



Review

A systematic review of the mental health outcomes associated with Facebook use



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ABSTRACT

The effect of social networking site (SNS) use on mental health has attracted growing scholarly attention, yet the nature of this relationship remains contentious. A systematic review was conducted to examine mental health outcomes associated specifically with the SNS, Facebook. A total of 65 articles met the inclusion criteria and were included in the review. Facebook use was associated with six key mental health domains: Facebook addiction, anxiety, depression, body image and disordered eating, drinking cognitions and alcohol use, and other mental health problems, albeit the strength and validity of these relationships varied. The review highlighted the multidimensional nature of Facebook use, and the subsequent importance of assessing specific SNS platforms or similar functions over platforms. The application of meta-analytic techniques is required to quantify the nature and direction of the relationships between Facebook use and mental health outcomes, as well as to identify pertinent moderators and individual difference factors.

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The psychological effects associated with social networking site (SNS) use have gained multidisciplinary academic attention over

the last decade (Lee, Park, & Tam, 2015). Nearly 80% of Internet users report SNS use and this use accounts for approximately one quarter of the total time spent online (Comscore, 2011). Facebook, which launched in 2004, reported a staggering 1.13 billion daily active users in June 2016 (Facebook, 2016), and is currently the most popular SNS worldwide (Ryan, Chester, Reece, & Xenos, 2014). Facebook is a complex, global phenomenon; on the one hand, it provides a platform for social connection and belongingness, a core need for human beings. This is of increasing importance in individualistic societies where one in ten people report feeling lonely often (Griffin, 2010). On the other hand, Facebook represents another technological medium that encourages continuous engagement: from creating and maintaining a profile of one's identity and life, to responding to notifications and updates. These features and functionalities present challenges for users such as moderating the frequency and duration of their usage.

Accordingly, it has been proposed that Facebook use can impinge on an individual's wellbeing and mental health. These effects are diverse and include: a feeling of isolation from significant others and society at large (Al-Dubai, Ganasegeran, Al-Shagga, Yadav, & Arokiasamy, 2013); greater psychological distress (Chen & Lee, 2013); perceiving other Facebook users to be happier than themselves (Chou & Edge, 2012); dissatisfaction with intimate partner relationships (Elphinston & Noller, 2011); negative mood (Fardouly, Diedrichs, Vartanian, & Halliwell, 2015; Kross et al., 2013); body dissatisfaction and drive for thinness (Fardouly & Vartanian, 2015); lower self-esteem (Kalpidou, Costin, & Morris, 2011); depressive symptoms; and anxiety (Labrague, 2014). These adverse outcomes are augmented for users exhibiting addictive use of Facebook. Such users experience many negative consequences (e.g., Hanprathet, Manwong, Khumsri, Yingyeun, & Phanasathit, 2015) in addition to cognitive and behavioral symptoms of addiction, which include salience, mood modification, tolerance, withdrawal, conflict, and relapse components related to their personal Facebook use (Andreassen, Torbjørn, Brunborg, & Pallesen, 2012).

Although Facebook use has been associated with a myriad of outcomes, the current review focuses specifically on mental health outcomes. To this end, mental health outcomes refer to psychological symptoms of diagnosable mental illnesses, generally consistent with the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders 5th Revision (DSM-5; APA, 2013). These outcomes are associated with clinical levels of distress and impaired functioning for the individual. This focus is merited as it will clarify whether SNS use can have a clinically significant effect on an individual's mental health. Understanding this relationship is paramount considering the pervasive uptake of SNS use, particularly among young people who are also vulnerable to mental health problems. Further, despite SNS use being associated with mental ill health, there is ambiguity around the definition and inclusion criteria for measurement of SNS use (Panek, Nardis, & Konrath, 2013).

Boyd and Ellison (2007) define SNS use as a platform that enables individuals to create private or public online profiles and subsequently use these profiles to interact and develop relationships with other users. Whilst this definition is readily applied in the literature and captures the essence of SNS use, a vast number of SNS platforms can be included under this definition. This becomes problematic when the unique features and functionalities of particular platforms are considered (Panek et al., 2013). For example, Twitter is a text-focused, micro-blogging site that promotes real-time news feeds; Instagram concentrates on visual functions via photo and video sharing; and Facebook combines text and visual features, with a particular emphasis on interpersonal activities, such as "liking" another user's activity. Therefore, SNS platforms can be viewed as discrete entities that require users to

digest and interact with content in different manners, and, as such, attract distinct audiences.

The uses and gratifications theory contextualizes the occurrence of discrete SNS audience profiles. The theory clarifies the "how" and "why" of media consumption, asserting that the motivation to participate in social media varies across users (Joinson, 2008). For example, Twitter users are often driven by their interest for entertainment, celebrity, and sports news (Hargittai & Litt, 2011); impression management categorizes the key motive of Bebo users (Dunne, Lawlor, & Rowley, 2010); and Facebook use is primarily motivated by relationship maintenance or passing time (Ryan et al., 2014). Davenport, Bergman, Bergman, and Farrington (2014) further demonstrated that age and personality antecedents influenced differential motives and subsequent SNS use. Specifically, narcissistic young people preferred to post content on Twitter whereas narcissistic adults favored Facebook posting. These differences aligned to the reasons for SNS usage, in which narcissistic young people had a stronger desire for an audience and admiration on Twitter, whereas narcissistic adults were more motivated by wanting friends, an audience, and admiration on Facebook. Individual difference factors play a key role in how and why an individual uses Facebook.

The overly inclusive and imprecise conceptualization of SNS use has also been associated with differential outcomes. For example, Petersen and Johnston (2015) examined Facebook and Twitter use independently and found excessive Facebook use predicted fewer social connections being developed and longstanding social connections being maintained, whereas the intensity of Twitter use had no such effect. It is apparent that distinctions exist across SNS platforms and user characteristics and experiences. This highlights the unreliability of investigating general SNS use or studying one SNS platform and assuming the findings can be generalized across all types of SNS platforms (Panek et al., 2013). Understanding the nature and effects of SNS use necessitates the examination of individual platforms.

1. The present study

Although there is an array of popular SNSs, Facebook was selected for two reasons. First, Facebook has a comparatively larger user base, with over 1.13 billion people actively using the service daily and 1.71 billion active monthly users on average for June 2016 (Facebook, 2016). Specifically in Australia, almost 40% of the population (equivalent to nine million people) login to Facebook daily (Godfrey, 2013). Further, among those Australians who accessed the Internet in a 12-month period between 2012 and 13, 66% of users reported SNS use as the most popular online activity, and it was the preferred activity for 92% of young people aged 18–24 years (Australian Bureau of Statistics [ABS], 2014). Its widespread use confirms its status as a contemporary phenomenon and justifies investigation into the psychological characteristics of this behavior. Second, due to its widespread use, Facebook has received significant scholarly attention. The extant empirical research indicates the appropriateness of conducting a review specific to this SNS.

The aim of the current study was to systematically review the mental health outcomes associated with Facebook use. Previous research has revealed a relationship between Facebook use and mental ill health (Balakrishnan & Shamim, 2013; Fardouly & Vartanian, 2015; Labrague, 2014). These associations have, however, been inconsistently reported and debate remains as to whether Facebook mostly elicits deleterious outcomes for its users and at a clinically significant level (e.g., Jelenchick, Eickhoff, & Moreno, 2013). The importance of this review is twofold. First, only one systematic review has been previously undertaken and this examined the effect of general SNS use on body image and

disordered eating only (Holland & Tiggemann, 2016). A comprehensive review that considers all mental health outcomes specific to Facebook is absent from the literature. Second, research in the field has grown substantially since previous reviews. This current review that considers all mental health diagnoses will help to clarify the effects of Facebook use on the mental health domain.

2. Method

2.1. Search strategy

Due to the heterogeneity in study objectives, designs, and outcomes, meta-analyses were not conducted; results are presented as a structured synthesis, stratified by methodological quality. The academic databases *PsycINFO*, *Scopus*, and *Web of Science* were selected to obtain articles over a period of 12 years, from February 4, 2004 (Facebook launch date) to June 1, 2016. To retrieve empirical studies investigating outcomes of Facebook use, the following search terms and syntax were used: ('Facebook') AND ('psychological' OR 'disorder' OR 'outcome' OR 'function*', OR 'health' OR 'use' OR 'usage' OR 'effect*', OR 'problem*' OR 'depress*' OR 'mood' OR 'anxiety' OR 'addiction'). Search terms were performed on article titles and keywords, except *Web of Science* where article title was used. Subject area was restricted to psychology, psychiatry, health care science services, and social sciences other topics for *Web of Science*, and to psychology and social sciences for *Scopus*. The reference lists of germane articles were reviewed to identify further articles. This review was conducted by applying relevant recommendations from the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines (Liberati et al., 2009). Accordingly, each study was assessed for risk of bias using the National Heart, Lung, and Blood Institute's (NHLBI) quality assessment tool (NHLBI, 2014). Two reviewers independently rated study quality and differences in ratings were resolved via discussion between the two reviewers or by a third reviewer where necessary.

2.2. Eligibility criteria

The eligibility criteria included empirical articles that examined mental health outcomes associated with Facebook use. Specifically, mental health outcomes referred to psychological symptoms of diagnosable mental illnesses, generally consistent with the DSM-5. Two caveats are noteworthy: first, although Facebook addiction is not yet recognized in the DSM-5, this outcome was retained in the review as it was clearly framed as a prospective mental illness. Second, and to a similar effect, it was acknowledged that drinking cognitions and body image concerns are not DSM-5 disorders; rather, they are significant, direct predictors of substance use and disordered eating, respectively. Hence, the majority of studies incorporated a combination of indicators for these disorders. For this reason, all studies examining drinking cognitions and body image were retained.

Facebook use comprised engagement in any feature or functionality of Facebook, except studies investigating the Facebook game application *Farmville*, as the nature of this feature aligns more closely with Internet gaming. Common conceptualizations of Facebook use included time spent on Facebook, number of Facebook friends, number of logins to Facebook, attitudes towards Facebook use, or the indicators of an addiction construct comprising a combination of behavioral and attitudinal variables. As a point of clarification, previous literature has treated Facebook addiction as both an independent variable (type of Facebook use) and dependent variable (mental health outcome) and is discussed as such in the results and discussion.

Exclusion criteria comprised articles that assessed general SNS use (e.g., Schmidt, Lelchook, & Martin, 2016), evaluated interventions incorporating Facebook (e.g., physical exercise intervention: Cavallo et al., 2014), and social support forums on Facebook for specific illnesses (e.g., diabetes: Greene, Choudhry, Kilabuk, & Shrank, 2011) or conditions (e.g., ostomy surgery: Frohlich & Zmyslinski-Seelig, 2016). Additionally, articles that were qualitative, non-English, non-peer reviewed, non-empirical studies, full-text inaccessible, and predating the year 2004 were excluded.

2.3. Data extraction

Database searches were performed and additional articles were identified through the reference lists of these records. Articles were initially screened and excluded based on the exclusion criteria and duplication. Remaining articles were reviewed by two authors and excluded based on the article title or abstract in the first instance, and the full-text when further information was required to make a determination (see Fig. 1).

3. Results and discussion

The aim of this paper was to systematically review mental health outcomes associated with Facebook use. A total of 65 articles met the inclusion criteria and were included in the review. Table 1 provides a summary of each article. Six outcomes were identified including Facebook addiction, anxiety, depression, body image and disordered eating, drinking cognitions and alcohol use, and other mental health problems. This section is divided into three parts: quality ratings are initially discussed, followed by a review of each outcome separately, and then concluding statements with overall implications, limitations, and directions for future research.

3.1. Methodological quality

In line with the PRISMA guidelines, each study was assessed for risk of bias using the NHLBI quality assessment tool (NHLBI, 2014). This tool assesses bias using 14 criteria regarding selection, information, measurement, and confounding bias to distinguish poor, fair, and good quality studies. Good quality studies are required to demonstrate high internal validity, which assesses the ability of the study to draw causal conclusions between the exposure and outcome variables. Distinguishing features of good quality studies included experimental designs that assessed different levels of exposure more than once over time with low attrition rates and blinded outcome assessors. Conversely, poor quality studies generally comprised cross-sectional designs that recruited small, convenience samples and, critically, did not control for confounding variables. The cross-sectional and longitudinal studies could not demonstrate a clear causal relationship and were therefore given a maximum rating of fair. Nevertheless, the majority of studies stated a clear research objective, provided a detailed procedure using well-validated dependent variables, and appropriately acknowledged methodological limitations. Studies that received a good quality NHLBI rating are distinguished with a caret symbol (^).

3.2. Facebook addiction

Five studies were identified that examined the effect of Facebook use on Facebook addiction. The quality ratings identified all studies to be of fair quality. All five studies comprised cross-sectional designs, with one of these including a longitudinal component. Females were generally overrepresented compared to males and three out of the five studies sampled participants from

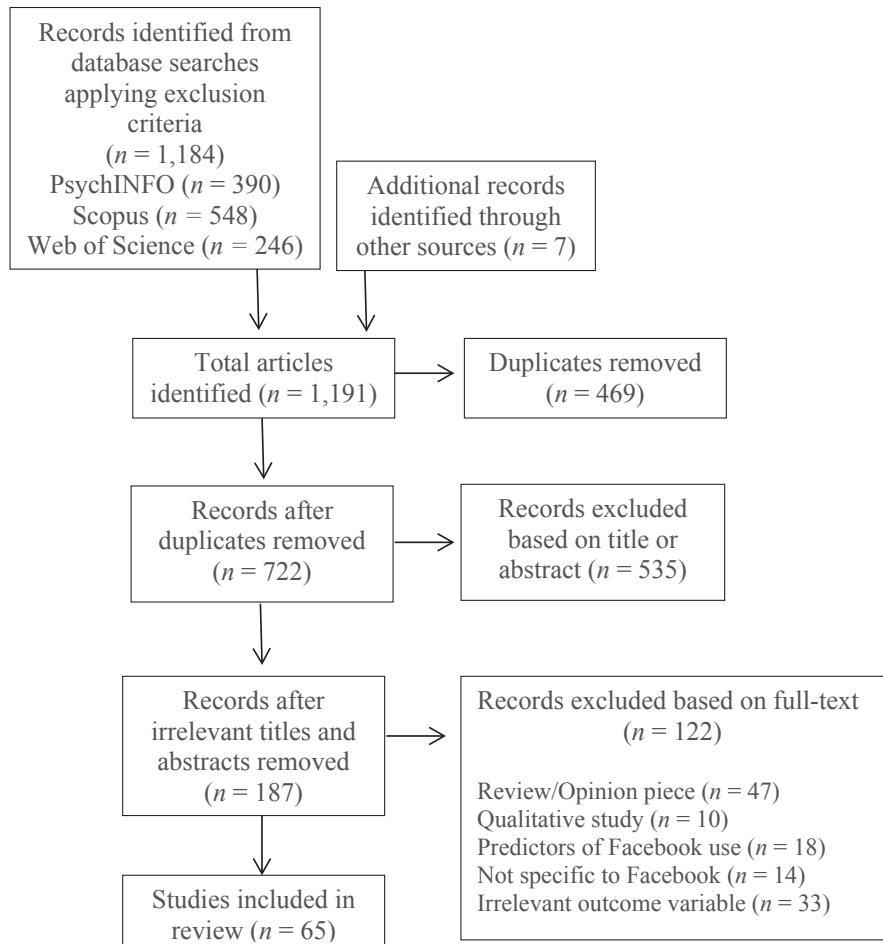


Fig. 1. PRISMA flow diagram for study inclusion.

the United States of America (USA). Three studies recruited university students and the remaining studies surveyed high school students and a combination of snowball sampling and advertising via a research company. Four of the five studies reported an average participant age between 14 and 23 years.

Each study concurrently examined addictive and general Facebook use, with generally small to medium effect sizes. Addictive use included use that was framed as addictive, compulsive, or habitual that causes negative personal outcomes, whereas general use comprised frequency of Facebook logins, time spent on Facebook, and number of Facebook friends. An initial challenge with evaluating this domain was the interchangeable use of Facebook addiction as both a predictor of mental health outcomes and as an outcome in and of itself. This appeared to relate to the purported research aims; specifically, as Facebook addiction is not yet recognized in the DSM-5, these studies firstly sought to operationalize and distinguish general from addictive Facebook use. The findings suggested that addictive use of Facebook predicted poorer well-being and mental health outcomes independent of general Facebook use, indicating they are distinct constructs and Facebook addiction elicits greater detriments than general use (Dhir, Kaur, Chen, & Lonka, 2016; Muench, Hayes, Kuerbis, & Shao, 2015; Wohn & LaRose, 2014). However, general use was indeed shown to be a precursor to addictive use (Koc & Gulyagci, 2013; Muench et al., 2015; Wohn & LaRose, 2014), and, moreover, a cyclical relationship emerged whereby an increase in Facebook use in the past three months led to higher levels of Facebook addiction; Facebook

addiction subsequently led to increased logins, daily time spent on Facebook, and active Facebook engagement (Turel, 2015). These conclusions are, however, tautological and predictable. Individuals who use Facebook in an addictive manner should, by default, also report high general use, and presumably an individual would initially engage in general usage before the behavior becomes addictive. Moreover, comprehensive measures of addictive use that impair functioning are logically going to be stronger predictors of adverse outcomes than single-item Facebook consumption measures. This reveals a tautological conundrum in the Facebook addiction literature.

The circularity in the field may relate to the marked difference in theoretical frameworks, diagnostic criteria, and assessment tools. Pathological Facebook use was differentially labeled (e.g., 'problematic', 'addictive', 'compulsive') and was conceptualized by drawing on numerous theoretical frameworks or taking an atheoretical, confirmatory approach. Although each conceptualization incorporates distress and impaired functioning for the individual, there are diverse clinical implications such as diagnostic criteria, mechanisms leading an individual to develop pathological use, and severity of impairment. For example, addictive use generally comprised salience, mood modification, tolerance, withdrawal, conflict, and relapse components; habitual use emphasized engagement in a behavior without conscious knowledge and intention; and compulsive use primarily reflected deficits in self-regulation (Andreassen et al., 2012; Wohn & LaRose, 2014). Although these themes overlap, it is evident that the operational

Table 1

Summary of included articles across outcome domain.

Facebook Addiction							
Author / Year	Country	Sample	Study Period	Study Design	Facebook Measure	Outcome(s)	Findings
Dhir, Kaur, Chen, & Lonka, 2016	India	804 high school students (228 female; age range 13–18, $M_{\text{age}} = 14.47$, $SD_{\text{age}} = 1.21$)	2013–2014	A	Problematic FB use (as perceived by self and others), frequency of FB use, excessive use of FB	Online regret (e.g., feeling sad after spending more time than required on FB, problems related to FB use)	Excessive use of FB significantly predicted higher online regret ($\beta = -.18$)**, however, frequency of FB use ($\beta = -.06$) was not a significant predictor. This suggests that frequently logging into FB is distinct from spending many hours on FB, with the latter relating more to the experience of regret, such as feeling like one spends too much time on FB, causes their studies to suffer, wastes time, and forgets about work responsibilities. Additionally, FB users who reported that their parents perceived their FB use as problematic ($\beta = .18$)** and those who experienced conflict with friends due to their FB use ($\beta = .17$)** experienced higher online regret ($R^2_{\text{adj}} = .17$, $f^2 = .20$) ¹ .
Koc & Gulyagci, 2013	Turkey	447 technical teacher education college students (100 female; age range 18–30, $M_{\text{age}} = 21.64$, $SD_{\text{age}} = 1.94$)	NR	A	Time spent on FB	FB addiction	Time spent on FB ($\beta = .29$)** positively predicted FB addiction ($R^2 = .22$, $f^2 = .28$) ² .
Muench, Hayes, Kuerbis, & Shao, 2015	US	489 snowball sample through email blasts and Mechanical Turk recruiting (300 female; age range 18–70+, with 28.4% aged 23–29)	2013	A	Time on FB, FB checking, FB addiction (neglect, social life, interference, unsuccessful attempts to reduce use)	Fear of missing out on enjoyable social interactions, perception that other FB users have better lives	Time on FB was associated with FB checking ($\beta = .46$) and FB addiction ($\beta = .28$). FB checking was also associated with FB addiction ($\beta = .21$). FB addiction had a direct effect on fear of missing out ($\beta = .21$) and the feeling that other FB users have better lives ($\beta = .11$) ³ .
Turel, 2015	US	284 university students (52.8% female; age range 18–46, $M_{\text{age}} = 23.1$)	NR	A + L	Past increase in FB use in the past 3 months	FB addiction (CRA)FB logins, use duration, active status updates, primary uses, and accessed on different devices	An increase in FB use in the past three months had a direct positive effect on FB addiction ($\beta = .29$, SMC = 11%)***, and FB addiction in turn had a direct positive effect on daily logins to FB ($\beta = .23$, SMC = 9%)***, daily FB use duration ($\beta = .29$, SMC = 8%)***, active FB status updates ($\beta = .21$, SMC = 4%)***, usage comprehensiveness ($\beta = .29$, SMC = 8%)***, and device heterogeneity ($\beta = .17$, SMC = 3%)**. Thus, FB addiction mediated the relationship between past increase in FB use and the Time 2 (one week later) outcomes, indicating that a past increase in FB use influences future use through the addiction levels it builds ⁴ .
Wohn & LaRose, 2014	US	380 university students (70.1% female; $M_{\text{age}} = 17.75$, $SD_{\text{age}} = 0.74$)	NR	A	Time spent on FB, number of FB friends	Habitual use of FB, compulsive use of FB, loneliness, social adjustment, academic motivation	Number of FB friends only had a direct effect on time spent on FB ($\beta = .13$)*. Time spent on FB in turn predicted habitual use of FB ($\beta = .55$)*** and compulsive use of FB ($\beta = .25$)***. Neither habitual or compulsive use of FB influenced social adjustment or loneliness, but both predicted (habitual: $\beta = -.11$) (compulsive: $\beta = -.13$)* academic motivation ⁵ .
Anxiety							
Davidson & Farquhar, 2014	US	336 university students (about 70% female; age not specified)	NR	A	FB intensity, number of unique groups within one's FB network	FB-specific anxiety, social anxiety, self-monitoring one's image on FB	FB intensity was not significantly related to FB-specific anxiety ($r = .04$), social anxiety ($r = .06$), or self-monitoring one's image on FB ($r = -.08$). Similarly, number of unique group on one's FB network was not significantly related to FB-specific anxiety ($r = .03$), social anxiety ($r = .06$), or self-monitoring ($r = -.07$).
Farquhar & Davidson, 2014	US	250 university students (68%)	NR	A	Time spent on FB, number of FB	FB anxiety, social anxiety	None of the FB variables predicted FB anxiety. Social anxiety ($B = .69$)*** was the strongest predictor of FB anxiety ($R^2_{\text{adj}} = .49$, $f^2 = .96$) ⁶ . Similarly, none of the FB variables predicted social

¹ Controlled for ownership of a mobile phone, social networking site brand participation, self- / teacher's- / friends'- perceptions of problematic FB use, and argument with parents due to FB use.

² Controlled for social motives, anxiety and insomnia, and severe depression.

³ Controlled for social desirability and self-esteem.

⁴ Controlled for age and sex.

⁵ Controlled for academic performance.

⁶ Controlled for hours of Internet use per day, role conflict, self-monitoring, religious affiliations, gender, race, parental education, class standing, and on-campus residency status.

NR: Not Reported.

		female; age not specified)			friends, FB intensity, number of unique groups within one's FB network		anxiety, but FB anxiety ($B = .65$)*** was the second strongest predictor ($R^2_{adj} = .51$, $f^2 = 1.04$) ⁷ .
Grieve, Indian, Witteveen, Tolan, & Marrington, 2013	Australia	274 university and community sample (232 female; $M_{age} = 25.87$, $SD_{age} = 9.90$)	NR	A	FB social connectedness	Anxiety	FB social connectedness was negatively related to anxiety ($r = -.21$)***.
Labrague, 2014	Philippines	76 nursing university students (81% female; age range 10-25, 81.56% aged 16-20)	NR	A	FB intensity (active use, emotional connection, integrated into life), number of FB friends, time spent on FB	Anxiety	FB intensity was not significantly related to anxiety ($r = .07$). Similarly, number of FB friends was not related to anxiety ($r = .16$). Time spent on FB was positively related to anxiety ($r = .26$)*.
Marder, Johnson, Shankar, & Thirlaway, 2016	UK	379 university students and snowball sampling (69% female; $M_{age} = 22.00$, $SD_{age} = 5.50$)	2014	A	FB intensity	Social anxiety	FB intensity did not predict social anxiety ($\beta = .10$), $R^2 = .30$, $f^2 = .43$ ⁸ .
McCord, Rodebaugh, & Levinson, 2014	US	216 university volunteer research pool (185 female; $M_{age} = 32.20$, $SD_{age} = 12.43$)	NR	A	Anxiety on FB, social FB use, anxiety on FB by social FB use interaction	Social anxiety	Anxiety on FB ($\beta = .67$)*** and social FB use ($\beta = .13$)* predicted greater social anxiety ($R^2 = .44$, $f^2 = .79$). Interaction effect was marginally non-significant. Indicates that feeling anxious on FB can predict social anxiety, in addition to individuals who do not necessarily feel anxious on FB but more so in face-to-face interactions and subsequently use FB socially to compensate for this fear and thus predicts greater social anxiety.
Shaw, Timpano, Tran, & Joorman, 2015	US	75 undergraduate students (55.2% female; age range 17-24, $M_{age} = 19.2$, $SD_{age} = 1.27$)	NR	A	Time spent on FB, passive FB use, content production on FB, and interactive communication on FB	Social anxiety symptoms, brooding	Time spent on FB was related to social anxiety symptoms ($r = .33$)**. Passive FB use ($\beta = .27$)* predicted social anxiety symptoms, however, content production on FB ($\beta = .11$) and interactive communication on FB ($\beta = .06$) were non-significant predictors ($R^2 = .12$, $f^2 = .14$). In a follow up model, passive FB use ($\beta = .28$)** again predicted social anxiety symptoms ($R^2 = .42$, $f^2 = .72$) ⁹ . Two mediation models were supported: brooding partially mediated the relationship between passive FB use and social phobia symptoms (Total effect $\beta = .32$ **, Direct effect $\beta = .24$ *). The second mediator was social phobia symptoms and it fully mediated the relationship between passive FB use and brooding (Total effect $\beta = .24$ *, Direct effect $\beta = .12$).
Depression							
Banjanin, Banjanin, Dimitrijevic, & Pantic, 2015	Serbia	336 high school students (222 female; $M_{age} = 18.0$, SD_{age} not reported)	2014	A	Time spent on FB, number of FB friends, number of self-portrait photographs shared on FB	Depression	Time spent on FB ($b = -.08$), number of FB friends ($b = .00$), and number of self-portrait photographs shared on FB ($b = -.00$) did not predict depression ¹⁰ .

⁷ Controlled for hours of Internet use per day, role conflict, self-monitoring, religious affiliations, gender, race, parental education, class standing, and on-campus residency status.⁸ Controlled for age, gender, trait anxiety, standards of the strictest audience (FB friends), and strength of the strongest audience (FB friends).⁹ Controlled for depressive symptoms and anxiety symptoms.¹⁰ Controlled for Internet addiction.

Feinstein et al., 2013	US	268 university students (62% female; $M_{\text{age}} = 19.66$, $SD_{\text{age}} = 2.29$)	NR	A + L	Facebook social comparison tendency	Depressive symptoms	FB social comparison tendency directly predicted increases in rumination ($\beta = .17$)*, which, in turn, was significantly associated with greater depressive symptoms. ($\beta = .29$)* (full mediation) ¹¹ .
Frison & Eggermont, 2016a	Belgium	910 high school students (51.9% female; $M_{\text{age}} = 15.44$, $SD_{\text{age}} = 1.71$)	2013	A	Passive FB use, active public FB use, active private FB use	Depression	Among females, passive FB use predicted higher levels of depression ($\beta = .18$)*. However, active public FB use ($\beta = .27$)*** and active private FB use ($\beta = .27$)*** both predicted increased perceived social support on FB, which, in turn, predicted lower levels of depression ($\beta = -.12$)*. Among males, passive FB use was not related to depression, however, active public FB use directly predicted greater levels of depression ($\beta = .25$)** and increased perceived social support on FB ($\beta = .18$)*, although perceived social support did not mediate the relationship between active public use and depression. Active private FB use did not affect social support or depression.
Frison & Eggermont, 2016b	Belgium	910 high school students (51.9% female; $M_{\text{age}} = 15.44$, $SD_{\text{age}} = 1.71$)	2013	A	Social support seeking via FB	Depression	Social support seeking via FB predicted perceived social support through FB ($\beta = .51$)***, which, in turn, predicted lower depression ($\beta = -.12$)*, $R^2 = .12$, $f^2 = .14$ ¹² . However, when social support seeking through Facebook was not perceived it increased depressed mood ($\beta = .13$)*. Face-to-face social support seeking did not directly affect depressed mood.
Grieve, Indian, Witteveen, Tolan, & Marrington, 2013	Australia	274 university and community sample (232 female; $M_{\text{age}} = 25.87$, $SD_{\text{age}} = 9.90$)	NR	A	FB social connectedness	Depression	FB social connectedness was negatively related to depression ($r = -.27$)***.
Labrague, 2014	Philippines	76 nursing university students (81% female; age range 10-25, 81.56% aged 16-20)	NR	A	FB intensity (active use, emotional connection, integrated into life), number of FB friends, time spent on FB	Depression	FB intensity was not significantly related to depression ($r = .11$). Similarly, number of FB friends was not related to depression ($r = .14$). Time spent on FB was positively related to depression ($r = .23$)*.
Locatelli, Kluwe, & Bryant, 2012	US	257 psychology university students; 251 FB users (184 female; age range 18-27, $M = 18.72$, $SD = 1.12$)	NR	A	Frequency of positive and negative status updates on FB	Depression	Frequency of negative status updates ($\beta = .37$)*** predicted greater depression, however, frequency of positive status updates ($\beta = -.12$, $p = .09$) did not predict depression ($R^2 = .14$, $f^2 = .16$)*** ¹³ . When taking rumination into account, negative FB posts ($\beta = .39$)*** and positive posts ($\beta = -.22$)** explained 18.1% of the variance in rumination, and rumination ($\beta = .52$)*** in turn predicted greater depression ($R^2 = .35$, $f^2 = .54$). The indirect effects did not include zero, indicating a mediation effect. Posting negative FB status updates contributes to rumination, whereas posting positive updates reduces rumination. Negative status updates may thus exacerbate ruminative cognitive processes that exacerbate depression.
McCloskey, Iwanicki, Lauterbach, Giammittorio, & Maxwell, 2015	US	633 undergraduate students (70.1% female; median age 21)	NR	A	Perceived support on FB: social, emotional, negative, instrumental	Depression	Social support on FB was unrelated to depression ($r = .07$), emotional social support on FB was positively related to depression ($r = .17$)**, negative social support on FB was positively related to depression ($r = .107$)*, and instrumental social support on FB was unrelated to depression ($r = .05$).
Morin-Major et al., 2016	Canada	88 adolescents from larger Canadian study (47 girls; age range 12-17, $M_{\text{age}} =$	NR	A	Frequency of FB use, FB network size, FB self-presentation	Depressive symptoms	Frequency of FB use was unrelated to depressive symptoms ($r = -.10$). FB network size was unrelated to depressive symptoms ($r = -.03$). FB self-presentation behaviour was unrelated to depressive symptoms ($r = -.06$). FB peer interaction behaviour was unrelated to depressive symptoms ($r = -.06$).

¹¹ Importantly, general social comparison did not predict rumination or depressive symptoms, suggesting that an increase in depressive symptoms may be specific to engaging in negative social comparison on Facebook rather than comparing oneself to others in general. Furthermore, the correlation between Facebook social comparison and general social comparison was small, suggesting that they are distinct constructs.

¹² Controlled for daily stress. Only among females did daily stress predict increased depression.

¹³ Controlled for sex, length of time using a FB account, time per day spent on FB, number of FB friends, number of daily status updates, and extent of dwelling on FB posts.

		14.5, $SD_{age} = 1.76$			behaviours, FB peer interaction behaviours		
Mota Pereira, 2014	Portugal	57 patients at an outpatient psychiatry clinic diagnosed with MDD (age range 18-70; gender not reported)	2011 - 2012	P	FB access with psychiatrist as "friend" and required to spend 1 hour/week on FB, FB access only, not using FB at all	Depression, response and remission rates	Analysis of the 4 time points—baseline, 1, 2, and 3 months—shows that depression scores decreased significantly on both Facebook groups at months 2 and 3 compared to baseline, although Facebook group with psychiatrist as "friend" showed a faster decrease, being significant after 1 month. The same pattern was observed when comparing both Facebook groups with the control group. On month 2, there was a significant difference in the percentage of non-responders, responders, and remitted patients between the control group and the Facebook group with psychiatrist as "friend" (non-responders: 100.0% (control) and 64.7% (Facebook with psychiatrist); responders: 0.0% (control) and 11.8% (Facebook with psychiatrist); remitted patients: 0.0% (control) and 23.5% (Facebook with psychiatrist)*. On month 3, this difference was statistically significant between the control group and the two Facebook groups (non-responders: 100.0% (control), 60.0% (Facebook only), and 47.1% (Facebook with psychiatrist); responder: 0.0% (control), 20.0% (Facebook only), and 17.6% (Facebook with psychiatrist); remitted patients: 0.0% (control), 20.0% (Facebook only), and 35.3% (Facebook with psychiatrist)*.
Naja, Kansoun, & Haddad, 2016	Lebanon	340 university students (57.4% female; age not reported)	2014	A	Use of "like" button, use of location tagging, easier to disclose on FB, using add FB friend to meet people, FB photos to capture positive memories, FB shows the best of your life, FB makes you feel noticed	Depression	Using the "like" feature on FB to indicate interest in topics that a user could not own, meet, or visit in their real life ($\beta = .09$)*, users who tag their current location wherever they go ($\beta = .18$)***, and users who feel more comfortable meeting someone via the "add friend" FB feature ($\beta = .10$)* predicted greater depression ($R^2 = .25$, $f^2 = 33$) ¹⁴ . No other FB features were significant predictors.
Park, Lee, Kwak, Cha, & Jeong, 2013	Korea	55 students (40 were males aged 19-36, $M_{age} = 24.89$, $SD_{age} = 4.35$) and 15 were females aged between 19-28 ($M_{age} = 23.33$, $SD_{age} = 2.17$)	2013	A	Number of FB groups, FB group administrator, number of "likes", FB pending friend requests, number of FB friends, location tagging, or FB interest categories	Depression	Depression was unrelated to number of FB groups, FB group administrator, number of "likes", FB pending friend requests, number of FB friends, location tagging, or FB interest categories.
Rosen, Whaling, Rab, Carrier, & Cheever, 2013	US	1143 adult education course (683 female; age range 18-65, $M_{age} = 30.74$, $SD_{age} = 12.34$)	NR	A	FB activities (frequency of engaging in a number of activities such as posting status updates), number	Major depression, dysthymia	FB activities did not predict major depression or dysthymia. Number of FB friends negatively predicted major depression ($\beta = -.08$)* and dysthymia ($\beta = -.11$)**. FB impression management did not predict major depression or dysthymia ¹⁵ .

¹⁵ All models controlled for gender, age, educational level, median income, ethnic/cultural background, technology-related attitudes (positive, negative, multitasking preference, ease of use, emotional support online), technology-related anxiety (not checking text messages, FB/SNS, personal e-mail, work e-mail), and general media usage (Internet, music, text messaging, and telephone use hours per day).

					of FB friends, FB impression management		
Simoncic, Kuhlman, Vargas, Houchins, & Lopez-Duran, 2014	US	237 college students (112 female; age range 18–23, $M_{\text{age}} = 18.81$, $SD_{\text{age}} = 0.98$)	2011 - 2012	A	FB activity (frequency of engaging in active use), daily FB use (time spent on FB per day incl. active + passive use)	Depression	Daily FB use was not associated with depressive symptoms ($r = .10$). FB activity by sex by neuroticism interaction predicted depressive symptoms ($\beta = -.06$)*, such that among females only, greater FB activity was associated with lower depressive symptoms for those high in neuroticism, but not among those with average or low levels of neuroticism ($R^2 = .42$, $f^2 = .72$) ¹⁶ . FB activity, FB activity by neuroticism, and FB activity by sex were all non-significant predictors. No form of FB activity with or without interactions predicted depressive symptoms when neuroticism was replaced with extraversion, controlling for the same factors.
Steers, Wickham, & Acitelli, 2014	US	Study 1 180 university students (141 female; age range 19–57, $M_{\text{age}} = 24.41$, $SD_{\text{age}} = 5.88$)	NR	A	Time spent on FB	Depressive symptoms	Among males, time spent on FB influenced greater FB social comparisons ($\beta = 2.52$)** which, in turn, led to higher depression ($\beta = .61$)*, indicating a full mediation effect. Among females, time spent on FB had a positive direct influence on depressive symptoms ($\beta = 2.19$)** and a positive direct influence on FB social comparison ($\beta = 1.26$)*. However, FB social comparison did not significantly affect depressive symptoms and did not have a mediation effect.
	US	Study 2 154 university students (95 female; age range 18–42, $M_{\text{age}} = 22.55$, $SD_{\text{age}} = 4.22$)	NR	A + L	Frequency of FB logins, time spent on FB (participants filled out a 14-day interval-contingent diary)	Depressive symptoms	Time spent on FB predicted more upward ($\beta = .15$)** and non-directional social comparisons on FB ($\beta = .35$)** as well as less downward comparisons ($\beta = -.25$)**. All comparisons, in turn, predicted greater depression including upward ($\beta = .61$)**, non-directional ($\beta = .18$)**, and downward ($\beta = .40$)**. Similarly, frequency of FB logins predicted more upward ($\beta = .07$)** and non-directional social comparisons on FB ($\beta = .10$)** as well as less downward comparisons ($\beta = -.07$)**. All comparisons, in turn, predicted greater depression including upward ($\beta = .61$)**, non-directional ($\beta = .19$)**, and downward ($\beta = .41$)**.
Tandoc Jr., Ferrucci, & Duffy, 2015	US	736 college students (68% female; $M_{\text{age}} = 19.09$, $SD_{\text{age}} = 2.51$)	NR	A	Time spent on FB, number of FB friends, feeling envious of others when using FB	Depression	FB envy predicted greater depression ($\beta = .54$)***, $R^2 = .28$, $f^2 = .39$ ¹⁷ . Time spent on FB and number of FB friends were non-significant predictors. No relationship between using FB for surveillance purposes (i.e., keeping track of other people's posts and photos) and depression, however, when FB envy is added as a mediator, using FB for surveillance use (i.e., keeping track of other people's posts and photos) predicted increased FB envy, which, in turn, predicted greater depression ($\beta = 7.79$, $t = 15.78$)*. Importantly, FB surveillance revealed a direct negative effect on depression ($\beta = -.77$, $t = -2.12$)** ¹⁸ . Thus, while using Facebook for surveillance can actually make people less depressed, it can also lead to depression when users start feeling envious of others.
Wright et al., 2013	US	361 undergraduate students (193 female; $M_{\text{age}} = 20.26$, $SD_{\text{age}} = 2.72$)	NR	A	FB social support satisfaction	Depression	FB social support satisfaction had a direct effect on depression ($\beta = -.12$)** ¹⁹ .

Body Image and Disordered Eating

Fardouly, Diedrichs, Vartanian, & Halliwell, 2015	UK	112 female university students and staff (age range 17–25, $M_{\text{age}} = 20.46$, $SD_{\text{age}} = 1.71$)	NR	B	10 minutes on own FB account, a fashion magazine website, or a home wares website	Body dissatisfaction, weight and shape discrepancy, face, hair, and skin discrepancy, mood	Viewing FB or the fashion magazine compared to the condition group did not lead to greater post-exposure body dissatisfaction ($F = 0.68$, $p = .512$, $R^2 = .01$, $f^2 = .01$). The addition of trait appearance comparison tendency and interaction terms between comparison tendency and conditions also did not predict body dissatisfaction ($F = .08$, $p = .924$, $R^2 = \text{"less than } 1\%$ "). Viewing the fashion magazine results in greater weight and shape discrepancy after exposure ($\beta = .28$)** ($F = 3.23$, $p = .04$, $R^2 = .06$, $f^2 = .06$) compared to the control condition. No differences were noted between FB and control or FB and magazine conditions. Appearance comparison tendency and interaction terms did not significantly predict weight and shape discrepancy ($F = 1.20$, $p = .306$, $R^2 = .08$, $f^2 = .09$). Viewing FB or the fashion magazine compared to the condition group did not impact on face, hair,
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¹⁶ Controlled for sex, neuroticism, and sex by neuroticism.

¹⁷ Controlled for age and gender.

¹⁸ Controlled for age and gender.

¹⁹ Controlled for social integrative motives, interpersonal communication motives, competence (communication and computer-mediated communication), and face-to-face social support satisfaction.

							and skin discrepancy ($F = 1.67, p = .194, R^2 = .03, f^2 = .03$). The interaction between comparison tendency and the contrast between the FB and control conditions was a significant predictor of face, hair, and skin-related discrepancies ($\beta = .36^{**} (F = 3.25, p = .04, R^2 = .09, f^2 = .10)$). For women who are high in comparison tendency, spending time on FB led to more face, hair, and skin-related discrepancy than did spending time on the control website. No other interaction terms were significant predictors of face, hair, and skin-related discrepancy.
Fardouly & Vartaman, 2015	Australia	227 female undergraduate university students ($M_{age} = 19.13, SD_{age} = 2.21$)	NR	A	Daily FB use (frequency of logins, duration)	FB appearance comparisons (in general, close friends, distant peers) by frequency / direction, body dissatisfaction, drive for thinness	In addition, the study assessed the effect of the manipulation on mood. At step 1, being assigned to the FB condition predicted greater negative mood ($\beta = .34^{**}$) than those in the control condition. No other condition contrast predicted negative mood ratings ($R^2 = .09, f^2 = .10$). At step 2, trait appearance comparison tendency did not moderate the relationship between website conditions and negative mood. At step 3, interaction terms between comparison tendency and condition contrasts were also non-significant ($R^2 = \text{"less than } 1\% R^2 \text{ change"} - so .10, f^2 = .11$).
Hummel & Smith, 2014	US	185 university students (78% female; $M_{age} = 18.73, SD_{age} = 1.20$)	NR	A + L	Negative feedback seeking on FB, comments received on status updates, posting revealing status updates	Eating restraint, shape concerns, eating concerns, weight concerns	FB appearance comparisons in general mediated the relationship between FB usage and body dissatisfaction ($\beta = .38, SE = .20$) and also between FB usage and drive for thinness ($\beta = .50, SE = .24$). The more frequently FB users compared themselves to close friends mediated the relationship between FB usage and body dissatisfaction ($\beta = 0.44, SE = 0.23$) and drive for thinness ($\beta = 0.63, SE = 0.31$). Similarly frequency of comparisons to distant peers was also a significant mediator of FB usage and body concerns (body dissatisfaction: $\beta = 0.64, SE = 0.26$; drive for thinness $\beta = 0.82, SE = 0.30$). Comparing oneself unfavorably to celebrities mediated the relationship between FB usage and body dissatisfaction ($\beta = 0.93, SE = 0.43$). The direction of comparisons to distant peers (body dissatisfaction: $\beta = 1.40, SE = 0.49$; drive for thinness: $\beta = 0.90, SE = 0.34$) more strongly mediated the relationship between FB usage and body image concerns. ²⁰
Kim & Chock, 2015	US	186 university students (119 female; age range 18–25, $M_{age} = 19.75, SD_{age} = 2.06$)	NR	A	FB use for social grooming (engagement in FB features like commenting), number of FB friends, time spent on FB per day	Appearance comparison, drive for thinness, drive for muscularity	The interaction between engaging in negative feedback seeking and receiving a high number of comments (compared to a low number of comments) predicted increased eating restraint at time 2 (31 days apart; $b = .32^{*}$). The interaction did not predict eating concerns, shape concerns, or weight concerns ²¹ . Similarly, the interaction between writing personally revealing status updates and receiving extremely negative comments (compared to less negative comments) predicted greater shape concerns ($b = .08^{**}$), eating concerns ($b = .03^{*}$), and weight concerns ($b = .07^{**}$) at time 2. The interaction did not predict eating restraint ²² .
Lee, Taniguchi, Modica, & Park, 2013	US & Korea	159 undergraduate US women (age range 17–34, $M_{age} = 20.59, SD_{age} = 3.04$) and 137 undergraduate Korean women (age range 18–28, $M_{age} = 20.57, SD_{age} = 1.95$)	NR	B	Mock Facebook profile: status update re desiring to lose weight (conditions: culture, body size, peers' comments)	Body satisfaction	Time spent on FB was not related to appearance comparison ($r = .04$), drive for thinness ($r = .07$), or drive for muscularity ($r = -.05$). Drive for muscularity was also unrelated to using FB for social grooming ($r = .02$) and number of FB friends ($r = .03$). Number of FB friends predicted increases in drive for thinness ($\beta = .18^{*}$), as did using FB for social grooming ($\beta = .18^{*} (R^2 = .20, f^2 = .25)$). Appearance comparison fully mediated the relationship between number of FB friends and drive for thinness ($\beta = .13, p > .05$) as well as fully mediating the relationship between using FB for social grooming and drive for thinness ($\beta = .12, p > .05$) ($R^2 = .29, f^2 = .41$).

²⁰ The pattern of results did not vary across participant ethnicity.²¹ Regressions controlled for race, ethnicity, and time 1 disordered body attitudes and behaviours (relevant to the dependent variable).²² Regressions controlled for time 1 disordered body attitudes and behaviours (relevant to the dependent variable).

							overweight peer's fat talk, but there was no effect for US participants. An interaction effect for culture and peers' comments on body satisfaction was not significant ($\beta = -.00, p = .99$). Overall $R^2_{adj} = .25, f^2 = .33^{23}$. In addition, the study assessed the effect of the manipulation on psychological wellbeing. Women who witnessed peers' thin-promoting comments to the status update, compared to thin-discouraging comments, reported lower psychological wellbeing ($\beta = .11^*$). The interaction between culture and peers' comments also predicted psychological wellbeing ($\beta = .20^{**}$) whereby Korean women reported lower psychological wellbeing when witnessing thin-promoting comments compared to thin-discouraging, but type of comment did not change the psychological wellbeing of the US group. However, body size ($\beta = .04, p = .335$), interaction between body size and comments ($\beta = -.00, p = .975$), and interaction between body size and culture ($\beta = -.04, p = .556$) did not significantly predict psychological wellbeing ($R^2_{adj} = .50, f^2 = 1.0^{24}$).
Mabe, Forney, & Keel, 2014	US	Study 1 966 female college students in the fall ($n = 626, M_{age} = 18.44, SD_{age} = 0.85$) and spring ($n = 334, M_{age} = 19.10, SD_{age} = 1.11$)	NR	A	Time spent on FB per week	Disordered eating attitudes (dieting and bulimia / food preoccupation subscales)	Duration of FB use was positively related to disordered eating for participants in fall ($r = .11^{**}$ and spring ($r = .16^{**}$).
		Study 2 84 females from Study 1 who used FB on a weekly basis ($M_{age} = 18.39, SD_{age} = 0.69$)	NR	B	Amount of time spent using FB, activities used on FB, importance of FB features, and access to FB, how similar the experimental use was to their usual use of FB	Preoccupation with weight, shape, state trait anxiety	Participants were allocated to spend 20 minutes on their FB account (experimental group) or 20 minutes on Wikipedia researching the ocelot, a neutral rainforest animal, and on YouTube watching a preselected ocelot video (control group). Participants in both conditions reported a decrease in their preoccupation with weight and shape from pre to post manipulation ($F = 23.62, d = .30^{***}$). A significant time by group interaction occurred ($F = 4.52^*$) whereby the control group reported a significant decrease in preoccupation ($F = 21.29, d = .42^{**}$), and the FB condition was a less robust decline ($F = 4.34, d = .13^*$). Preoccupation was not significantly different between the two conditions at time 1 or time 2. State anxiety was maintained over time across both conditions ($p = .82$). However, the effect of time varied by condition ($F = 7.55^{**}$) in which the control condition reported significantly less anxiety ($F = 6.04, d = .56^*$) whereas the FB group reported a non-significant increase in anxiety ($F = 2.57, p = .06, d = -.13^{23}$). State anxiety was not significantly different between the two conditions at time 1 or time 2. In addition, the study assessed the effect of the manipulation on state anxiety. State anxiety levels did not change across time 1 and time 2 for either the FB or control condition ($p = .82$). However, the effect of time varied by condition ($p < .01$) whereby participants in the control condition endorsed a significant decrease in anxiety ($F = 6.04, p = .02, d = .56$) while participants in the experimental FB condition endorsed a non-significant increase in anxiety ($F = 2.57, p = .12, d = 2.13$). There were no significant differences between experimental and control participants at time 1 ($F = 53.72, p = .06, d = .44$) or at time 2 ($F = .28, p = .60, d = .12^{26}$). The significant interaction effect suggests that FB use maintains state anxiety compared to an alternative internet activity.
Manago, Ward, Lemm, Reed, & Seabrook, 2015	US	815 undergraduate students (467 female; female $M_{age} = 19.07, SD_{age} = 0.82$, male $M_{age} = 19.50, SD_{age} = 1.08$)	NR	A	FB involvement (time spent on FB, passive and active use, emotional investment in FB)	Objectified body consciousness (appearance self-worth, body surveillance, enjoyment of sexualization), body	Greater involvement in FB predicated objectified body consciousness (i.e., self-worth being affected by their external appearance, more frequent monitoring of body appearance, and greater enjoyment in being perceived as a sex object) ($\beta = .55$ for women, $\beta = .44$ for men). Objectified body consciousness in turn predicted increased body shame ($\beta = .64$ for women, $\beta = .50$ for men), which, in turn, led to lower sexual assertiveness ($\beta = -.23$ for women, $\beta = -.16$ for men).

²³ Controlled for body mass index and self-esteem.²⁴ Controlled for body mass index and self-esteem.²⁵ All interactions remained once controlling for disordered eating.²⁶ Controlled for disordered eating.

						shame, sexual assertiveness	
Meier & Gray, 2014	US	103 female high school students (age range 12–18, $M_{\text{age}} = 15.4$)	NR	A	Time spent on FB, engagement in photo-related FB activities	Internalization of the thin ideal, weight satisfaction, self-objectification, appearance comparison, drive for thinness	Time spent on FB was not correlated with any of the body image variables. However, FB users who engaged in more photo-based FB activities were related to increased internalization of the thin ideal ($r = .36^{**}$), self-objectification, i.e., focusing on their appearance ($r = .29^{**}$), and drive for thinness ($r = .27^{**}$), and negatively related to weight satisfaction ($r = -.23^{*}$). Photo-based FB activities were unrelated to appearance comparison ²⁷ . Compared to non-FB users, FB users were significantly more likely to self-objectify* and make physical appearance comparisons*.
Smith, Haines, & Joiner, 2013	US	219 female college students (age range 17–35, $M_{\text{age}} = 18.72$, $SD_{\text{age}} = 1.60$)	NR	A + L	Maladaptive FB use (perceived negative social evaluations and social comparisons)	Bulimic symptoms, over eating episodes, body dissatisfaction, shape concern	Maladaptive FB use ($b = .13$, $sr = .18^{**}$) predicted increases in time 2 (time 1 and 2 were 2–4 weeks apart) bulimic symptoms ²⁸ . Similarly, maladaptive FB use ($b = .06$, $sr = .14^{*}$) predicted increases in time 2 over eating episodes ²⁹ . Maladaptive FB use ($b = .21$, $sr = .20^{**}$) also predicted increases in time 2 body dissatisfaction ³⁰ . Maladaptive FB use ($b = .03$, $sr = .17^{**}$) predicted increases in time 2 shape concern ³¹ . Residual change in body dissatisfaction fully mediated the relationship between maladaptive FB use and over eating episodes ($b = .05$, $sr = .13$, $p = .07$), whereas it only partially mediated the relationship between maladaptive FB use and bulimic symptoms ($b = .10$, $sr = .15$, $p = .03$). Similarly, shape concern fully mediated the relationship between maladaptive FB use and over eating episodes ($b = .04$, $sr = .10$, $p = .15$), but only partially mediated the relationship between maladaptive FB use and bulimic symptoms ($b = .09$, $sr = .15$, $p = .04$) ³² .
Stronge et al., 2015	New Zealand	11,017 community sample (6883 female; $M_{\text{age}} = 49.23$, $SD_{\text{age}} = 15.12$)	2012	A	Hours spent on FB in the past week	Body satisfaction	For women, FB users reported significantly lower body satisfaction than non-users ($b = -.36$, $Post SD = .05$). Age and FB use interaction had a significant linear ($b = .01$, $Post SD = .00$)*** and curvilinear ($b = .00$, $Post SD = .00$)*** relationship, i.e., middle-aged women were particularly dissatisfied with their body compared to both older and younger age cohorts. Body dissatisfaction was at its lowest at around 38 years of age. For men, FB users also reported significantly lower body satisfaction than non-users ($b = -.29$, $Post SD = .07$). However, there were no significant linear or curvilinear interaction effects between FB use and age on body satisfaction.
Taniguchi & Lee, 2012	US & Japan	96 American female college students (age range 17–55, $M_{\text{age}} = 21.02$, $SD_{\text{age}} = 4.87$) and 103 Japanese female college students (age range 18–46, $M_{\text{age}} = 19.86$, $SD_{\text{age}} = 3.02$).	NR	B	Mock Facebook profiles: status update re desiring to lose weight (conditions: body size of profile owner, peers' comments, culture)	Body satisfaction	Two cultural (American vs. Japanese) student groups viewed mock FB profiles whereby the profile owner was displayed as having different body sizes (underweight vs. overweight) and comments on their status update (encouraging weight loss vs. discouraging weight loss). Americans were more satisfied with their body than Japanese participants ($F = 35.66$, $\eta^2 = .16$)***. Body size was non-significant, i.e., witnessing an underweight profile did not lead to lower body satisfaction. Peers' comments were also non-significant, i.e., witnessing thin-promoting comments on the FB status update did not lead to lower body satisfaction. Significant interaction effect between culture and peers' comments ($F = 4.92$, $\eta^2 = .03$)*, i.e., Americans did not differ in body dissatisfaction between thin-promoting and thin-discouraging, however, Japanese were happier with their bodies when witnessing thin-discouraging weight loss comments. The remaining interactions were non-significant including between body size and peers' comments, i.e., body dissatisfaction wasn't lower when witnessing an underweight profile owner and thin-promoting messages; and body size and culture, i.e., body dissatisfaction wasn't affected between Americans and Japanese when witnessing either an underweight or overweight profile owner. In addition, the study assessed the effect of the manipulation on psychological wellbeing. American students reported higher psychological wellbeing than Japanese students ($F = 52.23$, $\eta^2 = .03$)*. Psychological wellbeing was not affected by body size of the profile owner, that is, witnessing an

²⁷ Correlations controlled for BMI.²⁸ Controlled for reassurance seeking, age, race, and time 1 residual change bulimic symptoms.²⁹ Controlled for reassurance seeking, age, race, and time 1 residual change over eating episodes.³⁰ Controlled for reassurance seeking, age, race, and time 2 residual change body satisfaction.³¹ Controlled for reassurance seeking, age, race, and time 2 residual change shape concern.³² Each mediation model controlled for age and race.

Thompson & Lougheed, 2012	US	268 college students (53.3% female; $M_{\text{age}} = 19.10$, $SD = 2.40$)	2010	A	Facebook use across gender	Thoughts and attitudes about FB use	underweight compared to overweight profile owner ($F = 1.53$, $\eta^2 = .01$, $p = .218$). Participants who observed thin-promoting messages reported lower psychological wellbeing than those who observed thin-discouraging messages ($F = 4.73$, $\eta^2 = .03$)*. There were no significant interaction effects between body size and message ($F = 0.19$, $\eta^2 = .00$, $p = .664$), body size and culture ($F = 0.24$, $\eta^2 = .00$, $p = .627$), or culture and message ($F = 0.19$, $\eta^2 = .00$, $p = .663$).
Walker et al., 2015	US	128 female undergraduate students (age range 18–23, specifics not reported).	NR	A	FB intensity	Online physical appearance comparison, online fat talk, disordered eating	Compared to men, women were significantly more likely to report that the pictures others post on Facebook give them a negative self body image**.
Drinking Cognitions and Alcohol Use							
Beullens & Schepers, 2013	Belgium	160 college students (83 female; age range 20–58, median = 26)	NR	A + C	Alcohol-related content on FB, number of FB friends, status updates with alcohol use references	Total number of pictures containing alcohol use	Text references to alcohol were less common than picture references. On average, a text based message on FB had three reactions ($M = 2.58$, $SD = 3.18$) and three “likes” ($M = 2.71$, $SD = 3.47$). The peer reactions towards the alcohol use message tended to be more positive 74.19%, versus negative (11.29%) or neutral (14.52%). More status updates with alcohol use ($b = 4.40$)** and number of FB friends ($b = .02$)** were significant predictors of total number of pictures containing alcohol use ($R^2 = .23$, $f^2 = .30$) ³⁴ .
Egan & Moreno, 2011	US	255 male college students (age range 18–23, $M_{\text{age}} = 19.90$, $SD_{\text{age}} = 1.20$)	2009	C	Number of FB friends, FB usage (no. of FB friends, date of last activity, date of profile origin)	Displayed alcohol reference on FB per profile	Number of FB friends related to an increase in the number of displayed alcohol references per profile (CI .009, .02)***. However, FB usage did not influence the odds of displayed alcohol references per profile.
Glassman, 2012	US	455 students (60% female; age range 18–24, $M_{\text{age}} = 23.09$, $SD_{\text{age}} = 7.45$)	NR	A	Posting pictures of oneself (and of others) consuming alcohol on FB	Drinks consumed per week	Posting pictures of oneself consuming alcohol was the strongest predictor ($\beta = .42$)*** of drinks consumed per week ($R^2 = .22$, $f^2 = .28$). Posting pictures of others consuming alcohol on FB was a non-significant predictor ³⁵ .
Fournier & Clarke, 2011	US	68 college students (49 female; age range 18–40, $M_{\text{age}} = 19.9$, $SD_{\text{age}} = 3.9$)	NR	A + C	Percent of alcohol-related FB content (posts & pictures)	Frequency/quantity of alcohol use, perceived alcohol norms	Alcohol-related content on FB was positively related to frequency ($r = .38$)** and quantity ($r = .38$)** of alcohol use. Alcohol-related content on FB was not related to perceived norms (students' reports of the frequency of alcohol use by their “close FB friends”; $r = .29$).
Fournier, Hall, Rieke, & Storey, 2013	US	57 university students (39 female; age range 18–33, $M_{\text{age}} = 20.0$)	2010	B	Viewing fictitious FB account with or without alcohol-related content for 10 minutes	Personal alcohol use, perceived drinking norms	Drinking norms: those exposed to the alcohol condition perceived frequency of alcohol use as significantly greater than those in the no alcohol condition ($F = 9.09$, $p = .004$, $\eta_p^2 = .15$). Binge drinkers specifically perceived greater drinking frequency than non-binge drinkers ($F = 8.78$, $p = .005$, $\eta_p^2 = .14$). No interaction effect. Interestingly, the alcohol condition did not perceive a higher quantity of alcohol use compared to the no alcohol condition. Binge drinkers did again perceive greater drinking quantity than non-binge drinkers ($F = 16.35$ $p < .001$, $\eta_p^2 = .24$). No interaction effect. Personal alcohol use: no difference between participants in each condition re how many drinks they planned to consume next time they drank alcohol.
Hormes, 2016	US	537 undergraduate students (64% female; $M_{\text{age}} = 19.63$,	NR	A	Disordered (n = 45) vs. no disordered (n =	Time spent on FB on average and previous day,	As expected, those classified as disordered FB users spent more time on FB on average ($\chi^2 = 30.21$, $p < .001$, $\Phi = .25$) and the previous day ($F = 19.64$, $p < .001$, $\eta_p^2 = .04$) compared to no disordered FB users. Similarly, disordered users scored higher on the AUDIT ($M = 9.50$, $SD = 6.50$) compared

³³ Regression and mediation model controlled for body mass index, depression, trait anxiety, perfectionism, negative urgency, and self-efficacy.³⁴ Controlled for gender, year of birth, and relationship status.³⁵ Controlled for age, race/ethnicity, sex, member of sorority/fraternity, job status, and grade point average.

		$SD_{age} = 4.24)$			436) FB use (based on addiction criteria)	AUDIT, temptation and restraint, approach and avoidance, drinking motives, drinking consequences	to no disordered ($M = 8.25, SD = 5.22$) ($F = 7.59, p = .01, \eta_p^2 = .02$), and were also more tempted to drink ($F = 15.99, p = .001, \eta_p^2 = .04$), more preoccupied with limiting drinking ($F = 9.65, p = .002, \eta_p^2 = .02$), more approach behaviours towards alcohol ($F = 4.52, p = .03, \eta_p^2 = .01$), more avoidance behaviours towards alcohol ($F = 9.24, p = .003, \eta_p^2 = .02$), using alcohol to cope ($F = 10.14, p = .002, \eta_p^2 = .02$), using alcohol to conform with a group ($F = 22.08, p < .001, \eta_p^2 = .05$), and more negative lifetime consequences due to alcohol use including physical ($F = 6.31, p = .01, \eta_p^2 = .02$) intrapersonal ($F = 13.32, p < .001, \eta_p^2 = .03$), social ($F = 17.67, p < .001, \eta_p^2 = .04$), and interpersonal ($F = 8.16, p = .01, \eta_p^2 = .02$) as well as in the past three months (values not reported: same domains significant as lifetime) ³⁶ .
Litt & Stock, 2011	US	189 high school students (51% female; age range 13–15, $M_{age} = 14.50, SD_{age} = 0.77$)	NR	B	Viewing 4 fictitious FB accounts primarily with or without alcohol use for 40 minutes, time spent on FB	Willingness to drink alcohol and risk-promoting cognitions towards alcohol use	Compared to the no alcohol condition, young people in the alcohol condition reported higher levels of risk-promoting cognitions ($F = 2.84$)* including greater willingness to drink alcohol ($F = 6.73, p = .01, d = .58$), more favourable prototypes of alcohol users ($F = 4.22, p = .02, d = .66$), more favourable attitudes toward alcohol use ($F = 4.45, p = .04, d = .37$), lower perceived vulnerability to the consequences of alcohol use ($F = 5.00, p = .03, d = .40$), and greater levels of perceived norms for alcohol use among high school students ($F = 7.89, p = .01, d = .73$). Mediation analysis found user prototypes, attitudes, and perceived norms to mediate the relationship between alcohol condition and willingness to use alcohol (full mediation as total effect became not significant). Time spent on FB was associated with greater willingness to use alcohol ($F > 5.00$)*.
Marczinzki et al., 2016	US	146 undergraduate students (85 female; $M_{age} = 19.59, SD_{age} = 2.87$)	NR	A	Alcohol-related FB activity	AUDIT total score, timeline follow-back (TLFB), personal drinking habits questionnaire (PDHQ)	Alcohol-related FB activity predicted higher AUDIT scores ($\beta = .39***, R^2 = .21, f^2 = .27$), more TLFB continuous days of drinking ($\beta = .37***, R^2 = .14, f^2 = .16$), less TLFB continuous days of abstinence ($\beta = -.33***, R^2 = .15, f^2 = .18$), greater TLFB total number of drinking days ($\beta = .43** R^2 = .20, f^2 = .25$), more TLFB total number of drinks ($\beta = .40***, R^2 = .21, f^2 = .27$), greater TLF highest number of drinks in one day ($\beta = .29***, R^2 = .14, f^2 = .16$), more TLFB heavy drinking (5 days ($\beta = .35***, R^2 = .14, f^2 = .16$), more TLFB drink days ($\beta = .42***, R^2 = .20, f^2 = .25$), more PDHQ typical number of drinks/occasion ($\beta = .18*, R^2 = .15, f^2 = .18$), more PDHQ typical dose ($\beta = .19*, R^2 = .09, f^2 = .10$), and more PDHQ weekly frequency of drinking ($\beta = .24**, R^2 = .09, f^2 = .10$). Alcohol-related FB activity did not predict PDHQ history (months) of regular drinking ³⁷ .
Miller, Prichard, Hutchinson, & Wilson, 2014	Australia	134 female university students (age range 18–30, $M_{age} = 21.48, SD_{age} = 3.00$)	NR	A	Time spent on FB, own alcohol-related text / photos on FB, friends' alcohol-related FB posts	AUDIT, alcohol-related attitudes	Time spent on FB ($\beta = -.08$), own alcohol-related text ($\beta = .19$), own alcohol-related photos ($\beta = .10$) on FB, and friends' alcohol-related posts on FB ($\beta = -.04$) were all non-significant predictors of positive attitudes towards alcohol ³⁸ . Time spent on FB ($\beta = .10$), own alcohol-related text ($\beta = .07$), and friends' alcohol-related posts on FB ($\beta = -.10$) were all non-significant predictors of own alcohol consumption. However, own alcohol-related photos ($\beta = .28**$ posted on FB predicted own alcohol consumption ($R^2 = .60, f^2 = 1.50$) ³⁹ .
Moreno, Christakis, Egan, Brockman, & Becker, 2012	US	224 undergraduate students (54.5% female; age range 18–20, $M_{age} = 18.81, SD_{age} = 0.70$)	2009 – 2010	A + C	Alcohol-related FB content: non-displayers vs. alcohol displayers vs. intoxication/problem drinking displayers (I/PD)	AUDIT	The mean AUDIT scores were: 9.5 (+/- 6.0) for I/PD displayers, 6.7 (+/- 4.3) for alcohol displayers and 4.7 (+/- 4.0) for non-displayers***. Compared to Non-Displayers, I/PD displayers had 1.64 times higher AUDIT scores (95% CI: 1.27–11.0)***. Compared to Alcohol Displayers, I/PD Displayers had 1.48 times (95% CI: 1.10–10.0) higher AUDIT scores, although this was not statistically significant. I/PD displayers were significantly more likely than non-displayers and alcohol displayers to be at risk of problem drinking (OR = 4.4, 95% CI = 2.0–9.4)*** and were more likely to report an alcohol-related injury in the past year (19%) compared to alcohol displayers (7%) and non-displayers (3%)** ⁴⁰ .

³⁶ Gender and race controlled for when found to be a significant covariate.³⁷ All models controlled for gender, social desirability, and impulsivity.³⁸ Controlled for age, perception of female friends' alcohol consumption, perception of average female student's alcohol consumption, perception of male friends' alcohol consumption, perception of average male student's alcohol consumption, and own alcohol consumption.³⁹ Controlled for age, attitude, perception of female friends' alcohol consumption, perception of average female student's alcohol consumption, perception of male friends' alcohol consumption, and perception of average male student's alcohol consumption.⁴⁰ Controlled for age and gender.

Moreno, Cox, Young, & Haaland, 2015	US	338 undergraduate students (56.1% female; age range 17–19, $M_{\text{age}} = 18.40$, $SD_{\text{age}} = 0.60$)	2011–2012	A + C	Initial display of alcohol reference on FB: like, status update, photo, profile picture	Any alcohol use, any binge episode, excessive drinking	Initial FB displays did not predict any alcohol use. Initial displays of alcohol reference on FB as a photograph (RR = 1.44*, 95% CI 1.05–1.98) and as a profile picture (RR = 1.35*, 95% CI 1.06–1.73) predicted any binge episode in the past 28 days. Similarly, initial displays of alcohol reference on FB as a photograph (RR = 1.79*, 95% CI 1.02–3.15) and as a profile picture (RR = 2.34**, 95% CI 1.54–3.58) predicted excessive drinking (four or more binge episodes in the past 28 days) ⁴¹ .
Moreno, D'Angelo, Kacvinsky, Kerr, Zhang, & Eickhoff, 2014	US	338 undergraduate students (56.1% female; age range 17–19, $M_{\text{age}} = 18.40$, $SD_{\text{age}} = 0.60$)	2011 – 2012	A + C	Number of FB friends, average number of monthly status updates	Likelihood of displaying alcohol-related content on FB, new alcohol display on FB	Students were screened for alcohol-related content at baseline (prior to starting college) and reassessed throughout the first year of college. The odds of displaying alcohol at baseline increased by 10.5% (95% CI: 0–22.1%) for every 100 more FB friends. Number of FB friends (HR = 1.19, 95% CI: 1.09–1.28, $p < 0.001$) for every 100 more friends, and total average monthly status updates (HR = 1.03, 95% CI: 1.002–1.05, $p = 0.033$) were identified as independent predictors for new alcohol display once commencing college ⁴² .
Ridout, Campbell, & Ellis, 2012	Australia	158 university students (101 female; age range 17–24, $M_{\text{age}} = 18.87$, $SD_{\text{age}} = 1.27$)	NR	A + C	Alcohol identity derived from FB (photos self- and other generated), number of FB friends	AUDIT-C, AUDIT-P graduated frequency-C, graduated frequency-B, RAPI, CBC	Number of FB friends (P1) and FB alcohol identity (P2) were significant predictors of all alcohol outcome measures including AUDIT-C (consumption subscale) (P1 $\beta = .17^{**}$, P2 $\beta = .57^{***}$, $R^2 = .29$, $f^2 = .41$), AUDIT-P (alcohol-related problems subscale) (P1 $\beta = .15^*$, P2 $\beta = .43^{***}$, $R^2 = .16$, $f^2 = .19$), graduated frequency-C (estimated standard drinks consumed in past year) (P1 $\beta = .20^{**}$, P2 $\beta = .50^{***}$, $R^2 = .22$, $f^2 = .28$), graduated frequency-B (estimated binge drinking session in the past year) (P1 $\beta = .19^{**}$, P2 $\beta = .49^{***}$, $R^2 = .22$, $f^2 = .28$), Rutgers Alcohol Problem Index (RAPI) (P1 $\beta = .19^*$, P2 $\beta = .35^{***}$, $R^2 = .11$, $f^2 = .12$), and College Behaviour Checklist (CBC) (P1 $\beta = .21^*$, P2 $\beta = .40^{***}$, $R^2 = .15$, $f^2 = .18$) ⁴³ .
Rodriguez, Litt, Neighbors, & Lewis, 2016	US	109 undergraduate students (88% female; $M_{\text{age}} = 21.8$, $SD_{\text{age}} = 4.42$)	NR	A	Alcohol-related FB posts (across previous 100 posts)	Drinking identity, alcohol use (drinks per week, drinking frequency, typical quantity, peak drinks)	Number of alcohol-related posts was positively associated with drinking identity ($r = .35^{***}$). Alcohol-related content was more strongly associated with all the drinking outcomes at lower levels of drinking identity. Specifically, a higher level of drinking identity was unrelated to FB posts and drinks per week ($b = .06$, $t = 1.43$, $p = .15$), typical quantity, and peak drinks. However, it was minimally related to drinking frequency ($p = < .05$). At medium levels of drinking identity, FB posts were associated with all drinking outcomes ($ps < .01$). At lower levels of drinking identity, FB posts were most strongly associated with all four drinking outcomes ($ps < .001$). Thus, among those who don't consider alcohol as an important part of their identity, external sources like FB may have a greater influence in predicting drinking behaviour; those high in drinking identity may not be bothered by FB and drink regardless. Alternatively, drinking identity may predict alcohol behaviours and FB posts moderate this relationship, i.e., students with low drinking identity post more alcohol-related FB content for self-presentation reasons and this increases their drinking behaviour whereas high identity drinkers may not need a feel to post FB content and drink regardless.
Westgate, Neighbors, Heppner, Jahn, & Lindgren, 2014	US	1,106 undergraduate students (654 female; age range 18–25, $M_{\text{age}} = 20.40$, $SD_{\text{age}} = 1.60$)	NR	A	Number of FB friends, alcohol-related content posted on FB by user and by user's friends	Drinks per week, alcohol problems, AUDIT, alcohol cravings	Number of FB friends ($\beta = .00$, $d = .62^{***}$) and user alcohol posts ($\beta = .56$, $d = .46^{***}$) predicted greater alcohol consumption per week. Number of FB friends ($\beta = .00$, $d = .61^{***}$) and user alcohol posts ($\beta = .50$, $d = .40^{***}$) predicted more alcohol-related problems. Number of FB friends ($\beta = .00$, $d = .83^{***}$), user alcohol posts ($\beta = .36$, $d = .51^{***}$), and user's friends' alcohol posts ($\beta = .05$, $d = .14$) predicted higher AUDIT scores. User alcohol posts ($\beta = 1.96$, $d = .21^{**}$) predicted stronger alcohol cravings ⁴⁴ .
Other Mental Health Problems							
Hanprathet, Manwong, Khumsri, Yingyeun, & Phanasatith, 2015	Thailand	972 high school students, with 872 current FB users (549 female, $M_{\text{age}} = 16.6$, $SD_{\text{age}} = 1.0$)	2014	A	FB addiction (BFAS) – stratified into normal, not so severe addiction, and severe	General mental health (somatic symptoms, anxiety & insomnia, social dysfunction, and severe depression)	The not so severe FB addiction group had a higher risk of somatic symptoms ($OR_{\text{adj}} = 1.2$, 95% CI = 0.9, 1.7)*, anxiety and insomnia ($OR_{\text{adj}} = 1.5$, 95% CI = 1.1, 2.1)*, and severe depression ($OR_{\text{adj}} = 1.5$, 95% CI = 1.0, 2.2)* than the normal group. The severe FB addiction group was at a higher risk of somatic symptoms ($OR_{\text{adj}} = 2.0$, 95% CI = 1.2, 3.4)*, anxiety and insomnia ($OR_{\text{adj}} = 1.4$, 95% CI = 0.8, 2.5)*, social dysfunction ($OR_{\text{adj}} = 1.8$, 95% CI = 1.1, 3.1)* and severe depression ($OR_{\text{adj}} = 1.6$, 95% CI = 0.8, 3.0)* than the not so severe FB addiction group ⁴⁵ .

⁴¹ Each model controlled for university, gender, and race.⁴² Controlled for gender and race.⁴³ Each model controlled for gender.⁴⁴ Each model controlled for gender and drinking motives (social, enhancement, conformity, coping).⁴⁵ Controlled for sufficiency of family income, school location, level of education, GPAX, and attention deficit hyperactivity disorder or learning disabilities

					addiction	
Hormes, Kearns, & Timko, 2014	US	253 undergraduate students (159 female; $M_{age} = 19.68$, $SD_{age} = 2.85$)	NR	A	Disordered FB use (diagnostic criteria related to SUDs)	General internet addiction, problems related to excessive FB use, difficulty regulating emotions, psychological flexibility, and thought suppression
						Compared to those not endorsing the criteria, disordered FB users scored higher on general internet addiction ($F = 34.48$, $\eta_p^2 = 0.14$)***, reported two or more problems related to excessive FB use ($\chi^2 = 10.22$, $\Phi = .21$)**, experienced more difficulties in regulating emotions ($F = 3.39$, $\eta_p^2 = 0.09$)**, and reported lower psychological flexibility ($F = 20.49$, $\eta_p^2 = 0.03$)***. There was no difference across tendencies to suppress thoughts ($F = 2.06$, $\eta_p^2 = 0.01$, $p = .16$) ⁴⁶ .
Jang, Park, & Song, 2016	South Korea	313 university students (219 female; $M_{age} = 21.17$, $SD_{age} = 1.95$)	2014	A	FB use (frequency, active posting, passive browsing)	Mental health
						FB use did not directly affect mental health. However, FB use predicted increased perceived social support ($\beta = .13$)**, which, in turn predicted improved mental health ($\beta = .15$)**, $R^2 = .22$, $f^2 = .28$ ⁴⁷ .
Malik & Khan, 2015	Pakistan	200 university students (100 female; age not reported)	2013	A	FB addiction (BFAS)	Narcissism
Rosen, Whaling, Rab, Carrier, & Cheevers, 2013	US	1143 adult education course (683 female; age range 18–65, $M_{age} = 30.74$, $SD_{age} = 12.34$)	NR	A	FB activities (frequency of engaging in a number of activities such as posting status updates), number of FB friends, FB impression management	Bipolar-mania, narcissism, antisocial, compulsive, paranoid, histrionic, schizoid
						FB activities positively predicted bipolar-mania ($\beta = .12$)***, narcissism ($\beta = .13$)***, antisocial ($\beta = .14$)***, and paranoid histrionic ($\beta = .16$)*** disorders and negatively predicted compulsive ($\beta = -.08$)* disorder. FB activities did not predict schizoid disorder. Number of FB friends negatively predicted schizoid ($\beta = -.22$)*** and positively predicted bipolar-mania ($\beta = .09$)*, narcissism ($\beta = .16$)***, and paranoid histrionic ($\beta = .25$)*** disorders. Number of FB friends did not predict antisocial or compulsive disorders. FB impression management positively predicted bipolar-mania ($\beta = .08$)*, narcissism ($\beta = .14$)***, and paranoid histrionic ($\beta = .10$)* disorders. FB impression management did not predict antisocial, compulsive, or schizoid disorders ⁴⁸ .
Walters & Horton, 2015	US	80 male undergraduate students (age range 18–22)	NR	A + L	Time spent on FB, number of logins to FB	Narcissism
						Participants were prompted with emails twice a day for four days to complete self-report measures. Time spent on FB was not correlated with narcissism ($r = -.03$, $p = .50$). Number of logins to FB predicted narcissism ($F = 2.78$, $p = .04$), however, FB logins did not predict residual change narcissism (difference between the most recent previous narcissism score and current narcissism score) ($F = .09$, $p = .96$) 2 or narcissism controlling for most recent previous narcissism score ($F = 1.17$, $p = .31$) ³ . Thus, this study found that FB use does not promote narcissism.

NB. FB: Facebook; Design A: quantitative, cross-sectional study; Design A + L: quantitative, cross-sectional study with a longitudinal component; Design A + C: quantitative, cross-sectional study with a content analysis component; Design B: experimental study; Design P: prospective, randomized design

* $p < .05$

** $p < .01$

*** $p < .001$

⁴⁶ All analyses controlled for gender and race.

⁴⁷ Controlled for self-esteem, impression management, and social comparisons on Facebook.

⁴⁸ Preliminary t tests found no significant differences between males and females across FB addiction, narcissism, or self-esteem.

⁴⁹ All models controlled for gender, age, educational level, median income, ethnic/cultural background, technology-related attitudes (positive, negative, multitasking preference, ease of use, emotional support online), technology-related anxiety (not checking text messages, FB/SNS, personal e-mail, work e-mail), and general media usage (Internet, music, text messaging, and telephone use hours per day).

definition of addictive Facebook use is ambiguous and challenges the notion of Facebook use as a behavioral addiction.

A plethora of assessment tools have also been developed and utilized, yet most are unable to support all six core substance addiction components (Balakrishnan & Shamim, 2013; Muench et al., 2015; Turel, 2015). Furthermore, the construct validity of scale items is questionable due to the reliance on single items to measure overarching components. For example, Turel (2015) assessed withdrawal symptoms by the item: "When I am not using Facebook I often feel agitated" which could be argued to lack clinical significance, and Muench et al. (2015) evaluated conflict through: "Using Facebook sometimes interferes with other activities" which relies on the individual to interpret the type of activity and the nature and severity of the interference. Similarly, occasional interferences may be deemed to lack clinical significance. The majority of measures also omit cut-off criteria to indicate harmful use and do not stipulate a minimum timeframe for experiencing problematic use. In summary, further research is required to develop an assessment tool and diagnostic criteria with sound psychometric properties. This will, in turn, establish whether Facebook use can develop into an addiction or may be more appropriately conceptualized as a non-clinical, problematic behavior.

3.3. Anxiety

Seven studies were identified that assessed the effect of Facebook use on anxiety, with generally small to medium effect sizes. The quality ratings identified four studies of fair quality and three of poor quality. All studies used cross-sectional designs, with six comprising student samples and one study using a university and community sample. Two studies did not specify age, and the remaining studies reported an average participant age between 16 and 32 years. Most studies included more females than males, and 57% assessed USA participants.

Grieve, Indian, Witteveen, Tolan, and Marrington (2013) found Facebook use to lessen anxiety symptoms; specifically, participants who reported greater social connection from using Facebook experienced lower anxiety. Conversely, Facebook use exacerbated anxiety among university students who spent more time on Facebook (Labrague, 2014; Shaw, Timpano, Tran, & Joormann, 2015), used Facebook in a passive manner (Shaw et al., 2015), reported anxiety about interacting on Facebook, or used Facebook for social purposes (McCord, Rodebaugh, & Levinson, 2014).

Shaw et al. (2015) identified brooding behavior as a potential mechanism through which Facebook can trigger anxiety. Social anxiety exhibited a cyclical relationship with brooding, whereby passive Facebook use triggered increased brooding, which, in turn, heightened social anxiety; similarly, passive use elicited social anxiety, which subsequently increased brooding behavior. The bidirectional relationship between anxiety and brooding has been established outside of the context of SNS use (Grant et al., 2013). Jose and Weir (2013) conceptualize brooding as comparing oneself to unrealized standards with a past- or present-orientation, while anxiety is future-oriented relating to anticipated threats or fears. The interplay between these constructs is plausible in light of these distinguishing features. Moreover, SNSs may be particularly apt at eliciting such behaviors because of the speed and ease at which one can access Facebook and the exposure to Facebook friend profiles that often depict a glorified version of the other person's life (Delise, 2014), thus increasing the likelihood of comparing oneself to others and monitoring one's online image.

Two studies examined individuals who reported preexisting anxiety. Individuals reporting anxiety related to interacting with others on Facebook had greater social anxiety, and social anxiety

heightened Facebook-specific anxiety (Farquhar & Davidson, 2014; McCord et al., 2014). Interestingly, McCord et al. also identified that social use of Facebook related to increased social anxiety. The authors postulated that some individuals may feel less anxious about interacting on Facebook due to the non-confrontational affordances of online communication; however, face-to-face interactions may arouse more anxiety and Facebook is subsequently utilized to compensate for this fear. Facebook may, therefore, be used as a coping strategy for users who have underlying anxiety, with previous research establishing anxiety as a predictor of excessive Facebook use (Koc & Gulyagci, 2013; Lee & Stapski, 2012; Lee, 2015). Yet, Facebook users have also reported experiencing anxiety when they were unable to login to their Facebook account (Rosen, Whaling, Rab, Carrier, & Cheever, 2013). To a similar effect, individuals who reported a fear of missing out were more likely to use Facebook, which is a pervasive apprehension that one is absent from rewarding experiences that others are enjoying (Beyens, Frison, & Eggermont, 2016). This indicates that Facebook use has a complex relationship with anxiety: sheer use (of lack thereof) may trigger anxiety among some users, exacerbate or maintain anxiety for those with preexisting anxiety, or reduce anxiety when social connectedness benefits are realized.

Four studies employed Ellison, Steinfield, and Lampe's (2007) Facebook intensity scale, which measures active use, an emotional connection to Facebook, and the extent to which Facebook is integrated in a user's daily life, and found intensity was unrelated to anxiety, social anxiety, or self-monitoring one's image on Facebook (Davidson & Farquhar, 2014; Farquhar & Davidson, 2014; Labrague, 2014; Marder, Joinson, Shankar, & Thirlaway, 2016). Similarly, there was no relationship between anxiety and various single-item Facebook use measures including number of unique groups within one's Facebook network (Davidson & Farquhar, 2014; Farquhar & Davidson, 2014), time spent on Facebook (Farquhar & Davidson, 2014), number of Facebook friends (Farquhar & Davidson, 2014; Labrague, 2014), content production on Facebook, and interactive communication on Facebook (Shaw et al., 2015).

3.4. Depression

Eighteen studies were identified that assessed the effect of Facebook use on depression, with generally small effect sizes (NB. two of these studies were presented in the one paper). The quality ratings identified studies of poor (4), fair (13), and good (1) quality. Seventeen studies used a cross-sectional, correlation design, with two of these including a longitudinal component. The remaining study adopted a prospective, randomized design. Two studies did not report participant age, and the remaining studies reported an average age between 14 and 30 years. Samples included university students (11), high school students (4), mixed university and community sample (1), adult education course (1), and patients at an outpatient psychiatry clinic (1). The majority of studies included more females than males and 50% sampled USA participants.

Individuals who used Facebook in a manner that enabled perceived social support and connection reported lower depressive symptoms (Frison & Eggermont, 2016a; Frison & Eggermont, 2016b; Grieve et al., 2013; Mota Pereira, 2014; Wright et al., 2013). Mota Pereira (2014) utilized a prospective, randomized design including 57 patients diagnosed with treatment-resistant major depressive disorder attending a psychiatry outpatient clinic. Participants were randomly assigned to one of three conditions: to spend a minimum of 1 h per day on Facebook and have their treating psychiatrist as a Facebook "friend" whom they could communicate with as needed; to spend a minimum of 1 h per day on Facebook without the psychiatrist as a Facebook "friend"; or the

control condition of no Facebook use. Patients in the Facebook conditions had not used Facebook before the trial and patients in the control condition did not have a Facebook account. Psychological therapy was not delivered by the psychiatrist via Facebook.

Response and remission rates across four time points (baseline, 1, 2, and 3 months) revealed a significant difference between the Facebook with psychiatrist and control group at one month, and a significant difference between the control and both Facebook groups at three months, such that the Facebook conditions improved response and remission rates. Importantly, of those participants assigned to the Facebook with psychiatrist as "friend" condition, only three contacted the psychiatrist via Facebook during the trial and each time this was in regards to medication enquiries and not for social support. This suggests that merely knowing support from a health professional is available can provide therapeutic benefits, speculatively due to a sense of reassurance. This aligns with previous research that has shown that the perception of social support can independently buffer psychological wellbeing (Montpetit, Nelson, & Tiberio, 2016; Zhong, 2009; Zhu, Woo, Porter, & Brzezinski, 2013). The improvement in the alternate Facebook condition also indicates that regular engagement on the platform was beneficial, again likely related to perceived social support and actual socialization opportunities.

Conversely, more depressive symptoms were associated with: passive Facebook use (Frison & Eggermont, 2016a; Tandoc Jr., Ferrucci, & Duffy, 2015), active public Facebook use (Frison & Eggermont, 2016a; Simoncic, Kuhlman, Vargas, Houchins, & Lopez-Duran, 2014), time spent on Facebook (Labrague, 2014; Steers, Wickham, & Acitelli, 2014), posting negative status updates (Locatelli, Kluwe, & Bryant, 2012), receiving emotional or negative social support on Facebook (McCloskey, Iwanicki, Lauterbach, Giannittorio, & Maxwell, 2015), seeking but not perceiving social support via Facebook (Frison & Eggermont, 2016b), use of the "like" feature, tagging current location, and using the "add friend" feature to feel more comfortable when meeting someone (Naja, Kansoun, & Haddad, 2016). To a similar effect, Rosen et al.'s (2013) study of 1143 adult education course attendees found that more Facebook friends predicted greater depressive and dysthymia symptoms, after controlling for a comprehensive range of demographic and technology-related attitudes and behaviors. Among those studies that investigated possible moderators or mediators, more depressive symptoms were noted when Facebook use interacted with: personality traits such as neuroticism (Simoncic et al., 2014), participant gender (Frison & Eggermont, 2016a; Simoncic et al., 2014: NB. gender affected depression differentially depending on type of Facebook use examined), perceived social support (Frison & Eggermont, 2016a; Frison & Eggermont, 2016b), feelings of envy (Tandoc Jr., Ferrucci, & Duffy, 2015), ruminative behaviors (Feinstein et al., 2013; Locatelli et al., 2012), and frequent social comparisons (Steers et al., 2014).

Depression was not associated with the following types of Facebook use: time spent on Facebook (Banjanin, Banjanin, Dimitrijevic, & Pantic, 2015; Morin-Major et al., 2016; Simoncic et al., 2014; Tandoc Jr. et al., 2015); number of Facebook friends (Banjanin et al., 2015; Labrague, 2014; Morin-Major et al., 2016; Park, Lee, Kwak, Cha, & Jeong, 2013; Tandoc Jr. et al., 2015); Facebook intensity (Labrague, 2014); number of self-portrait photographs (Banjanin et al., 2015); passive Facebook use or active private Facebook use among males, and active public use among females (Frison & Eggermont, 2016a); active Facebook use (Rosen et al., 2013; Simoncic et al., 2014); frequency of positive status updates (Locatelli et al., 2012); perceived instrumental and social support on Facebook (McCloskey et al., 2015); impression management behavior on Facebook (Morin-Major et al., 2016; Rosen et al., 2013); peer interaction on Facebook (Morin-Major et al.,

2016); attitudes towards Facebook, such as finding it easier to disclose information via Facebook or perception that your profile shows the best of your life (Naja et al., 2016); number of groups a user belongs to; being a group administrator; number of "likes"; number of pending Facebook requests; Facebook interest categories; and location tagging (Park et al., 2013).

3.5. Body image and disordered eating

Fourteen studies were identified that assessed the effect of Facebook use on body image and disordered eating, with generally medium effect sizes (NB. two of these studies were presented in the one paper). The quality ratings identified studies of poor (3), fair (7), and good (4) quality. Of the 14 studies, 10 used cross-sectional designs, with two of these including a longitudinal component. The remaining four studies used experimental designs. Nine of the 14 studies comprised female only samples, with the remaining five including more females than males. Seventy eight percent of studies sampled USA participants and recruited student (11), mixed student and staff members (1), high school students (1), and community (1) samples. Twelve of the 14 studies reported an average participant age between 18 and 23 years.

Stronge et al. (2015) initially examined body image comparing Facebook users and non-users in a community sample of 11,017 participants. Facebook users reported significantly lower body satisfaction than non-users, and this effect held across gender. Likewise, Facebook users were more likely to self-objectify and make physical appearance comparisons than non-users in a study of 103 female high school students (Meier & Gray, 2014). Seven studies assessed single-item measures of Facebook consumption or specific activities. Fardouly and Vartanian (2015) found daily Facebook use, comprising time spent on Facebook and frequency of Facebook logins, to predict increased body dissatisfaction and drive for thinness. Similarly, Mabe, Forney, and Keel (2014) found time spent on Facebook to be associated with increased disordered eating attitudes while Manago, Ward, Lemm, Reed, and Seabrook (2014) related involvement in Facebook with greater objectified body consciousness, and, in turn, increased body shame.

A greater number of Facebook friends and using Facebook for social engagement related to an increased drive for thinness (Kim & Chock, 2015) and photo-based Facebook activities were associated with increased internalization of the thin ideal, self-objectification, drive for thinness, and weight dissatisfaction (Meier & Gray, 2014). Hummel and Smith (2014) found that engaging in negative feedback seeking on Facebook when a high number of peer comments are received (compared to a low number of status update comments) predicted increased eating restraint over time. Likewise, writing personally revealing status updates and receiving extremely negative comments (compared to less negative comments) predicted greater shape concerns, eating concerns, and weight concerns over time. Finally, Thompson and Lougheed (2012) found that compared to men, women were significantly more likely to report that pictures others post on Facebook make them feel negative about their body image.

Five studies reported appearance comparison as a potential mechanism underlying the relationship between Facebook use and poor body image and disordered eating. Fardouly et al. (2015) randomly assigned 112 female university students and staff members to spend 10 min on either their own Facebook account, a fashion magazine website, or a homewares website. They found that individuals who reported a tendency to compare their appearance to others were more likely to experience face, hair, and skin discrepancy after spending time on their own Facebook account, compared to the control conditions. These individuals also

reported a significantly lower mood than the control groups post manipulation. Similarly, Smith, Hames, and Joiner (2013) measured users' maladaptive Facebook use, defined as perceived negative social evaluations and comparisons, over two time points two to four weeks apart. They found maladaptive use to predict increases in bulimic symptoms, overeating episodes, body dissatisfaction, and shape concern. The harmful role of appearance comparison was also supported in cross-sectional studies (Fardouly & Vartanian, 2015; Kim & Chock, 2015) and was particularly evident in Walker et al.'s (2015) study in which intensity of Facebook use predicted disordered eating, but only when online physical appearance comparison was included in the model. This indicates that Facebook use tends to trigger negative body image in individuals high in appearance comparison.

The effect of cultural background on body image outcomes was examined in two experimental studies (Lee, Taniguchi, Modica, & Park, 2013^a; Taniguchi & Lee, 2012^a). Female university students from two different cultural backgrounds were asked to view a mock Facebook profile in which the profile owner had posted a status update desiring to lose weight. Participants were randomly assigned to view a profile owner with varying body sizes (overweight vs. underweight) and peer comments in response to the status update (thin-promoting vs. thin-discouraging). Lee et al. (2013) found that Korean participants reported lower body satisfaction after viewing an underweight profile owner. However, the body size of the profile owner did not affect USA participants' body satisfaction. Similarly, Korean participants experienced significantly lower psychological wellbeing than USA participants after viewing thin-promoting peer comments. On the other hand, Taniguchi and Lee (2012) revealed Japanese participants to report improved body satisfaction when they viewed thin-discouraging peer comments, whereas USA participants' body satisfaction was unaffected by peer comments. However, all participants reported significantly lower psychological wellbeing after viewing thin-promoting peer comments. These studies indicate that some cultural groups may be more susceptible to body image concerns following Facebook use. Further, the interpretation of peer comments and images related to weight loss could influence one's own body image.

Kim and Chock (2015) did not find a relationship between time spent on Facebook and the outcomes of drive for thinness and drive for muscularity. Similarly, drive for muscularity was unrelated to using Facebook for social engagement purposes and number of Facebook friends. Meier and Gray (2014) were also unable to associate time spent on Facebook with internalization of the thin ideal, weight dissatisfaction, self-objectification, or drive for thinness. Hummel and Smith (2014) did not associate negative feedback seeking on Facebook with eating concerns, shape concerns, or weight concerns. Furthermore, writing personally revealing status updates did not predict eating restraint. In the Fardouly et al. (2015) study, participants who spent 10 min on their own Facebook account did not report significantly different body dissatisfaction or weight and shape discrepancy, compared to the fashion magazine or homewares website conditions. A similar experiment conducted by Mabe et al. (2014^a) randomly allocated 84 female university students to spend 20 min viewing their own Facebook account or two preselected Wikipedia and YouTube websites regarding a neutral rainforest animal. Participants in both conditions reported a decrease in their preoccupation with weight and shape. A supplemental measure of anxiety revealed the control group to report significantly less anxiety post manipulation, while participants in the Facebook condition reported a non-significant increase, suggesting Facebook use maintains state anxiety.

3.6. Drinking cognitions and alcohol use

Fifteen studies were identified that assessed the effect of Facebook use on self-reported drinking cognitions and alcohol use. The quality ratings identified studies of poor (2), fair (11), and good (2) quality. Twelve studies used cross-sectional designs, with seven of these studies including a content analysis component. One study solely conducted content analysis and the remaining two studies employed experimental designs. Fourteen studies comprised university students and one recruited high school students, with an average age between 14 and 26 years, and generally an even proportion of male and female participants. Eighty percent of studies sampled USA participants.

Seven studies included single-item measures of Facebook consumption or specific activities. An increase in time spent on Facebook related to a greater willingness to drink alcohol among high school students (Litt & Stock, 2011), and more Facebook friends and monthly status updates increased the likelihood of an initial displayed alcohol reference (i.e., the first time they post alcohol-related content on Facebook) for individuals commencing university (Moreno et al., 2014). A greater number of Facebook friends also related to an increase in the number of displayed alcohol references on Facebook more generally (Beullens & Schepers, 2013; Egan & Moreno, 2011; Moreno et al., 2014), and predicted greater alcohol consumption, alcohol-related problems, and binge drinking sessions (Ridout, Campbell, & Ellis, 2012; Westgate, Neighbors, Heppner, Jahn, & Lindgren, 2014). One study investigated Facebook addiction, revealing greater Facebook addiction to predict increased alcohol use and alcohol-related problems (Hormes, 2016). These studies suggest that exposure to SNSs during early adulthood can influence attitudes towards alcohol use, and that individuals with larger online networks are more likely to exhibit problematic alcohol-related behaviors.

Two experimental studies examined the effect of Facebook use on attitudes towards alcohol use and perceived drinking norms, reporting medium effect sizes. Litt and Stock (2011^a) allocated 189 high school students to fictitious Facebook profiles that either included or omitted references to alcohol. Compared to the no alcohol condition, young people in the alcohol group reported significantly higher willingness to drink alcohol, and this relationship was mediated by increased user prototypes (i.e., perceived favorability of and similarity to the typical person their age and gender who uses alcohol), more positive affective attitudes towards alcohol use, and greater normative perceptions of alcohol use among peers. Similarly, Fournier, Hall, Ricke, and Storey (2013^a) exposed 57 university students to an alcohol or no alcohol fictitious Facebook profile for 10 min and found that those in the alcohol condition perceived significantly higher frequency of alcohol use among peers than the no alcohol group. However, the Facebook profile exposure did not influence the number of drinks participants planned to drink in the future. Viewing alcohol-related content on Facebook could disproportionately increase perceptions of peer drinking norms.

Ten studies assessed the effect of posting alcohol-related Facebook content on alcohol-related behaviors. Moreno, Cox, Young, and Haaland (2015) tracked 338 undergraduate students and found that an initial display of alcohol reference on Facebook as a photo or profile picture predicted both any binge drinking episode as well as four or more binge episodes in the previous 28 days. Alcohol-related content on Facebook was also associated with increased general alcohol consumption, harmful levels of alcohol use, and alcohol-related problems (Fournier & Clarke, 2011; Glassman, 2012; Marczinski et al., 2016; Miller, Prichard, Hutchinson, & Wilson, 2014; Moreno, Christakis, Egan, Brockman, & Becker, 2012; Moreno et al., 2015; Ridout et al., 2012;

Rodriguez, Litt, Neighbors, & Lewis, 2016; Westgate et al., 2014).

Two studies assessed individual differences related to increased alcohol use. Moreno et al. (2012) demonstrated that participants who displayed intoxication or problem drinking content were significantly more likely to report higher total scores on the alcohol use disorder identification test (AUDIT; Babor, Higgins-Biddle, Saunders, & Monteiro, 2001) than non-alcohol displayers, and were more likely than both non-alcohol and some alcohol displayers to be at risk of problem drinking and report more alcohol-related injuries in the past year. Interestingly, Rodriguez et al. (2016) found that for those participants who reported low levels of identifying as a drinker (compared to medium and high levels), alcohol-related Facebook posts were strongly associated with increased alcohol use. This suggests that those who consider alcohol as an unimportant aspect of their identity may nevertheless post more alcohol-related content on Facebook or be influenced more by external sources like Facebook, which, in turn, relates to an increase in their drinking behavior. Further, Facebook users who post their own alcohol-related content on Facebook (compared to their friends posting the content) and content in the form of pictures (compared to text or "likes") tended to report more alcohol-related behaviors (Glassman, 2012; Miller et al., 2014; Moreno et al., 2015; Westgate et al., 2014).

The following types of Facebook use were not associated with alcohol-related cognitions or behaviors: number of Facebook friends (Westgate et al., 2014), time spent on Facebook (Litt & Stock, 2011; Miller et al., 2014), Facebook usage (Egan & Moreno, 2011), posting pictures of others consuming alcohol on one's Facebook page (Glassman, 2012; Miller et al., 2014), alcohol-related content posted by users' friends (Westgate et al., 2014), own alcohol-related content posted on Facebook (Fournier & Clarke, 2011; Miller et al., 2014), and an initial displayed alcohol reference on Facebook (Moreno et al., 2015).

3.7. Other mental health problems

Six studies investigated the effect of Facebook use on other mental health problems. Each study demonstrated fair quality. All six studies comprised cross-sectional designs, with one study including a longitudinal component. One study sampled only male participants, while the remaining studies tended to over represent female participants. Four studies recruited university samples, and the remaining studies comprised high school students and adult education course attendees. Half of the studies assessed USA participants. Three studies investigated the effect of Facebook addiction on mental health problems, associating Facebook addiction with an increased risk of general mental health symptoms (Hanprathet et al., 2015), a higher propensity to report general Internet addiction, more difficulties in regulating emotions, lower psychological flexibility (Hormes, Kearns, & Timko, 2014), and development of narcissistic qualities (Malik & Khan, 2015).

Two studies examined the effect of general Facebook use. Walters and Horton (2015) found that neither time spent on Facebook nor number of logins to Facebook promoted narcissism. Jang, Park, and Song (2016) demonstrated that Facebook use did not directly affect mental health, however, it indirectly related to improved mental health for individuals who perceived greater social support via Facebook or engaged in fewer social comparisons on Facebook. Finally, Rosen et al. (2013) surveyed 1143 adults and found frequent engagement in Facebook activities (such as posting status updates) positively predicted bipolar-mania, narcissism, antisocial, and paranoid histrionic disorders and negatively predicted compulsive disorder. Frequency of Facebook activities was unrelated to schizoid disorder. A greater number of Facebook friends negatively predicted schizoid disorder and positively

predicted bipolar-mania, narcissism, and paranoid histrionic disorders. Number of Facebook friends did not predict antisocial or compulsive disorders. Lastly, users who were more active in managing their impression on Facebook reported higher scores on bipolar-mania, narcissism, and paranoid histrionic disorders. Facebook impression management was unrelated to antisocial, compulsive, and schizoid disorders. Small effect sizes were noted, with the strongest effects evident for number of Facebook friends compared to the other Facebook measures. These studies indicate the potential for Facebook use to relate to a number of mental health outcomes, although further research is required.

3.8. General discussion

The effect of SNS use on mental health has attracted growing scholarly attention, yet a comprehensive review is absent from the literature. The current review sought to clarify the relationship between Facebook use and mental health outcomes. Results from 65 peer-reviewed journal articles found Facebook use was associated with six main outcomes: Facebook addiction, anxiety, depression, body image and disordered eating, drinking cognitions and alcohol use, and other mental health problems, albeit the strength and validity of these relationships varied. The alcohol use and disordered eating outcome domains demonstrated the strongest effect sizes and methodological quality, such that specific types of Facebook use were associated with increased alcohol-related cognitions and behaviors, and negative body image and disordered eating, respectively. Further research is required to: (i) determine the magnitude of these relationships; (ii) quantify the individual difference factors (e.g., gender, personality) and mechanisms (e.g., passive use, rumination, social comparison) through which these effects transpire; and (iii) utilize prospective designs to determine how Facebook affects mental health (i.e., precipitating and/or maintaining factor).

Across all domains, brooding, rumination, social comparison, and appearance comparison were commonly examined as mediators of poor mental health. The intersecting nature of these constructs is evident; namely, they describe negative self-evaluations in relation to others. This is unsurprising considering the features and functionalities of Facebook encourage users to create their own "virtual identity" via pictures and textual descriptions about themselves and, in turn, Facebook 'friends' use this virtual identity to draw conclusions about the user. Moreover, there was a trend of passive Facebook use predicting poorer mental health. There seems a plausible link between passive use and negative self-evaluations, such that perusing the photos, comments, and activity of other users, rather than actively engaging with them, cultivates a climate for ruminative behaviors.

There was significant diversity in the operationalization and measurement of Facebook use. The most commonly employed single-item measures were time spent on Facebook and number of Facebook friends. Their association with poorer mental health is understandable in that the more time an individual spends on Facebook, the prospect of encountering possible harms will increase, and use may start to interfere with daily responsibilities and functioning. Similarly, those with more friends on their Facebook network are subsequently exposed to a larger number of peer profiles. This exposure may be problematic for individuals with a tendency to engage in social comparison, appearance appraisal, or rumination. Alternatively, Skues, Williams, and Wise (2012) found loneliness to predict a greater number of Facebook friends, suggesting that individuals who are lonely add more online friends to compensate for a lack of offline relationships. However, if these online relationship needs are not met, such individuals may be more susceptible to poorer mental health outcomes from Facebook

use (Teppers, Luyckx, Klimstra, & Goossens, 2014).

It is, however, important to acknowledge the positive psychological effects of Facebook use. The conception of Facebook had a positive premise in that it was designed to facilitate and maintain social connections, and it has been widely supported in previous research that Facebook affords psychosocial benefits, such as: perceived emotional and social support from significant others (Akbulut & Günüç, 2012); reduced feelings of isolation (Asante & Nyarko, 2014); enhanced wellbeing (Gonzales & Hancock, 2011; Kim & Lee, 2011); and greater health and wellness satisfaction (Asbury & Hall, 2013). These psychosocial benefits are, in turn, known protective factors for mental health (Montpetit et al., 2016; Zhong, 2009; Zhu et al., 2013). Thus, differential outcomes of Facebook use are to be expected as some users reap psychosocial benefits from their use. This was demonstrated in Tandoc Jr. et al.'s (2015) study whereby Facebook use predicted greater depression only when use triggered feelings of envy; otherwise, Facebook use actually lessened depressive symptoms. A meta-analysis that investigates the role of Facebook use in psychosocial or wellbeing outcomes would be beneficial.

It is proposed that the field should move away from investigating the dichotomous research question of whether Facebook use is good or bad. Debate has arisen in the literature due to both positive and negative outcomes associated with Facebook use, prompting the question of how to reconcile seemingly divergent findings (Jelenchick et al., 2013; Rae & Lonborg, 2015). It is likely, however, that some users experience positive outcomes while others (and possibly the same users at different points in time) experience deleterious outcomes. Therefore, a more meaningful point of focus is to understand the individual difference factors and mechanisms that comprise risk and protective factors for the effects of Facebook use. Moreover, prospective designs that assess general and clinical populations are required to discern whether Facebook use elicits and/or maintains mental ill health across the domains identified in this review. A greater emphasis on theory-driven research is needed rather than atheoretical, confirmatory approaches, as well as a consistent measure of Facebook use that can provide insights of value to the field. Finally, undertaking meta-analysis will quantify these relationships and provide clarity in the field.

3.9. Implications

Several practical implications are prompted from this review, the most conspicuous being the importance of limiting Facebook use when it has a negative impact on functioning and mental health or when use becomes difficult to regulate. Practical strategies to regulate use may include turning off Facebook notification prompts, refraining from use prior to sleep, and developing healthy patterns of use, such as logging out of Facebook during a set period of study or work. Reducing Facebook use is particularly relevant in light of recent research demonstrating that a growing proportion of individuals report their use of Facebook as an obligation or for fear of missing out (Beyens et al., 2016; Fox & Moreland, 2015; Muench et al., 2015), thus not even desiring to use Facebook.

Greater education regarding the potential consequences of Facebook use is merited. This review has shown that Facebook use can affect a wide range of domains and has the capacity to influence psychological symptoms at a clinical level. The unique impact of Facebook was noted; for instance, Frison and Eggermont (2016b) demonstrated that social support seeking through Facebook directly worsened adolescents' depressed mood, whereas traditional face-to-face social support has no such effect. Furthermore, Sagioglou and Greitemeyer's (2014) study that found Facebook users commit an affective forecasting error whereby they expect to

feel better after using Facebook despite actually feeling worse. To a similar effect, Farooqi et al. (2013) surveyed 1000 students and found nearly 70% did not perceive themselves to be addicted to Facebook. Likewise, Dhir et al.'s (2016) found only 4.1% of the 804 high school students sampled perceived their Facebook use to be highly problematic (compared to moderate, low, and unproblematic). Opportunities exist for psychologists to incorporate psychoeducation into treatment plans or develop prevention or intervention programs that educate young people on cognitive biases and the capacity to recognize and address problematic use.

The extent of variability in conceptualizing and measuring Facebook use demonstrates the complexity of the construct. It is postulated that single-item measures, such as time spent on Facebook, cannot capture the diverse features and functionalities of Facebook use nor be consistently associated with poor mental health as some users reap benefits from use while others report negative consequences. Future research may benefit from measuring SNS use specific to a particular platform, or to similar functions over platforms; examining a broad measure of Facebook use including: consumption, attitudinal, and type of use (e.g., passive vs. active) components; and considering specific Facebook features relevant to the outcome domain, such as photo-based Facebook activities for disordered eating, or frequency of alcohol-related content on Facebook for alcohol use.

3.10. Methodological issues

Given only seven studies met the criteria for a good quality rating, the findings need to be interpreted in the context of their limitations, of which selection, information, and measurement bias are most notable. Over three quarters of the studies used convenience sampling to recruit university students, which limits generalizability. Similarly, a disproportionate number of studies included samples that overrepresented young, female participants of a White, USA background. Yet, the demographic profile of Facebook account holders is diverse; for example, 43% of Australians aged 65 years and over reported social networking as their most common online activity in 2014–15 (ABS, 2016). Future research would benefit from widening the sampling frame and utilizing systematic sampling techniques.

Limitations were also noted regarding the approach for collecting data. Most studies used self-report approaches, which can introduce social desirability and recall bias (Althubaiti, 2016). Muensch et al.'s (2015) study revealed 26.8% of participants responded in a socially desirable manner, and social desirability exhibited the strongest relationship with the outcome variables, such that an increase in social desirability related to improved psychological health. This indicates that social desirability is an important covariate to control for in SNS research. Similarly, Junco (2013) demonstrated the presence of recall bias in the Facebook literature by comparing self-reported time spent on Facebook against actual usage, as measured by computer monitoring software. Participants reported significantly more minutes spent on Facebook per day (145) than computer estimates (26). Future research may mitigate self-report error through strategies such as participant diary entries or utilizing Facebook metrics which provide an online tool that automatically generates data about a participant, such as number of Facebook friends.

Bias related to the measurement of variables was also evident. Notably, there is no consistent measure of Facebook use. Furthermore, the majority of measures employ Likert scales that are susceptible to acquiescence response bias; that is, the tendency for participants to agree with agree-disagree questions. Kuru and Pasek (2016) assessed acquiescence bias specific to Facebook use and found this bias introduced significant systematic errors.

However, they demonstrated that this bias could be mitigated through the use of balanced scales, item-specific questions, and statistical corrections. There was also a concerning number of studies that controlled for few or no confounding factors. A lack of controls, particularly in cross-sectional studies, critically reduces the ability to draw reliable conclusions from the findings.

3.11. Application of meta-analyses

The aim of the current study was to provide a structured synthesis; however, future research would benefit from conducting meta-analyses to quantitatively compare studies and identify moderating influences. Meta-analyses were not conducted in each domain largely due to: (i) clinically diverse operationalization and measurement of Facebook use and outcome variables, which can render combined analysis nonsensical and obscure genuine differences in effects; and (ii) the majority of studies received poor to fair quality ratings as the studies were at risk of bias, which can lead to misleading interpretations if studies are combined due to errors being compounded (Higgins & Green, 2011).

Meaningful meta-analyses will require specific considerations within each domain. The addiction domain requires clarification as to the definition, theoretical underpinnings, and measurement of Facebook addiction. The anxiety domain comprises two distinct clinical diagnoses including social anxiety and generalized anxiety and should be analyzed separately when there are sufficient studies. The depression, body image and disordered eating, and drinking cognitions and alcohol use domains require consideration of comparable study objectives and samples. For example, in the depression domain, assessing the effect of health professionals as Facebook friends for psychiatry outpatient participants (Mota Pereira, 2014) differs considerably in aim from examining intensity of Facebook use among university students (Labrague, 2014). To a similar effect, the alcohol use domain comprised studies investigating male only samples (Egan & Moreno, 2011), high school students (Litt & Stock, 2011), university students (Glassman, 2012), and outcomes ranging from an initial alcohol-related Facebook post (Moreno et al., 2014) to past alcohol use (Westgate et al., 2014). Likewise, the body image domain included diverse definitions of Facebook use including single-item usage measures (e.g., time spent on Facebook; Mabe et al., 2014) while others examined a specific type of use (e.g., engaging in social comparisons on Facebook; Smith et al., 2013) that is more reflective of an underlying moderator. Facebook use was associated with other mental health problems; however, an adequate sample is required before a meta-analytic synthesis would be appropriate.

3.12. Limitations

The current systematic review has several of its own limitations. As a consequence of the proliferation of research in the SNS field, the most recently published studies are not included in the current review. Equally, as the field has only recently begun to investigate specific platforms rather than general SNS use, eligible studies may have been omitted if the article's keywords and title contained 'social networking site' as opposed to specifying 'Facebook'. Finally, the conclusions drawn in the current review are tempered by the diversity of measures for the outcome, but particularly Facebook use, variables. This limits the ability to accurately synthesize study findings.

In conclusion, the current systematic review has provided a novel examination of the effect of Facebook use on the mental health domain. The review established a relationship between Facebook use and mental ill health, with the alcohol use and disordered eating domains demonstrating the strongest

relationships and highest methodological rigor. The importance of assessing specific SNS platforms or similar functions over platforms was underscored, as was the multidimensional nature of Facebook use. Future research is required to quantify these relationships and clarify the precipitating and/or maintaining effect of Facebook use on mental ill health, particularly in conjunction with pertinent moderators and individual difference factors.

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