, although there is a strong positive association between social media exposure and risk behaviour, the relationships of gender and age to these variables is complex and varies across specific risk behaviours. The evidence for the complexity of these relationships conflicts with media and governmental concerns about a general harmful influence of social media, especially for young people. It can be inferred from this study that a one-size-fits-all approach to legislation is likely to be unhelpful, and it is important to look in more detail at the relationships between variables to inform policy and mental health interventions.

5. FURTHER CRITIQUE

As this study was a replication and extension of an extant piece of work, it was done under a certain set of assumptions. Although the majority of studies of online risk and behaviour are conducted under these assumptions, it is important to interrogate these and examine their utility when planning future research.

5.1. Evaluating The Quality Of Existing Studies

The Specialist Unit for Review Evidence (SURE) at Cardiff University have created a series of checklists to support the critical appraisal of research studies (SURE, 2018a, 2018b). In line with the research designs of studies published to date, the Specialist Unit for Review Evidence checklists for cross-sectional and cohort studies have been used to inform the evaluation of studies in this chapter.

A review of the published literature revealed seven original research studies that investigated the relationship between social media exposure to a specified risk-related behaviour and behaviour in adult participants. A brief summary of the SURE checklists as applied to the six cross-sectional studies and the one cohort study can be seen in Tables 29 and 30.

Each study reviewed clearly stated the study design, addressed a focused question and provided sufficient data on participant eligibility, the setting, location and relevant dates for recruitment and data collection. However, many studies in this area have been less clear on the rigour of participant selection and sampling and the appropriateness of measures of assessment. The remainder of this chapter will explore the most common limitations of the extant research in more detail, drawing on research in related areas where appropriate.

Table 29

Specialist Unit for Review Evidence (SURE, 2018a) Questions to assist with the critical appraisal of cross-sectional studies

	Branley & Covey, 2017	Brunelle & Hopley, 2017	Cabrera-Nguyen, Cavazos-Rehg, Krauss, Bierut, & Moreno, 2016	Hoffman, Pinkleton, Weintraub Austin, & Reyes-Velázquez, 2014	Robertson, McKinney, Walker, & Coleman, 2017	Stoddard, Bauermeister, Gordon-Messer, Johns, & Zimmerman, 2012
Is the study design clearly stated?	Yes, cross-sectional study design	Yes, cross-sectional study design	Yes, cross-sectional study design	Yes, cross-sectional study design	Yes, cross-sectional study design	Yes, cross-sectional study design
Does the study address a clearly focused question?	<p>“This study addresses this gap in the literature by using a measure of behavior and investigating whether there is a relationship between the type of content viewed on social media and congruent offline risky behavior.”</p> <p>Risk propensity, peer behaviour and gender controlled for.</p>	<p>“The purpose of this study is to investigate the role of descriptive norms as a potential mediator of the relationship between alcohol exposure via SNS and problematic alcohol consumption.”</p> <p>Gender, hours spent on social media and frequency of social media user controlled for</p>	<p>“We took a first step toward studying the associations between exposure to pro-alcohol- and marijuana-related content among young adults via Twitter and current heavy episodic drinking and current marijuana use, respectively.”</p>	<p>“The purpose of this study is to investigate associations between students’ use of social media, their exposure to alcohol marketing messages through social media, and their alcohol-related beliefs and behaviors.”</p> <p>Participants’ university and demographic factors controlled for</p>	<p>“To investigate how alcohol marketing and peers may promote college students’ alcohol use through social media.”</p> <p>Gender and race controlled for</p>	<p>“The purpose of this study was to examine the association between the presence of AOD [alcohol and other drug] use content in online social networking, perceived norms ... and alcohol and marijuana use in a sample of 18- to 24-year-olds.”</p>

Are the setting, locations and relevant dates provided?	Yes	Yes	Yes	Yes	Yes	Yes
Were participants fairly selected?	<p>Non-random, convenience sample; snowball sample, recruited through advertising on social media</p> <p>Eligibility: Aged 18-25, fluent English speakers, accessed social media within the past three months</p>	<p>Non-random, convenience sample; recruited from undergraduate students at a Canadian university</p> <p>Eligibility criteria unclear</p>	<p>Non-random, convenience sample; members of an online survey panel</p> <p>Eligibility: Social media users aged 18-25</p>	<p>Non-random, convenience sample; recruited from undergraduate communications courses at two US universities</p> <p>Eligibility criteria unclear</p>	<p>Non-random, convenience sample; recruited from undergraduate sociology classes at a US university and students who lived in campus residence halls</p> <p>Eligibility: 18-22 year old college students at a US university</p>	<p>Non-random, convenience and purposive sample; first wave of recruitment was through Facebook advertising with participants selected based on race/ethnicity and region of the US, second wave recruited through snowball sampling from these participants</p> <p>Eligibility: Aged 18-24, living in the US, with access to the internet</p>
Are participant characteristics provided?	Age, gender, and country of origin data provided	Age, gender, and ethnicity data provided	Age, gender, and ethnicity data provided	Age, gender and ethnicity data provided	Age, gender, ethnicity and year group data provided	Age, gender, race/ethnicity, level of education data provided

Are the measures of exposures & outcomes appropriate?	Self-report questionnaire Questionnaire reviewed by expert and piloted on a small sample	Self-report questionnaire	Self-report questionnaire	Self-report questionnaire Questionnaire piloted on a small sample	Self-report questionnaire Questionnaire based on focus group data and piloted on a small sample	Self-report questionnaire
Is there a description of how the study size was arrived at?	No	No	No	No	No	No
Are the statistical methods well described?	Logistic Regression Adequate description of how missing data were handled Coherent causal framework justifying the choice of confounding variables not provided Potential confounding factors controlled for	Multiple mediation analysis Statistical methods generally well described Adequate description of how missing data were handled Potential confounding factors controlled for	Logistic Regression Description of statistical methods and rationale very brief Adequate description of how missing data were handled Potential confounding factors not mentioned	Principal Components Analysis and Hierarchical Multiple Regression Description of statistical methods and rationale very brief No mention of missing data or data quality Potential confounding factors controlled for	Structural Equation Modelling Statistical methods generally well described Potential confounding factors controlled for	Multivariate regression Description of statistical methods and rationale very brief Missing data and data quality not mentioned Potential confounding factors not mentioned
Is information provided on participant eligibility?	Yes	No	No	Yes	No	Yes
Are the results well described?	Basic descriptive	Basic descriptive statistics included	Basic descriptive statistics included	Basic descriptive statistics included	Basic descriptive statistics included	Basic descriptive statistics included

	statistics not included	Results generally well described, but brief	Results generally well described	Results generally well described	Results generally well described	Results generally well described	Results described very briefly
	Confidence intervals for odds ratios not included						
Is any sponsorship/conflict of interest reported?	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Did the authors identify any limitations and, if so, are they captured above?	Limitations of study design in determining causality identified	Limited generalisability recognised Limitations of study design in determining causality identified	Limited generalisability recognised Limitations of self-report recognised Limitations of study design in determining causality identified	Limited generalisability recognised Limitations of study design in determining causality identified	Limitations of non-random sampling recognised Limitations of study design in determining causality identified	Limitations of non-random sampling recognised Limited generalisability recognised Limitations of self-report recognised Limitations of study design in determining causality identified, though language used throughout implies directional casual relationships	Limited generalisability recognised Limitations of study design in determining causality identified

Table 30

Specialist Unit for Review Evidence (SURE, 2018b) Questions to assist with the critical appraisal of cohort studies

Specialist Unit for Review Evidence (SURE) Questions to assist with the critical appraisal of cohort studies	Boyle, LaBrie, Froidevaux, & Witkovic, 2016
Is the study design clearly stated?	Yes, prospective cohort study
Does the study address a clearly focused question?	“This prospective study examines how exposure to alcohol-related SMS content by peers (i.e., Facebook + Instagram + Snapchat) during the initial six weeks of college (T1) may influence viewers’ alcohol consumption during the second semester of college (T2).”
Are the setting, locations and relevant dates provided?	Participants’ gender, own alcohol use and alcohol use of peers at T1 controlled for Yes
Were participants fairly selected?	Non-random, convenience sample; first year undergraduate students recruited in the summer prior to beginning at a university in the US. Students were initially recruited as part of a larger study for which selection criteria were unclear. Students attending summer orientation were emailed links to the questionnaire at T1 and T2. 80.1% of recruited participants completed both T1 and T2 measures. Eligibility: First year undergraduate university students, unmarried, under the age of 21, residing with a parent or guardian and planning to attend summer orientation.
Are participant characteristics provided?	Age, gender, and ethnicity data provided
Are the measures of exposures & outcomes appropriate?	Self-report questionnaire
Was bias considered?	Unknown
Is there a description of how the study size was arrived at?	No

Is information provided on participant flow?

Brief information provided on participant flow: e.g. numbers of participants at recruitment, T1 and T2.

Details of missing participant data not mentioned

Are the results well described?

Basic descriptive statistics included

Results generally well described

Is any sponsorship/conflict of interest reported?

N/A

Did the authors identify any limitations and, if so, are they captured above?

Limited generalisability recognised

Limitations of self-report recognised

Limitations of study design in determining causality identified

5.2. Limitations Of Current Research On Risk-Promoting Social Media Material And Behaviour

5.2.1. Participant Selection: Representativeness, Coverage And Sampling

In all quantitative research, it is important that sampling is conducted so that the responding participants accurately mirror the population that the survey seeks to represent. It is common for psychological studies to use a convenience sample consisting of local university students, despite evidence suggesting that university students are unrepresentative of the general population across many domains (Henrich, Heine, & Norenzayan, 2010). Mirroring this tendency in the wider discipline of psychology, the majority of studies published to date investigating the relationship between viewing risk-promoting content on social media and participants' own risk behaviour has been conducted on university students (e.g. Brunelle & Hopley, 2017; Cabrera-Nguyen, Cavazos-Rehg, Krauss, Bierut, & Moreno, 2016; Hoffman, Pinkleton, Weintraub Austin, & Reyes-Velázquez, 2014).

Studies that have not focused on school or university students have tended to recruit participants by publicising the survey through social media, advertisements posted on the internet or through personal networks (e.g. Branley & Covey, 2017). While this strategy may be appropriate when the specific population of interest is social media users, it is likely to be less suitable when researchers wish to reach a sample that represents the general population.

When conducting research that is not specifically focused on internet or social media users, this technique may lead to the systematic exclusion of significant segments of the population. Although some studies have found internet-based samples to be relatively diverse in terms of age, gender, socioeconomic status and geographic region (Gosling, Vazire, Srivastava, & John, 2004), others have reported participants in internet survey panels to be richer, younger and more educated than participants in postal survey panels (Rookey, Hanway, & Dillman, 2008). In the US, postal survey panels have been found to reflect the demographic profile of the general population more closely than internet survey panels (Rookey, Hanway, & Dillman, 2008). More recent research has shown

that in Western Europe and the United States, the population of internet users is very similar to the general population across all characteristics surveyed (Internet Society, 2014). These findings indicate that although internet research may now have capacity to reach a similar population to offline methods, this may not have been the case for earlier internet-based studies. Additionally, online and offline samples may differ in specific characteristics that have not been accounted for in comparative research to date, and so researchers should be cautious in generalising the results to the population as a whole.

The issues associated with recruitment through social media are less pronounced for studies that focus exclusively on social media users. However, care must still be taken to ensure that the study participants reflect the population of social media users as a whole. For example, when investigating the behaviour of users of a particular social media platform, researchers could compare demographic data of participants with estimated population totals for users of that specific social media platform. If specific demographic groups are seen to be systematically underrepresented in the participant sample, researchers could focus on these groups in an additional recruitment drive.

Self-selection bias may also be an issue for the representativeness of an online, non-random sample. Although the population of internet users may now more accurately reflect the general population, the group of internet users who choose to participate in online research may not be representative. Rooney (2016) asserts that while this problem is not specific to online research, due to the large samples recruited online this effect can be magnified. Chang and Krosnick (2009) conducted a comparison of a random sample and a non-random sample of participants completing an online questionnaire. They found that the non-random sample who selected studies to complete according to personal interest returned more accurate results than the random sample, but were less representative of the general population. It is likely that self-selecting participants in studies of social media use and behaviour have a greater interest in the subject, and so their results are less generalisable to the population as a whole.

5.2.2. Difficulties In Defining And Categorising Social Media For Research

Purposes

Studies of risk-promoting social media content and behaviour have either asked participants to respond based on their experiences with a specific social media site, or have asked based on their experiences with social media in general.

There are advantages and disadvantages to both approaches.

5.2.2.1. Research on multiple social media sites: As the majority of social media users engage with more than one social media site (Smith, Anderson, & Jiang, 2018), it may be difficult to explicate the relationship between behaviour and use of a specific social media site. Many of the studies to date on the relationship between social media and risk behaviour have asked participants about their experiences with social media in general, rather than any specific site. However, there are a number of issues with this approach.

Although there have been many attempts to define social media (e.g. Boyd & Ellison, 2007; Kaplan and Haenlein, 2010; Obar & Wildman, 2015), there is no consensus on which sites or apps constitute social media, and definitions differ across studies and research groups. For example, Pew Research Center includes messaging apps such as Whatsapp in its yearly social media use report (Smith, Anderson, & Jiang, 2018), whereas messaging apps are explicitly excluded from the definitions of social media used in many published studies on social media and risk behaviour (e.g. Branley & Covey, 2017). Some studies provide participants with definitions of the types of app and site that they consider to be social media (e.g. Branley & Covey, 2017), while others describe the activities they consider to constitute participating in social media (e.g. Hoffman, Pinkleton, Weintraub Austin, & Reyes-Velázquez, 2014) or explicitly name the sites that they want participants to hold in mind for the purposes of their study (e.g. Boyle, LaBrie, Froidevaux, & Witkovic, 2016). Overly broad or unclear definitions of social media may result in participants drawing on their own idiosyncratic definition of social media when responding, which may differ from the definition of the researcher and even other respondents. This is a particular risk when the survey or interview is long and when the definition of social media is presented at the beginning. Asking participants about specific, named social media sites is a potential solution to this issue of categorisation.

Social media can encompass purposes as diverse as facilitating text, photo and video sharing, encouraging the growth of professional networks and enabling people to track their family history. Under the umbrella term social media, research suggests that users of different social media sites use the sites in different ways, engage in different offline behaviours and have different demographic characteristics (Duggan, Ellison, Lampe, Lenhart, & Madden, 2015). This calls into question the assumption that a uniform association would exist between social media exposure and behaviour across social media platforms. These differences mean that researchers should think carefully, for example, about whether the relationship between exposure to risk-promoting content and behaviour on Twitter could be expected to have the same magnitude or direction as the association between the same variables on Facebook. If the magnitude of the relationship differs across social media sites, a study treating social media as a monolith creates a possibility of real effects on a specific site being obscured by this variation.

5.2.2.2. Research on specific social media sites: However, considering specific social media sites is not without problems. In addition to demographic differences across social networking sites, the demographic profiles of users of specific social media sites can change rapidly over time; for example, the number of American teenage Facebook users was recently found to have dropped 20% over a three year period (Anderson & Jiang, 2018). Assumptions that the results of a ten-year-old study of Facebook users could be comparable to a direct replication conducted today must be questioned. Social media sites may also be launched, change or shut down on a cycle that is far shorter than that of the average piece of research, raising subsequent questions about the relevance of the results of the study. Regardless of whether participants are asked about specific social media sites or social media sites in general, the limited generalisability of study results across social media sites, settings and time must be recognised.

A potential partial solution to the problem of general versus specific questions on social media sites is a hybrid approach, asking participants to report on their experiences with a range of social media sites sequentially. If separate

analyses show that the relationship between the variables of interest is similar across social media platforms, then the data may then be analysed in aggregate if needed.

If choosing specific social media sites to investigate, researchers may wish to identify their target population and target behaviour and choose a social media site accordingly. For example, in 2019, Snapchat or Instagram would be more appropriate platforms than Facebook for researchers who wish to focus on the relationship between alcohol-related social media and the behaviour of 18-25 year olds.

5.2.3. Limitations Of Self-Report Measures

It is important to note that none of the published studies to date in this area have looked at actual exposure to risk content on social media, and have instead collected self-reports of exposure to risk content. Likewise, all measures of participants' own behaviour are based on self-report rather than direct measurements. The accuracy of responses is likely to be affected by a number of factors, and so responses may not be a direct analogue for actual exposure to the material or actual behaviour.

Self-report survey data is the cornerstone of research into the relationship between online material and behaviour; not one of the studies found in the literature search for this thesis used another method. However, the limitations of self-report measures should be recognised and minimised in future research.

Tourangeau (1984) argues that there are four components to the process of answering survey questions. The participant must understand the questions as the researcher intended, retrieve the necessary information, integrate the information they receive using an appropriate estimation or judgment strategy and report the answer without distortion.

5.2.3.1. Comprehending the questions: It is vital to accurately conceptualise and operationalise constructs and variables of interest in any research, but it is even more important in self-report surveys, where participants cannot ask for clarification. Conceptualising constructs may be particularly difficult in studies of

risk behaviour, where nomenclature may differ across cultural and demographic groups. Drug use terminology (Ouellet, Cagle, & Fisher, 1997), definitions of sex (Sanders & Reinisch, 1999) and definitions of sexting (Barrense-Dias, Berchtold, Suris, & Akre, 2017) are known to vary widely across age groups, cultures and locations. If definitions used in research do not match those used by study participants, participants' experiences may not be accurately captured. Qualitative research with specific population groups of interest and focus groups may be helpful during survey development to minimise these risks. Specificity is also an important consideration in question formulation. Generally speaking, global, inexact questions can be expected to not fully capture less common experiences that would nevertheless fall under the category in question (Johnson, 2014).

5.2.3.2. Retrieving the necessary information and making required judgments:

Once the question has been understood by the participant, they must retrieve the memory and make a judgment to convert the retrieved information into an appropriate answer. Having any kind of memory impairment is likely to interfere with memory retrieval, affecting the accuracy of the results. In terms of risk behaviour, high current or historical drug and alcohol consumption have been associated with impaired memory which may affect participants' ability to provide accurate responses (Ardila, Rosselli, & Strumwasser, 1991; Babor, Steinberg, Anton, & Del Boca, 2000; van Gorp et al. 1999).

A specific memory difficulty which may impact accuracy of self-report is retrieval bias. The majority of studies on retrieval bias in self-report behavioural measures have focused on alcohol consumption. Some studies have found using a daily diary to track alcohol consumption to be the most reliable method, at 90% accurate, while questionnaire data was found to be 60% accurate on average (Poikolainen, & Kärkkäinen, 1983). Although diary protocols have been considered the gold standard in self-report research (Johnson, 2014), they are not practical for gauging less common behaviour, or tracking behaviour over longer periods of time.

In further evidence of the difficulty of collecting accurate self-report data, a within-subjects design study found that asking participants about their alcohol

consumption in three different ways led to drastically different self-estimates of high risk drinking and prevalence of harm, with one method associated with estimates of five times and three times higher prevalence rates than the other two (Rehm, Greenfield, Walsh, Xie, Robson, & Single, 1999). Given the assumption that participants are unlikely to overreport socially undesirable behaviour, it can be inferred that the method with the highest estimates of prevalence of harm is the most accurate (Tourangeau & Yan, 2007). The study found that questions about weekly drinking behaviour and average drinking behaviour over a year were associated with less disclosure than a “graduated frequency measure”, which asks questions about the number of occasions over the past year when specific quantities of alcohol were consumed (>12 drinks, 8-11 drinks, 5-7 drinks, etc.). The authors hypothesised that the graduated frequency measure allows a more precise estimate of irregularly-timed high alcohol consumption. Other studies have found asking participants about their alcohol consumption on the previous day to be the best method to minimise underreporting (Stockwell, Zhao, Chikritzhs, & Greenfield, 2008). However, like diary protocols, this method is unlikely to be practical over the longer term.

These examples highlight the importance of carefully formulating self-report surveys to maximise accurate recall through increasing question specificity while capturing the variability of instances of the behaviour across time. Questions which prompt participants to recall their average alcohol or substance use are unlikely to be accurate.

5.2.3.3. Reporting the answer without distortion: Survey methodology is commonly used to ask questions about sensitive behaviours such as engagement in illicit drug use, voting behaviour or experiences of abortion (Tourangeau & Yan, 2007). However, research on the accuracy of self-report has shown that misreporting behaviour is a major source of bias in surveys. For example, a study of reporting issues in surveys of drug use found that 30%-70% of participants who tested positive for cocaine or opiates denied having used drugs recently (Tourangeau & Yan, 2007). Similar results have been found when comparing national data on abortion rates with self-reports from women (Fu, Darroch, Henshaw, & Kolb, 1998) and comparing self-reported voting behaviour with voting records (Belli, Traugott, & Beckmann, 2001)

Social norms are likely to affect both rates of engagement in a behaviour and the social desirability of engaging in that behaviour. As social norms tend to vary across ages and cultures, image management and social desirability bias are also likely to vary across groups; Johnson and van der Vijver (2002) provide the example of voting norms and education level:

For instance, the norm of voting is probably stronger among those with high levels of education than among those with less education. As a result, highly educated respondents are both more likely to vote and more likely to misreport if they did not vote than are respondents with less education. This differential misreporting by education will yield an overestimate of the strength of the relationship between education and voting. (p. 196).

Additionally, social desirability bias can operate in different directions for different groups. Smith (1992) found that men consistently report having had almost twice as many lifetime sexual partners as women, despite the fact that both the total and average number of partners should be approximately the same for both genders. This indicates that the social desirability of sexual activity with multiple partners is not just different in magnitude between the genders, but also in direction.

The degree to which image management is an issue with self-report measures is likely to vary according to the sensitivity of the topic of interest, as well as the qualities and experiences of the respondent. For example, a woman from a socially conservative country may be less likely to divulge details of her sexual activity in an online survey than a man from a more socially liberal country. In studies of online material and risk behaviour, the differential rates of under and overreporting of risk behaviours across groups may lead to erroneous conclusions being drawn about between-group differences. Across the literature reviewed for this thesis, none of the studies which compared groups addressed the limitation of differing levels of reporting bias for different demographic groups.

Social desirability bias is also likely to vary across behaviours; although evidence suggests that survey participants tend to underreport both alcohol use

(Lemmens, Tan, & Knibbe, 1992) and drug use (Johnson & O'Malley, 1997), participants tend to underreport drug use to a larger degree (Tourangeau, Rips, & Rasinski, 2000). One explanation may be that participants may be less likely to report antisocial or illegal behaviours than behaviours that simply deviate from social norms; for this reason studies investigating multiple risk behaviours should recognise that even within a sample, the magnitude of the social desirability bias across different behaviours may not be generalisable across behaviours.

However, steps may be taken to reduce bias by minimising researcher presence in the administration of self-report measures. Providing anonymity has been linked to reduced bias in self-reported alcohol consumption (Del Boca & Darkes, 2003). Reviews of the literature have found increased levels of reporting on socially undesirable topics such as drug use (Tourangeau & Yan, 2007) and psychiatric symptoms Richman, Kiesler, Weisband, and Drasgow, 1999) when questions were administered using a computer rather than an interviewer. Similarly, Tourangeau and Smith (1996) found that self-administration eliminated the gap between men's and women's reported number of sexual partners, reducing the number of partners reported by men and increasing the number reported by women. Additionally, experimental and observational research has concluded that Web-based survey administration yields more accurate results than other forms of paper-based and computer-based self-administration (Chang & Krosnick, 2010; Kreuter, Presser, & Tourangeau, 2008; Tourangeau, Rips, & Rasinski, 2000). Therefore Web-based methods of survey administration may be more suitable for gathering data on sensitive topics where responses are vulnerable to social desirability bias.

5.2.3.4. Online self-report measures: Online data collection has many other advantages; it is low cost, it can enable researchers to reach very large numbers of participants or specific groups of participants who may be more difficult to recruit through more conventional means (Clifford & Jerit, 2014). However, the lack of researcher oversight during data collection can be a concern for researchers. Laboratory-based studies allow researchers to optimise the environment under which the data is collected, setting boundaries in terms of noise, distractions and time limits on completing the survey. It is also

possible that participants may pay more attention or put more effort into their performance while overseen by a researcher, as opposed to, for example, while completing the survey on their phone in the evening while watching TV. These concerns can be somewhat ameliorated by specifying in the survey directions the conditions under which the survey is to be completed; for example, with the study window maximised on a laptop or desktop computer rather than a mobile device, in a quiet room and all in one sitting. Although it is not always possible to police if participants are following these instructions, there are technological solutions to block participants completing the survey on a mobile device or in a non-maximised browser window, and imposing time limits for sections of the survey can help participants to stay on task and not take breaks during self-administration.

There can be more capacity for participants to be untruthful about their demographic information, language proficiency, or other factors that may influence the validity of the data when collected online versus face to face. Rodd (2019) recommends administering a short vocabulary test as part of the survey to determine if participants meet minimum language requirements for the study, and asking important demographic questions more than once, excluding participants that give inconsistent results.

5.2.4. Issues With Causal Inferences

Chambliss and Schutt (2018) list three criteria to consider when attempting to establish the existence of a causal effect: empirical association, temporal priority of the independent variable, and nonspuriousness. Thus far, an association between reported exposure to risk-related content on social media and reported behaviour has been found across a number of single time point self-report studies, meeting the first criterion (e.g. Branley & Covey, 2019; Hoffman, Pinkleton, Weintraub Austin, & Reyes-Velázquez, 2014; Stoddard, Bauermeister, Gordon-Messer, Johns, & Zimmerman, 2012). However, none of these studies have been designed in such a way as to provide convincing evidence as to the presence or absence of a directional or causal relationship. Many of these studies hypothesise that social media exposure may have a causal influence on behaviour, yet it is also possible that engagement in the risk

behaviour may influence people to seek out social media material to validate their choices. The research to date has not untangled these two possibilities.

In terms of future research, although it may be technically possible to conduct experimental research in this area using targeted advertising, social media posts, and data collected by social media companies, there are ethical issues with conducting experimental research which may lead to participants engaging in behaviour with greater risk of harm. Due to the difficulties with conducting experimental research in this area, evidence of a directional causal relationship between the variables of interest may potentially be collected through observational longitudinal studies. A longitudinal study could track a cohort of participants who do not engage in the risk behaviour over an extended period of time, collecting data periodically on engagement in the behaviour and exposure to risk-promoting content on social media. The results of a well-designed longitudinal study would have the potential to meet Chambliss and Schutt's (2018) second and third criterion for establishing a causal relationship. Within studies of the association between risk behaviour and social media, the only longitudinal study was conducted by Boyle, LaBrie, Froidevaux, & Witkovic (2016), investigating alcohol consumption in first year undergraduate university students. The study questioned participants about alcohol behaviours, viewing of alcohol-related material on social media, and a number of theorised mediating variables one month into their first semester at university (T1) and six weeks into their second semester. (T2) Taking additional data points, both before the start of the first semester and between T1 and T2, may have clarified the temporal order and directionality of any effect.

Even when the authors do not assert causality, word choice and styles of reporting may lead the reader to assume a direction of influence. Studies of online material and risk behaviour tend to use the word exposure (e.g. Branley & Covey, 2017; Cabrera-Nguyen, Cavazos-Rehg, Krauss, Bierut, & Moreno, 2016), which may be assumed to precede a negative event, as in the terms sun exposure, pre-exposure prophylaxis and radiation exposure. The word exposure has been used throughout this thesis due to its ubiquity in the literature; more neutral alternative terms such as "encountered on social media" or "seen on social media" may make readers' erroneous inferences of causality

less likely. Clarity around causality is particularly important for research that may be reported in the media or used to inform public policy.

5.2.5. Recommendations For Future Research In The Area

Over the past decade, much knowledge has been gathered on the relationship between online material and behaviour through employing self-report survey methodology. However, important gaps in our knowledge remain which cannot be filled by proceeding with the same strategies. Some recommendations for future research are listed below.

- Optimise research design to maximise data quality.
 - This can be done through having a specific hypothesis and target population for recruitment, ensuring that exclusion criteria are clear and explicit, and recruitment strategies are selected that maximise access to this population. If recruitment occurs online or through social media, researchers should consider ways in which recruited participants may differ from those recruited through other strategies, and potentially consider supplemental recruitment drives to make the sample more representative. Alternatively, be clear about the limited generalisability of the results.
 - If using self-administered survey methodology, develop strategies for maximising the likelihood of participants understanding what the researchers mean by the questions. This may involve expert reviews, focus groups, cognitive interviews or other forms of preliminary qualitative research before conducting a quantitative investigation. A “pre-test” phase where a small number of participants complete the survey and give feedback on the experience can help with identifying issues before data collection begins.
 - Be precise in definitions of key variables and constructs of interest (especially in the definition of social media), and if possible maintain consistency with previous studies in the area to aid comparison of results.
 - Be parsimonious in the amount of information that is presented to participants in order to reduce cognitive load and fatigue as the survey progresses.

- There few alternatives to self-report methodologies for effectively monitoring risk behaviours in a general population. For this reason, it is important to do everything possible to make the responses collected more accurate, following best practice in the area.
- Improve data analysis
 - Pre-register studies where possible and make a clear distinction between hypothesis testing and exploratory (post hoc) analyses.
- Understanding, reporting and reproducing results
 - Following up on the results of quantitative research with qualitative work can add depth and richness to the findings.
 - In addition to surveys, use more diverse research methods to investigate the area of interest, e.g. online observational studies, interviews, online experiments, direct monitoring of social media use in real time and use of daily diaries. The concurrent validity of results of previous studies may be evaluated by comparing the results with studies using different methodologies. Alternatively, results of survey research can be confirmed by studies using smaller samples, shorter time periods and more resource intense methodologies, such as direct monitoring of social media use.

5.2.6. Additional Recommendations On Research Into Online Harms

The Online Harms White Paper (Department for Digital, Culture, Media & Sport & Home Office, 2019) proposes a new regulatory framework to protect internet users in the UK from online harms, both legal and illegal. However, there is a dearth of research on the nature of the link between online material and harm, and what interventions would be appropriate to reduce the risk of harm.

This thesis has focused specifically on the relationship between six specific legal but potentially harmful volitional risk behaviours and risk-related material on social media, viewed by adult participants. Although this constitutes a subset of the kinds of harms mentioned in the White Paper, I believe that this research and literature review may provide an indication of potentially fruitful areas of related research. In addition to the recommendations made in the previous section, several online harm-related possible directions for future research are indicated below.

5.2.6.1. Establishing a causal relationship between online material and harm:

The Online Harms White Paper mentions that several different risk behaviours, such as self-harm and suicide, are commonly associated with online risk-promoting material. However, a causal relationship between the behaviour and the online content has not been definitively established. High-quality, large scale longitudinal studies following a representative sample of the general population should be a research priority in order to determine if viewing risk-promoting content precedes or succeeds engagement (or plans to engage) in similar risk behaviour. Without investigating if there is a causal relationship between the variables and collecting data on how harmful online content may be, there is a risk that content and behaviour defined as harmful may be dictated by social mores rather than evidence. Investigating these questions should be a priority to ensure that policy is based on objective evidence and any interventions are necessary and proportionate.

5.2.6.2. Defining and measuring online harm: In addition to the general recommendations listed in the previous section, the limitations of research to date show that it is necessary to define harm clearly and operationalise it for future research studies. Recent exploratory qualitative and quantitative research by Ofcom found that many adults and young people surveyed reported that they had experienced online harm, and were worried about the vulnerability of others to experiencing harm and engaging in harmful behaviour (Ofcom, 2018c, 2019a, 2019b). A possible next step would be to use the qualitative data collected in these studies to inform a working definition of online harm. It may be necessary to distinguish between different types of harm – for example, material that causes harm directly may be considered distinct from material that encourages harmful or risky behaviour. Once online harm has been clearly defined, a large-scale quantitative research study could be conducted with a random sample of participants nationwide, establishing the prevalence of online harm, the impact on individuals, and investigating whether specific demographic groups are more likely to be affected. Achieving random sampling is important in an area of research where most studies conducted thus far have involved self-selecting groups that are likely to be unrepresentative of the general population. It may also be advisable to focus research on groups

that may be particularly vulnerable to online harm: a recently released Rapid Evidence Assessment on adult online hate, harassment and abuse (Davidson et al., 2019) recommends additional research into victim diversity.

Systematically collecting data on the sexual orientation, race, ethnicity, and disability of people who experience online harm may provide insight on whether specific groups are at greater risk of harm. However, identifying particularly vulnerable groups should not preclude investigation of situational and contextual factors which may also increase risk of harm.

It may also be helpful to identify the social media and websites that participants report to be most associated with harm, as this information may be used to inform interventions. Participants in one study of the prevalence of online harassment reported experiencing harassment more frequently on Facebook than on other social media sites (Cybersmile Foundation, 2017), but it is not known whether this is because harassment is more common on Facebook or whether Facebook is just more commonly used than other social media. Further research into online harms more generally should prioritise mapping the social media which are currently perceived as hosting content that is more or less harmful. However, due to the rapid pace of changes in online communication and social media, any study of this kind should be considered a snapshot in time rather than a definitive picture of the area.

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7. APPENDICES

Appendix A: Ethical Approval

School of Psychology Research Ethics Committee

NOTICE OF ETHICS REVIEW DECISION

For research involving human participants

BSc/MSc/MA/Professional Doctorates in Clinical, Counselling and Educational Psychology

REVIEWER: Elley Wakui

SUPERVISOR: Volker Thoma

STUDENT: Chris O'Mahony

Course: Professional Doctorate in Clinical Psychology

Title of proposed study: TBC

DECISION OPTIONS:

1. **APPROVED:** Ethics approval for the above named research study has been granted from the date of approval (see end of this notice) to the date it is submitted for assessment/examination.
2. **APPROVED, BUT MINOR AMENDMENTS ARE REQUIRED BEFORE THE RESEARCH COMMENCES** (see Minor Amendments box below): In this circumstance, re-submission of an ethics application is not required but the student must confirm with their supervisor that all minor amendments have been made before the research commences. Students are to do this by filling in the confirmation box below when all amendments have been attended to and emailing a copy of this decision notice to her/his supervisor for their records. The supervisor will then forward the student's confirmation to the School for its records.
3. **NOT APPROVED, MAJOR AMENDMENTS AND RE-SUBMISSION REQUIRED** (see Major Amendments box below): In this circumstance, a revised ethics application must be submitted and approved before any

research takes place. The revised application will be reviewed by the same reviewer. If in doubt, students should ask their supervisor for support in revising their ethics application.

DECISION ON THE ABOVE-NAMED PROPOSED RESEARCH STUDY

(Please indicate the decision according to one of the 3 options above)

Minor amendments required *(for reviewer):*

Approved –just a few details to update, e.g. Chair of School ethics is Tim Lomas. I have attached a commented copy so it is easy to find this.

Major amendments required *(for reviewer):*

Confirmation of making the above minor amendments *(for students):*

I have noted and made all the required minor amendments, as stated above, before starting my research and collecting data.

Student's name *(Typed name to act as signature):* Chris O'Mahony
Student number: 1622894

Date: 28/9/18

(Please submit a copy of this decision letter to your supervisor with this box completed, if minor amendments to your ethics application are required)

ASSESSMENT OF RISK TO RESEACHER *(for reviewer)*

Has an adequate risk assessment been offered in the application form?

YES / NO

Please request resubmission with an adequate risk assessment

If the proposed research could expose the researcher to any of kind of emotional, physical or health and safety hazard? Please rate the degree of risk:

HIGH

Please do not approve a high risk application and refer to the Chair of Ethics. Travel to countries/provinces/areas deemed to be high risk should not be permitted and an application not approved on this basis. If unsure please refer to the Chair of Ethics.

MEDIUM (Please approve but with appropriate recommendations)

LOW

Reviewer comments in relation to researcher risk (if any).

Reviewer (*Typed name to act as signature*):

Elley Wakui

Date: 27/09/18

This reviewer has assessed the ethics application for the named research study on behalf of the School of Psychology Research Ethics Committee

RESEARCHER PLEASE NOTE:

For the researcher and participants involved in the above named study to be covered by UEL's Insurance, prior ethics approval from the School of Psychology (acting on behalf of the UEL Research Ethics Committee), and confirmation from students where minor amendments were required, must be obtained before any research takes place.

For a copy of UELs Personal Accident & Travel Insurance Policy, please see the Ethics Folder in the Psychology Noticeboard

Appendix B: Participant Information Sheet

Information sheet

About this study

You are invited to take part in a study investigating social media use. Social media are defined as *websites and applications that enable users to create and share content or to participate in social networking*. This study is being conducted as part of my Professional Doctorate in Clinical Psychology at the University of East London.

What does the study involve?

The study involves completing an anonymous online questionnaire about social media use and behaviour, which should take no longer than 12 minutes.

Who can take part?

If you are over 18 years old, a fluent English speaker and have used social media within the last three months, you are eligible to participate.

Are there any risks or benefits of taking part in the study?

There are no risks to taking part in this study. While taking part in this study would not lead to personal benefits for you, it would contribute to our knowledge of social media and behaviour. As a thank you for participating, everyone who completes this questionnaire will have the opportunity to be entered into a free prize draw to win one of four £25 Amazon vouchers. Once data collection has been completed, the winners will be contacted via email.

What will happen to the information that I provide?

You will be asked to complete an online questionnaire anonymously, and you will not be asked for any information that might identify you. All information will be treated in the strictest confidence, and will not be traceable back to you. The results of this study will be used as part of a doctoral thesis that will be submitted to the University of East London, which may later be shared in an academic journal or at professional conferences. You may withdraw your data up until the point that I begin data analysis, which is currently estimated to be March 2019. The data collected in this study will be held on an EU-based server and will be subject to EU data protection laws, and all online data will be destroyed once data collection is complete.

What if I have any questions before, during or after taking part in this study?

If you have any questions, you can contact me, the principal researcher, by emailing me at u1622894@uel.ac.uk or by writing to me at: Chris O'Mahony School of Psychology University of East London Water Lane London E15 4LZ You may also contact my supervisor Dr Volker Thoma at v.thoma@uel.ac.uk, or Dr Tim Lomas, Chair of the School of Psychology Ethics Committee at the University of East London at t.lomas@uel.ac.uk.

A printable version of this information sheet can be downloaded here: [Information sheet](#)

Appendix C: Consent Form

Statement

I have read and understood the information sheet relating to the research study on social media use and behaviour, and I have been given the option of downloading and keeping this document. I understand the purposes of this research and what I am being asked to do in this study.

I understand that no personally identifying data will be collected in this study, and both my involvement in this study and any personal data collected will remain strictly confidential, and will only be accessed by the researchers running this study. If I wish to withdraw my data from this study I will be free to do so up until the point at which the researcher begins data analysis, which is currently estimated to be January 2019.

I understand that participation is entirely voluntary. By signing this consent form, I am stating that I am over the age of 18 and I freely and fully consent to participate in this study.

- I consent to take part in this study (1)
- I do not consent to take part in this study (2)

Appendix D: End of Survey Message

Thank you for completing this survey. For a chance to win one of four £25 Amazon vouchers, please click [here](#), which will take you to a new page where you can enter your email address. It will not be possible to link your answers in

this survey to your email address, and so your responses will remain confidential.

Please take a note of the participant code that you provided at the beginning of this survey. You can email the code to me if you wish to withdraw your data from the study.

If you are feeling distressed as a result of completing this survey, please contact Samaritans for support. Alternatively, you can contact me at the email address below and I can direct you to other organisations that can provide assistance. You can also contact me if you have any questions about this research.

Chris O'Mahony
Email: u1622894@uel.ac.uk

Supervisor:
Volker Thoma
v.thoma@uel.ac.uk

SAMARITANS
Email: jo@samaritans.org
Phone: 116 123

Appendix E: Questionnaire

Are you over the age of 18?

Yes (1)

No (2)

Have you used social media within the past three months?

- Social Media includes all of the following:
Social Networking Sites, e.g. Facebook, Google+, LinkedIn
- Blogging and Microblogging platforms, e.g. Twitter, Tumblr, WordPress, LiveJournal
- Photo and video-sharing platforms, e.g. Snapchat, Instagram, Pinterest, YouTube Online communities/forums, e.g. Reddit, Slashdot

We are interested in your use of these kinds of Social Media applications regardless of whether you access them on a computer or via apps on a mobile device.

PLEASE NOTE: For the purpose of this research the following sites/applications are *not* included:

- Email Chat rooms (e.g. Google Hangouts, Chatroulette)
- Instant messaging (e.g., Skype, WhatsApp, Viber, Kik, Messenger)
- Online games and virtual worlds (e.g. Fortnite, Minecraft, SecondLife, World of Warcraft)

Yes (1)

No (2)

Please select and take note of a four to six character code that will be used to identify your information. If after submission you decide to withdraw your answers from the dataset, you can email me with your code which will allow me to identify and remove your answers. Your code can contain numbers, letters or a mixture of both, e.g. 1234, abcde or 1a2b3c.

—

Social Media

Whilst using Social Media over the past 12 months, how often have you come across material that encourages the following behaviours? This can include material that: is supportive of these behaviours, encourages and/or provides instruction on how to partake in these behaviours or simply portrays these

behaviours in a positive light for example by portraying the behaviour as 'fun', 'enjoyable', 'cool', 'fashionable' etc.

	Never (1)	Rarely (2)	Occasionally (3)	Frequently (4)	Very frequently (5)
Illegal drug use (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drinking alcohol to excess, i.e., until very drunk (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sex with a stranger (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unprotected sex (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sending sexually explicit text messages (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sending sexually explicit photographs or videos of yourself (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please indicate the extent to which you agree or disagree with the following statements, where 1=totally disagree, 9=totally agree, and 5=neutral.

	1	2	3	4	5	6	7	8	9
Safety first (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I do not take risks with my health (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I prefer to avoid risks (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I take risks regularly (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I really dislike not knowing what is going to happen (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I usually view risks as a challenge (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please indicate the extent to which you view yourself as a risk avoider or risk seeker.

	Risk avoider							Risk seeker	
	1	2	3	4	5	6	7	8	9
I am a...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Over the past 12 months, how often have you engaged in the following behaviours?

	Never (1)	Rarely (2)	Occasionally (3)	Frequently (4)	Very frequently (5)
Illegal drug use (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drinking alcohol to excess, i.e., until very drunk (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sex with a stranger (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unprotected sex (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sending sexually explicit text messages (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sending sexually explicit photographs or videos of yourself (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

To the best of your knowledge, have any of your friends engaged in the following behaviours within the past 12 months?

	Not aware of any friends who have done this (1)	Know one friend who has done this (2)	Know of more than one friend who has done this (3)
Illegal drug use (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drinking alcohol to excess, i.e., until very drunk (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sex with a stranger (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unprotected sex (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sending sexually explicit text messages (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sending sexually explicit photographs or videos (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Finally, I would like to ask you for some demographic information.

What is your gender?

- Male (1)
- Female (2)
- Other (3)

Do you consider yourself to be...

- Heterosexual (1)
- Gay/Lesbian (2)
- Bisexual (3)
- Other (4)
- Prefer not to say (5)

What is your relationship status?

- In a committed relationship (1)
 - In a casual relationship (2)
 - Married (3)
 - Separated/Divorced (4)
 - Single (5)
 - Other (6)
-

In which country were you born?

In which country do you now live?

How old are you?

- Under 18 (1)
- 18 - 24 (2)
- 25 - 34 (3)
- 35 - 44 (4)
- 45 - 54 (5)
- 55 - 64 (6)
- 65 - 74 (7)
- 75 - 84 (8)
- 85 or older (9)

Appendix F: Descriptive Statistics

Frequencies for social media exposure and behaviour, split by age (N=684)

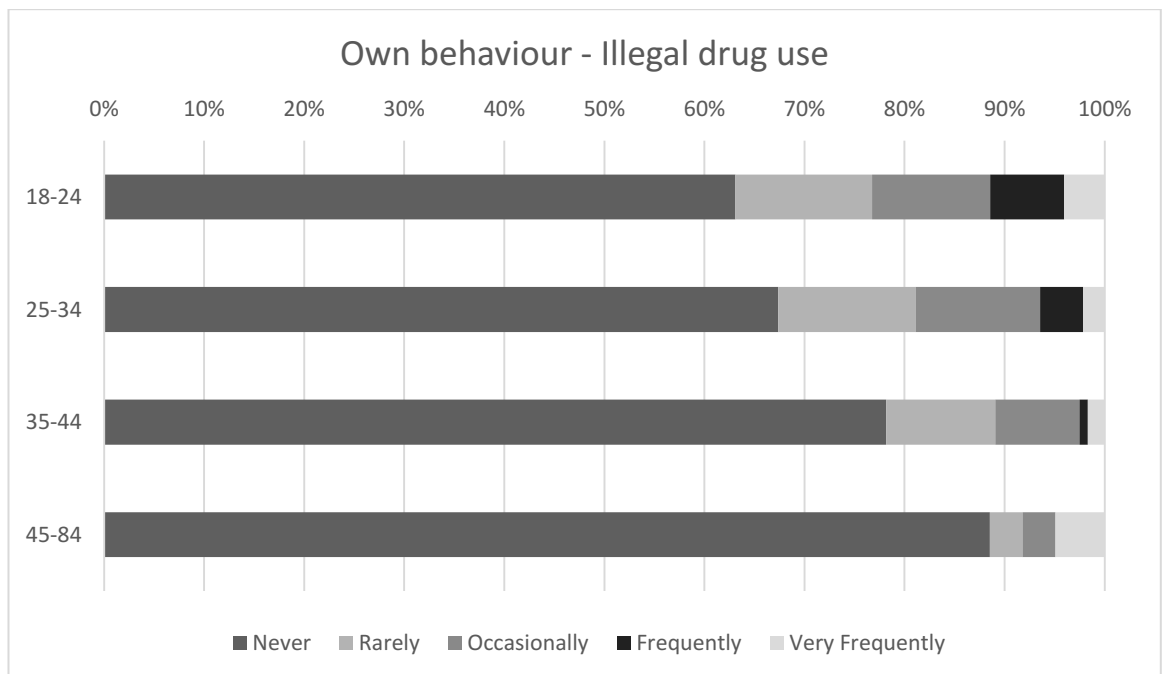


Figure 1: Frequency of self-reported drug use over the previous 12 months, split by age group

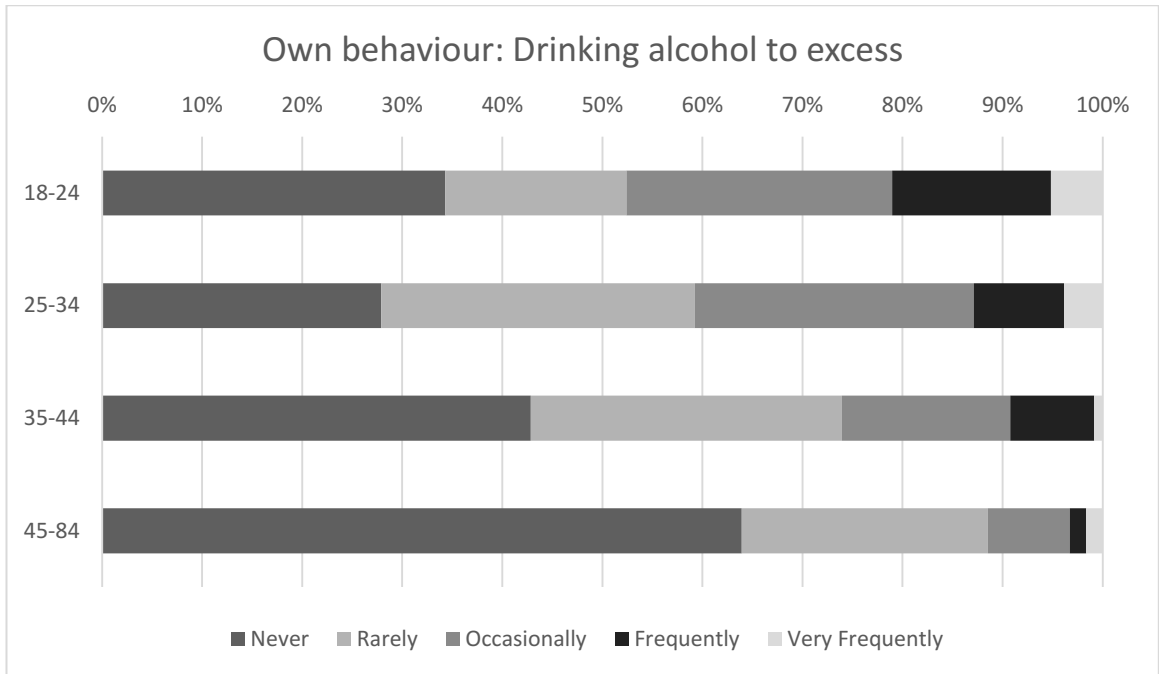


Figure 2: Frequency of self-reported drinking alcohol to excess over the previous 12 months, split by age group

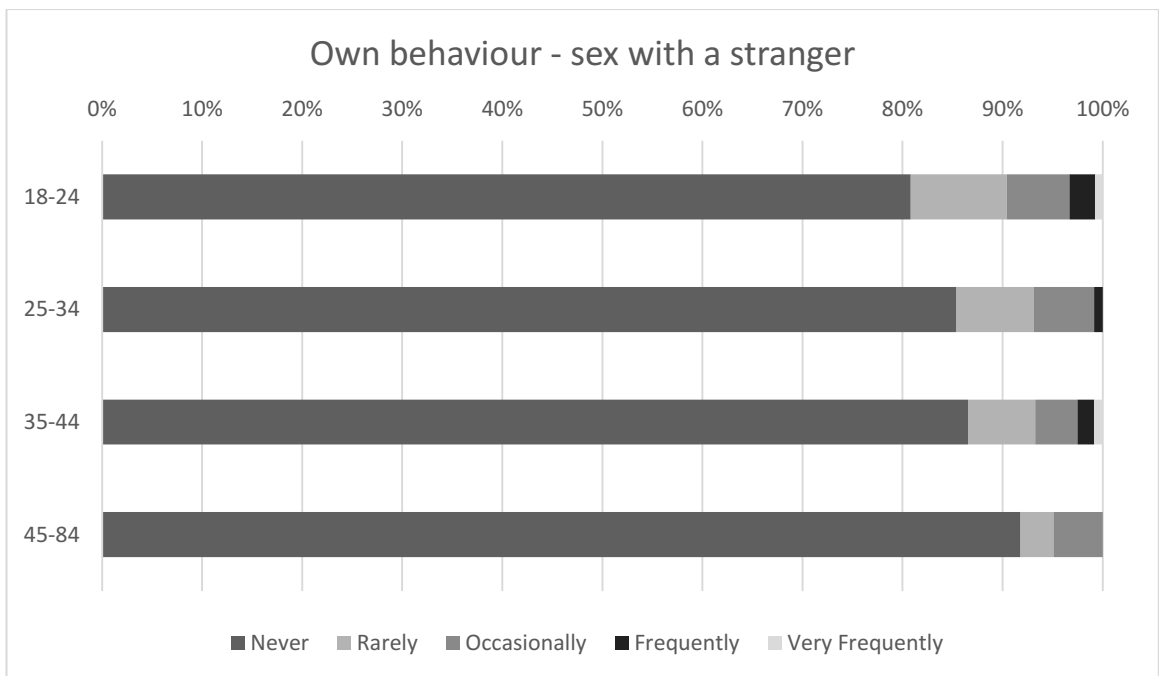


Figure 3: Frequency of self-reported engagement in sex with a stranger over the previous 12 months, split by age group

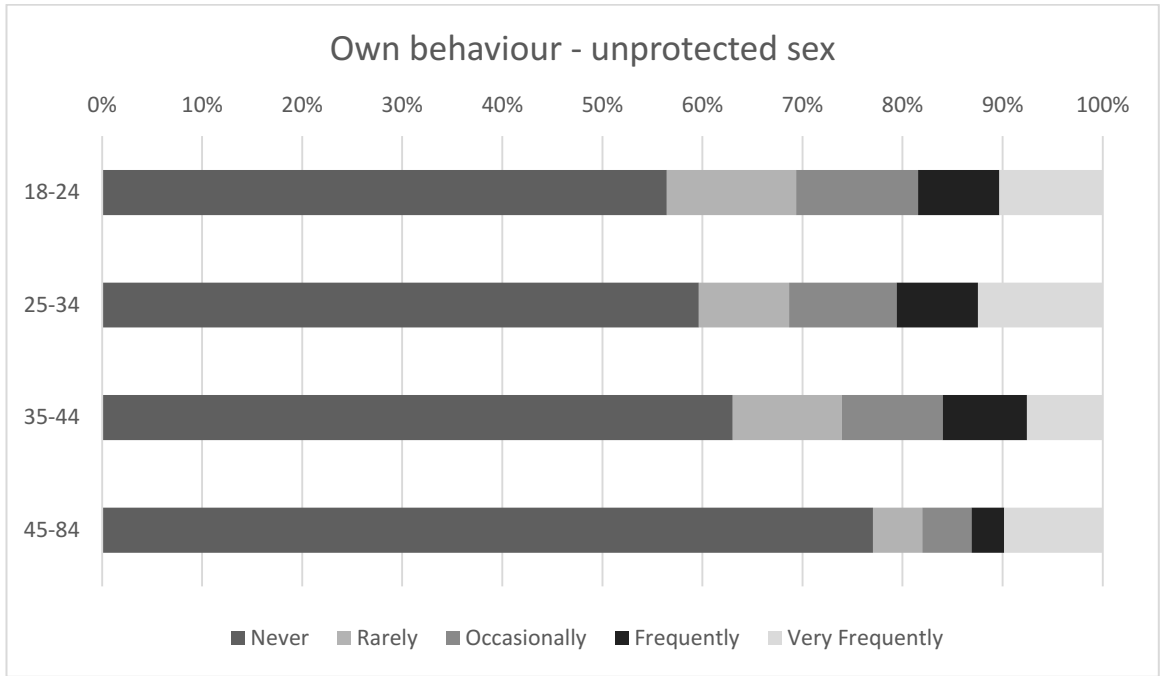


Figure 4: Frequency of self-reported engagement in unprotected sex over the previous 12 months, split by age group

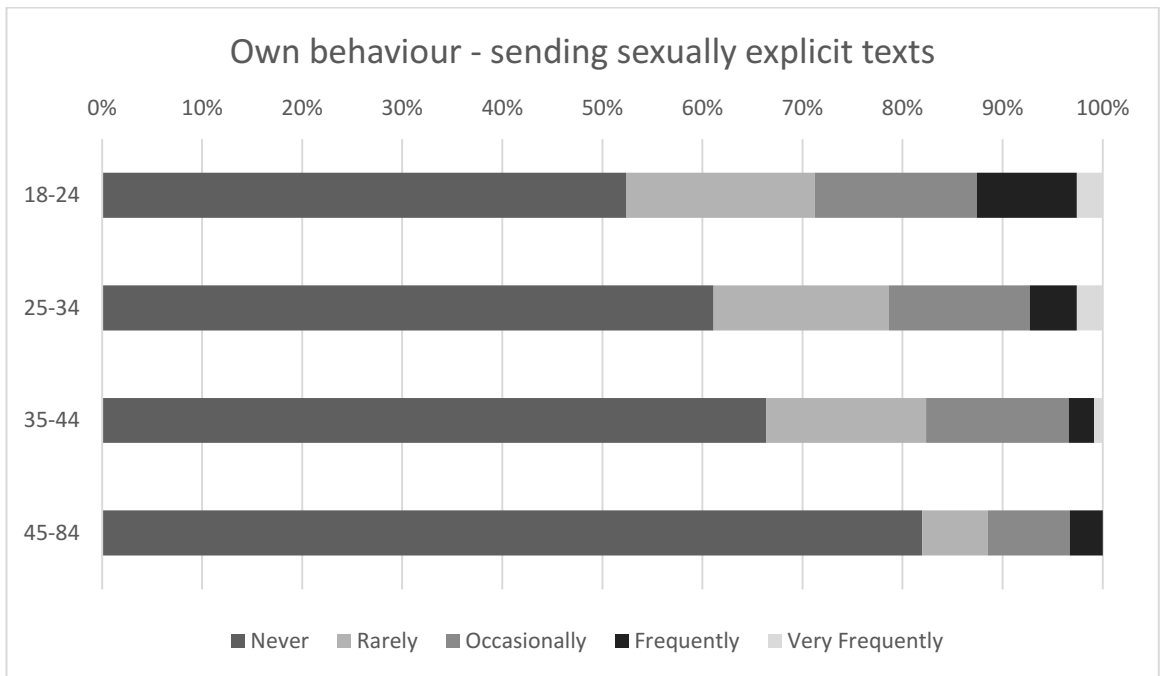


Figure 5: Frequency of self-reported sending of explicit text messages over the previous 12 months, split by age group

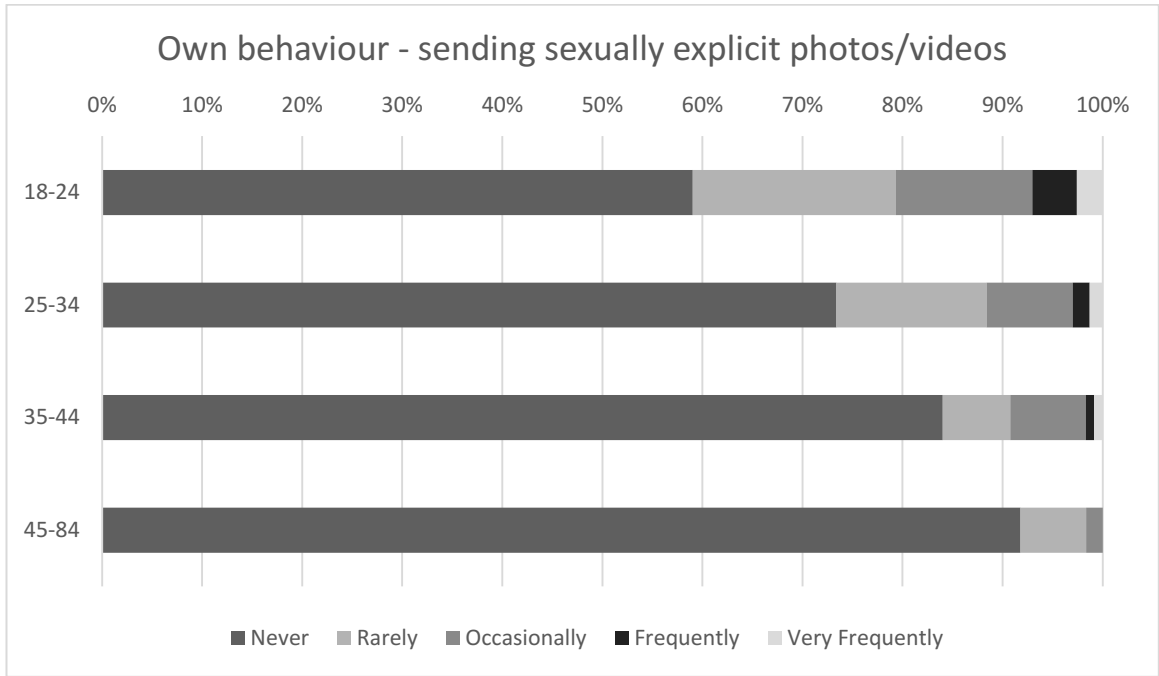


Figure 6: Frequency of self-reported sending of sexually explicit photos or videos of oneself over the previous 12 months, split by age group

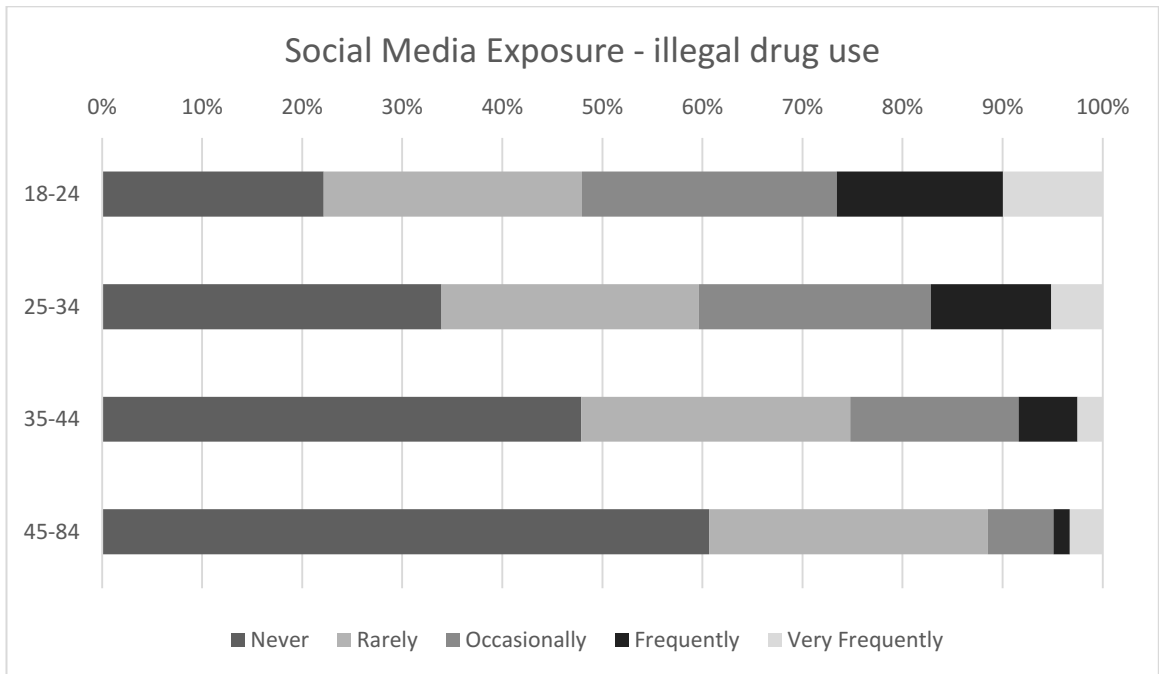


Figure 7: Frequency of exposure to social media content encouraging drug use over the previous 12 months, split by age group

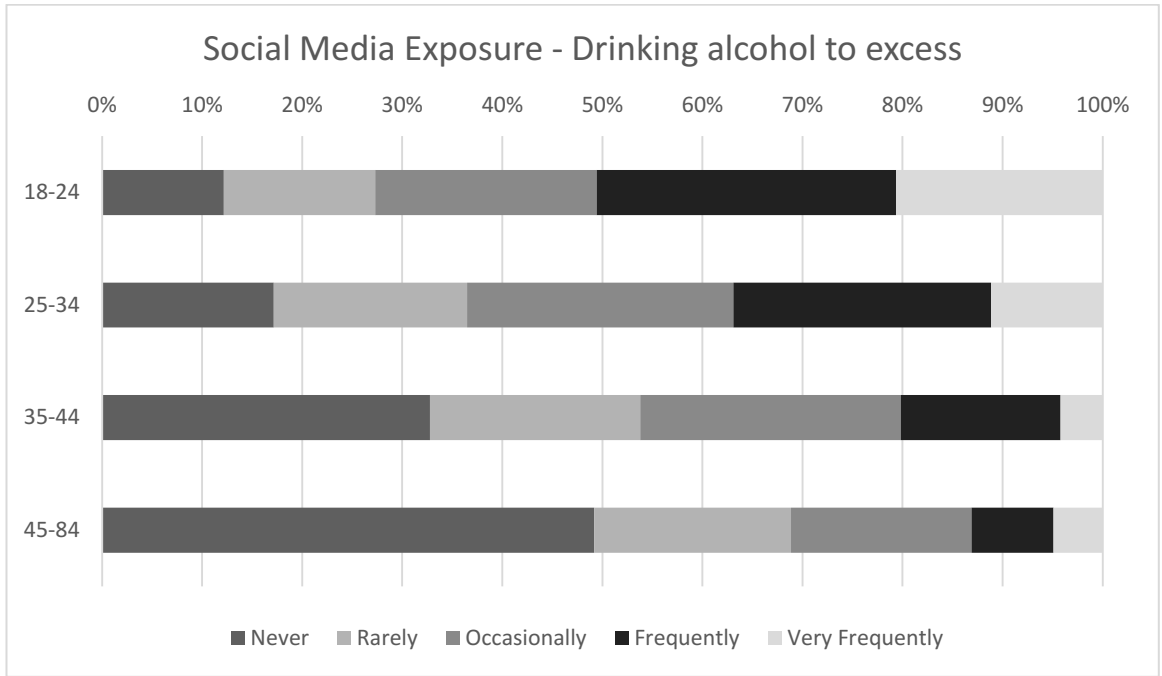


Figure 8: Frequency of exposure to social media content encouraging drinking alcohol to excess over the previous 12 months, split by age group

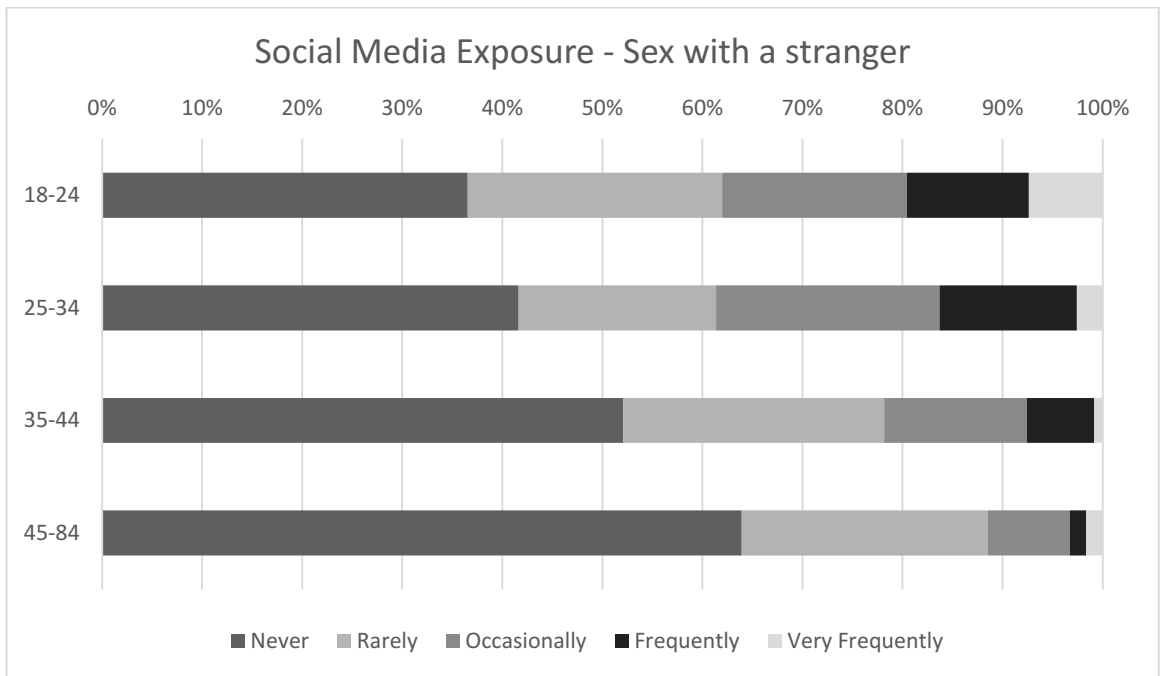


Figure 9: Frequency of exposure to social media content encouraging sex with a stranger over the previous 12 months, split by age group

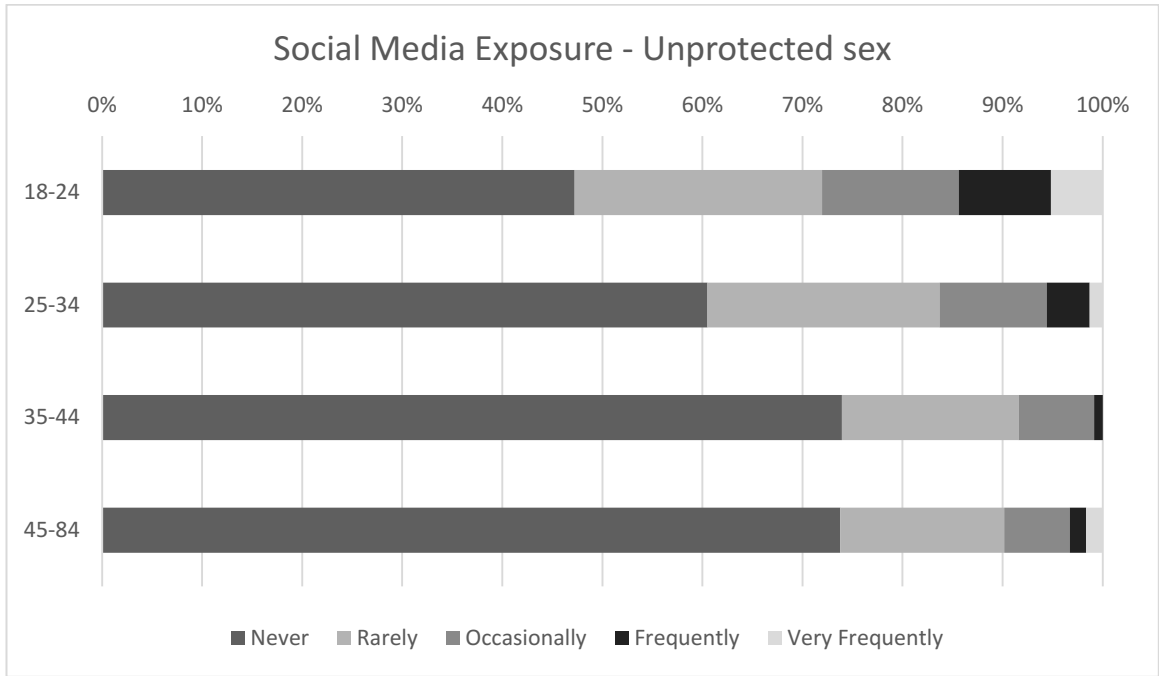


Figure 10: Frequency of exposure to social media content encouraging unprotected sex over the previous 12 months, split by age group

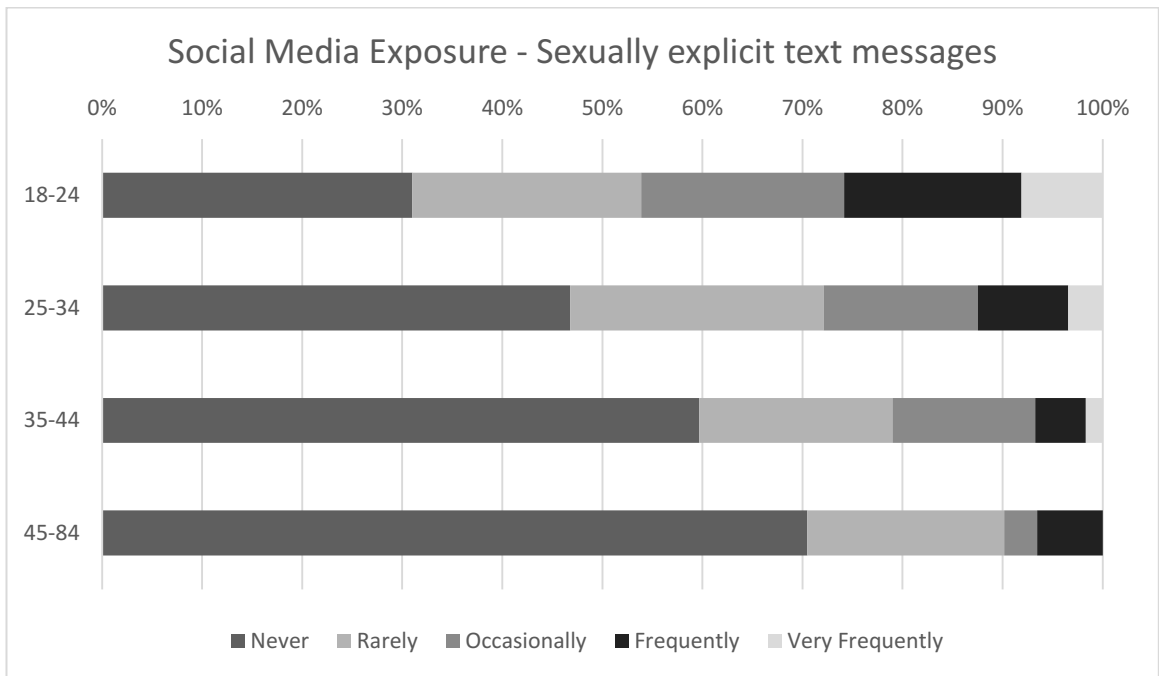


Figure 11: Frequency of exposure to social media content encouraging sending sexually explicit text messages over the previous 12 months, split by age group

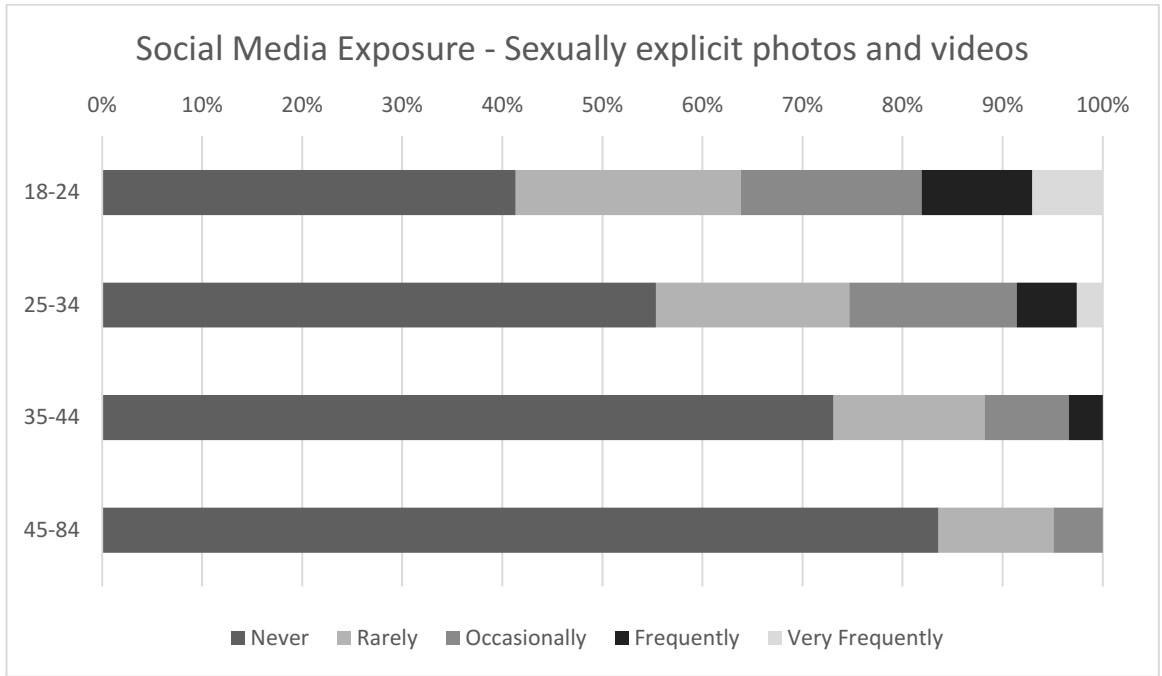


Figure 12: Frequency of exposure to social media content encouraging sending sexually explicit photos and videos over the previous 12 months, split by age group