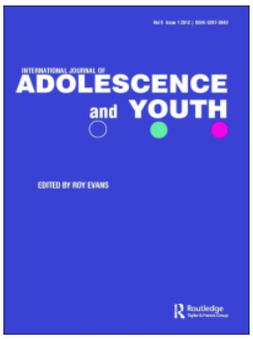

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A systematic review: the influence of social media on depression, anxiety and psychological distress in adolescents

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ABSTRACT
While becoming inextricable to our daily lives, online social media are blamed for increasing mental health problems in younger people. This systematic review synthesized evidence on the influence of social media use on depression, anxiety and psychological distress in adolescents. A search of PsycINFO, Medline, Embase, CINAHL and SSCI databases reaped 13 eligible studies, of which 12 were cross-sectional. Findings were classified into four domains of social media: time spent, activity, investment and addiction. All domains correlated with depression, anxiety and psychological distress. However, there are considerable caveats due to methodological limitations of cross-sectional design, sampling and measures. Mechanisms of the putative effects of social media on mental health should be explored further through qualitative enquiry and longitudinal cohort studies.

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Adolescents; social media; depression; anxiety; psychological distress

Introduction

Children and adolescent mental health

The World Health Organization (WHO, 2017) reported that 10–20% of children and adolescents worldwide experience mental health problems. It is estimated that 50% of all mental disorders are established by the age of 14 and 75% by the age of 18 (Kessler et al., 2007; Kim-Cohen et al., 2003). The most common disorders in children and adolescents are generalized anxiety disorder and depression, respectively (Mental Health Foundation, 2018; Stansfeld et al., 2016). According to the Royal Society for Public Health, & Young Health Movement (2017), the prevalence of anxiety and depression has increased by 70% in the past 25 years in young people. Depression and anxiety have adverse consequences on adolescent development, including lower educational attainment, school dropout, impaired social relationships, and increased risk of substance abuse, mental health problems and suicide (Copeland, Angold, Shanahan, & Costello, 2014; Gore et al., 2011; Hetrick, Cox, Witt, Bir, & Merry, 2016). Morgan et al. (2017) reported that the rate of self-harm in the UK has risen by 68% in girls aged 13–16 over the last 10 years.

Reasons for the apparently growing psychological morbidity in young people are not known conclusively. McCrae (2018) suggests that diagnostic activity has been influenced by educational initiatives to raise mental health awareness. Undeterred by stigma, many young people feel free to discuss their psychological difficulties and seek professional help. Another important factor is the ease of sharing personal experiences in the digital information age (Reid-Chassiakos, Radesky, Christakis, & Moreno, 2016). Whereas in the past mental health problems were suffered in isolation, today a struggling younger person can readily find others with similar problems, either through social interaction or support groups. Alongside increasing awareness and help-seeking behaviour, doctors may be more inclined to diagnose and treat mental health problems, possibly with the effect of lowering the diagnostic threshold.

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Social media

The term 'social media' refers to the various internet-based networks that enable users to interact with others, verbally and visually (Carr & Hayes, 2015). According to the Pew Research Centre (2015), at least 92% of teenagers are active on social media. Lenhart, Smith, Anderson, Duggan, and Perrin (2015) identified the 13–17 age group as particularly heavy users of social media users, with 87% having access to a computer, and 58% to a tablet device. Almost three-quarters of adolescents aged 15 to17 use a smartphone, and 68% of those aged 13 to 14 (Pew Research Centre, 2015).

Impact on mental health

Understanding the impact of social media on adolescents' well-being has become a priority due to a simultaneous increase in mental health problems (Kim, 2017). Problematic behaviours related to internet use are often described in psychiatric terminology, such as 'addiction'. However, some activity in younger people could be misconstrued as abnormal. For example, young people who frequently post images of themselves ('selfies') may appear narcissistic, but such behaviour has emerged as a social norm in younger social networks (McCrae, 2018). Nonetheless, warnings have been issued by psychologists and other experts on how younger people are engaging with social media and related impairment to personal and social development (Greenfield, 2014; Twenge, 2006).

Social media could be regarded as a 'double-edged sword'. Studies show the benefits of enabling people to express their thoughts and feelings, and to receive social support (Deters & Mehl, 2013; Lenhart et al., 2015; Lilley, Ball, & Vernon, 2014; O'Keeffe & Clarke-Pearson, 2011; Rosen, 2011). Research has also indicated a link between social media use and psychological problems. A systematic review of 11 studies measuring social media use and depressive symptoms in children and adolescents showed a small but statistically significant relationship (McCrae, Gettings, & Purssell, 2017). A meta-analysis of 23 studies showed correlation of problematic Facebook use and psychological distress in adolescent and young adults (Marino, Gini, Vieno, & Spada, 2018). Other systematic reviews have also found a meaningful relationship between social media use and depression (Best, Manktelow, & Taylor, 2014; Hoare, Milton, Foster, & Allender, 2016).

The link between social media and mental health problems is not straightforward, with various contributory factors. A report by the Royal Society for Public Health, & Young Health Movement (2017) suggested impaired sleep as a mechanism. Internet use is a sedentary behaviour, which in excess raises the risk of health problems (Iannotti et al., 2009). A meta-analysis by Asare (2015) showed that sedentary behaviour has a deleterious effect on mental health in young people, although the direction of this relationship is unclear: people with mental health problems may be more likely to be less physically active. Multitasking is common on social media, with users having accounts on multiple platforms. A study by Rosen, Whaling, Rab, Carrier, and Cheever (2013) showed that online multitasking predicts symptoms of mental disorders. Primack and Escobar-Viera (2017) found that the number of social media accounts correlated with the level of anxiety, due to overwhelming demand.

Another principal factor influencing the relationship between social media use and mental health is social support. According to the report published by the American Academy of Pediatrics, social media enable adolescent users to strengthen bonds with existing friends and to form new friendships online, which reduce social isolation and loneliness, and indirectly improve mental health (O'Keeffe & Clarke-Pearson, 2011). Studies support that those with low social support are more likely to suffer from mental health problems (e.g. depression, anxiety and psychological distress) compared to those with high social support from family, friends and neighbours (Klineberg et al., 2006; Maulik, Eaton, & Bradshaw, 2011). Reviewing 70 studies, Seabrook, Kern, and Rickard (2016) found an inverse correlation between supportive online interaction on social media and both depression and anxiety. However, as some researchers (e.g. Teo, Choi, & Valenstein, 2013; Vandervoort, 1999) have indicated, the quality of social support may be more important than quantity.

As explained by social comparison theory (Festinger, 1954), people tend to compare themselves to others to assess their opinion and abilities. Interestingly, such behaviour is more common in adolescents than in younger children and adults (Krayer, Ingledew, & Iphofen, 2008; Myers & Crowther, 2009). The impact of social media on mental health may differ between adolescents who engage in downward social comparison (comparing themselves to lower performers) and those who use higher performers as a reference point. A systematic review by Seabrook et al. (2016) reported a correlation between negative online interaction and both depression and anxiety. Similarly, Appel, Gerlach, and Crusius (2016) found that passive Facebook use predicts social comparison and envy, which in turn lead to depression.

Adolescence is the period of personal and social identity formation (Erikson, 1950), and much of this development is now reliant on social media. Due to their limited capacity for self-regulation and their vulnerability to peer pressure, adolescents may not evade the potentially adverse effects of social media use, and consequently, they are at greater risk of developing mental disorder. However, evidence on the influence of social media on adolescents' psychosocial development remains at an early stage of development. Much of the research to date has studied young people of later adolescence and college or university students. Previous systematic reviews included more studies since they have either focussed on a heterogeneous population including children, adolescents and adults (Baker & Algorta, 2016; Marino et al., 2018; Seabrook et al., 2016) or focussed on general mental well-being including both clinical outcomes and subjective well-being as the outcome of interest (Best et al., 2014; Marino et al., 2018).

Current study

This systematic review examined evidence for the influence of social media use on depression, anxiety and psychological distress in adolescents. The intention was to inform policy and practice and to indicate further research on this topic.

Method

Protocol and registration

For transparency, the protocol for this review was registered with the International Prospective Register of Systematic Reviews (Prospero; CRD42018102770). This report follows the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Moher, Liberati, Tetzlaff, & Altman, 2009a).

Eligibility criteria

For inclusion in this review, studies fulfilled the following eligibility criteria:

- Participants: aged 13 to 18
- Exposure: measurement of social media use
- Outcome: depression, anxiety or psychological distress, assessed by validated instruments
- Studies published in peer-reviewed journals with full text available in English

Studies were excluded if they crossed either boundary of the age range. Studies measuring exposure to other internet activities such as video-gaming were not included unless social media use was also measured. Outcomes of substance misuse, eating disorder, well-being, life satisfaction, self-esteem, body image problems, conduct disorders, loneliness or stress were excluded, unless the outcomes of interest were also measured by the researchers.

Search strategy

The databases Medline, Embase, PsychINFO, Cumulative Index to Nursing and Allied Health (CINAHL) and Social Sciences Citation Index (SSCI) were systematically searched in May 2018. A set of search terms was created with truncations, Medical Subject Headings (MESH) and Boolean operators, as shown in Table 1.

Data extraction

All papers from the automated database searches were collated using the Mendeley reference management software. After duplicates were deleted, screening was conducted to ensure that studies fulfilled the eligibility criteria. In a three-stage process, papers were screened on title and on abstract (by BK) and the remaining papers were screened on full text (by BK, NM and AG). Key information relevant to the research question was systematically extracted and tabulated to aid comparison and synthesis of the studies. These data comprised authors, publication date, country of origin, study design and data analysis method, relevant outcome measures, sample size, demographic data and results. The extraction process was conducted by BK and AG and any disagreements resolved through discussion with NM.

Assessment of quality

The quality of eligible studies was assessed using the National Institutes of Health Quality Assessment tool for Observational Cohort and Cross-Sectional Studies (NIH, 2014), which covers design, selection bias, data collection, confounders, blinding and attrition. An overall rating of 'good', 'fair' or 'poor' was given for each study. All of the studies were independently rated by BK and AG, and any disagreements were resolved through discussion with NM.

Data analysis

As outcome measures varied across the studies, we were unable to perform meta-analysis. Instead, narrative synthesis was conducted. This enabled consideration of confounding, mediating and moderating variables, which are often not given due attention in meta-analysis (Popay et al., 1995). Each study was described, followed by comparative analysis and synthesis.

Results

The literature search yielded 6598 articles from the five databases. After 1818 duplicates were removed, screening on title excluded 4206 of the 4780 unique papers. The remaining 574 articles were screened on abstract, with 475 removed, leaving 99 papers. On reading the full text, 86 papers found to be ineligible, the most common reason being the age range. The PRISMA (Moher, Liberati, Tetzlaff, & Altman; The PRISMA Group, 2009b) flowchart (Figure 1) provides further detail on reasons for exclusion. Ultimately a total of 13 papers were eligible for the review.

Table 1. Search terms and linkage (Medline).

Participants	exp Adolescent/or adolescen* OR teen* OR youth* OR young OR juvenile OR 'high school student*' OR 'secondary school student*'
	AND
Exposure	social network* OR exp Social Networking/or exp Social Media/OR Facebook OR Instagram OR twitter
	AND
Outcomes	exp Mental Health/OR 'psychological well-being' OR exp Mental Disorders/or exp Mood Disorders/or exp Depression/or affective disorder* or exp Affective Symptoms/or exp Depressive Disorder/OR psych* OR exp anxiety/or exp anxiety disorders/OR exp Stress, Psychological/or 'psychological distress*'

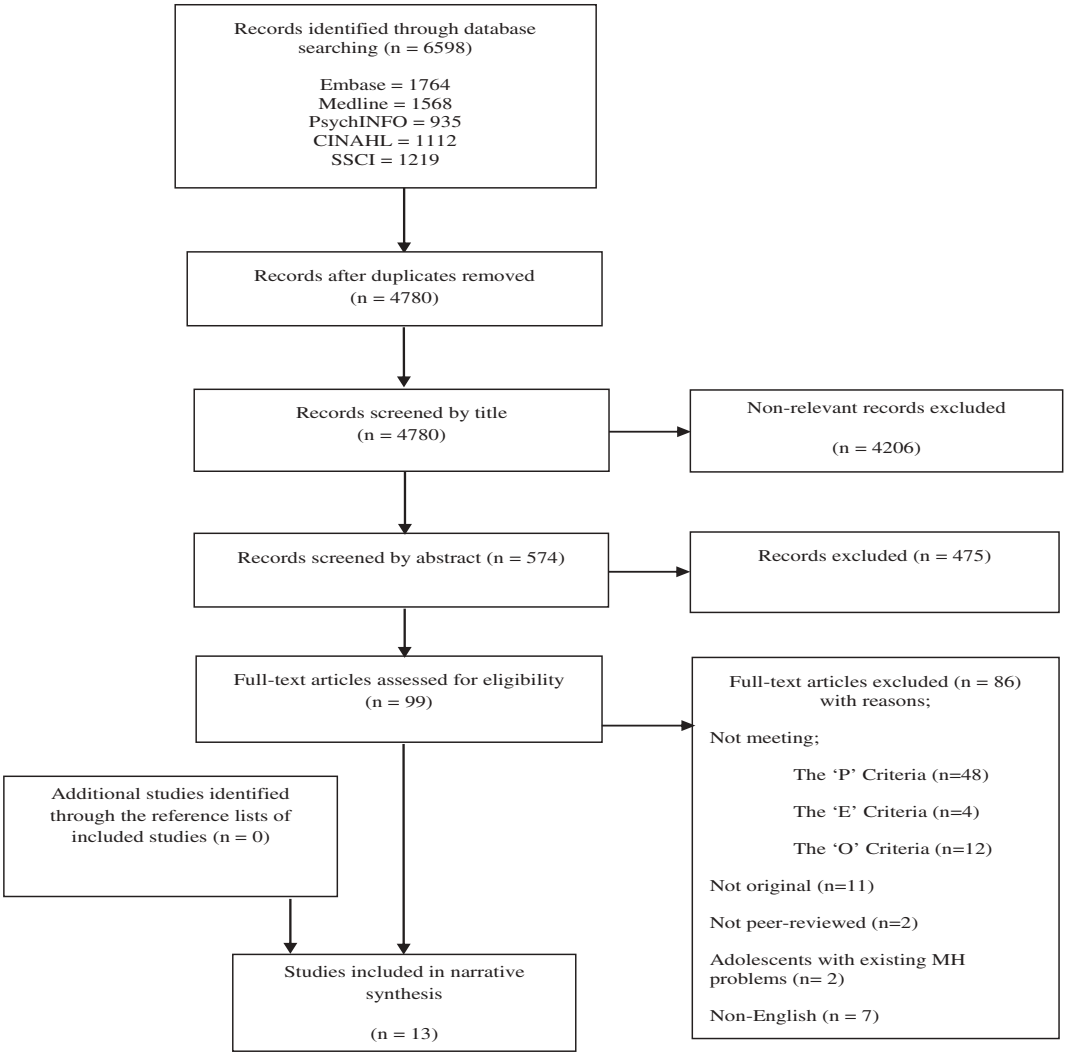

Figure 1. PRISMA 2009 flow diagram.

Description of studies

The reviewed papers are summarized in Table 2. In design, 12 studies were cross-sectional and only one was longitudinal. The total sample across the studies was 21,231. Three studies were conducted in Australia, three in China, and one each in Serbia, USA, Malaysia, Belgium, Thailand and Canada; one study was conducted in six European counties including Greece, Spain, Poland, the Netherlands, Romania and Iceland. Participant ages ranged from 13 to 18. Nine studies covered exposure to social media in general, while four studies (Banjanin, Banjanin, Dimitrijevic, & Pantic, 2015; Dumitrache, Mitrofan, & Petrov, 2012; Frison & Eggermont, 2016; Hanprathet, Manwong, Khumsri, Yingyeun, & Phanasathit, 2015) focused specifically on Facebook use. As well as measuring depression, anxiety or psychological distress, some studies investigated confounding variables (e.g. age and gender) and mediating and moderating factors (e.g. insomnia, rumination and self-esteem). Ten of the studies entailed both correlational and regression analyses; one study (Dumitrache et al., 2012) performed correlational analyses and a t-test for gender differences; Vernon, Modecki, and Barber (2017) used latent growth modelling to test longitudinal mediation.

Table 2. Summary of studies.

Study	Aim	Design	Sample size	Sample characteristics	Outcome measure(s)	Findings/results
O'Dea and Campbell (2011)	To explore the effect of online interaction on psychological distress	Cross-sectional	400	Aged 13–16 54.8% female	The Kessler (K-6) Scale (Kessler et al., 2003)	Negative correlation between the time spent on SM and psychological distress
Dumitrache et al. (2012)	To emphasize the relations between depression and the identity outlined on FB	Cross-sectional	76	Aged 16–17 68.4% female	Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961)	Significant correlations between depression and the number of identity related pieces of information on FB
Neira and Barber (2014)	To investigate the relationship between social media use and depressed mood	Cross-sectional	1819	Aged 13–17 55% female	Depressed Mood Scale (Cronbach's α = 0.76)	No meaningful relationship between SM use frequency & depressed mood. A positive association with investment in SM and depressed mood
Tsitsika et al. (2014)	To investigate the associations between heavier SNS use and internalizing behaviours.	Cross-sectional	10,930	Aged 14–17 52.3% female	Youth Self Report (YSR) problem checklist (Achenbach & Resorta, 2001)	A positive association between heavier SM use (more than 2 h/day) and internalizing problems (anxiety and depression).
Hanprathet et al. (2015)	To investigate the relationship between Facebook addiction and mental health	Cross-sectional	832	Mean age = 16.7 years SD = 1.0 Grade 10th–12th 63.5% female	The Thai General Health Questionnaire (GHQ-28; Goldberg & Williams, 1988)	A positive association between Facebook addiction and depression
Sampasa-Kanyinga and Lewis (2015)	To explore the relationship between SNSs use and psychological distress	Cross-sectional	753	Mean age = 14.1 years Grades 7th–12th 48.5% female	The Kessler (K-10) Scale (Kessler et al., 2002, Kessler et al., 2003)	The use of SNSs more than 2 hours per day was related to increased level of psychological distress.
Banjanin et al. (2015)	To investigate potential relationship between internet addiction and depression	Cross-sectional	336	Mean age = 18 years 66% female	Center for Epidemiologic Studies of Depression Scale for Children (Faulstich, Carey, Ruggiero, Enyart, & Gresham, 1986)	No relationship between time spent on SM and depression or between SM activities and depression.

(*Continued*)

Table 2. (Continued).

Study	Aim	Design	Sample size	Sample characteristics	Outcome measure(s)	Findings/results
Frison and Eggermont (2016)	To provide a deeper understanding of the relationships between different types of Facebook use, perceived online social support, and boys' and girls' depressed mood	Cross-sectional	910	Mean age = 15.44 years SD = 1.71 51.9% female	Center for Epidemiological Studies Depression Scale for Children (Faulstich et al., 1986)	Positive correlation between passive FB use and depressed mood as well as between active FB use and depressed mood Perceived online social support mediated this relationship; and gender influenced this association.
Vernon et al. (2017)	To examine change in problematic social networking investment and disrupted sleep, in relation to change in depressed mood and externalizing behaviour	Cohort	874	Mean age = 14.4 years Grade 9th and 11th 59% female	Depressed mood scale (adapted from the longitudinal Michigan Study of Adolescent Life Transitions) (Barber, Eccles, & Stone, 2001)	Increased investment in SM predicted higher depressed mood in adolescents, which was explained by the impact of higher levels of sleep disruptions.
Barry, Sidoti, Briggs, Reiter, and Lindsey (2017)	To determine the relations between adolescent social media use and adolescents psychosocial adjustment	Cross-sectional	226 (113 adolescent-parent dyads),	Aged 14–17 45.1% female N = 7 (6.2% did not report gender)	DSM checklist V (APA, 2013)	SM activity (#of accounts, frequency of checking) was moderately, positively correlated with anxiety and depression as reported by parents.
Li et al. (2017)	To examine the mediating effects of insomnia on the associations between online social networking addiction and depression	Cross-sectional	1015	Grade 7th–9th 41.2% female	Chinese version of the Center for Epidemiological Studies Depression scale (Chen, Yang, & Li, 2009)	A significant association between SM addiction and depression and insomnia partially mediated this relationship.
Yan et al. (2017)	To determine the time spent on SNSs, and its association with anxiety	Cross-sectional	2625	13–18 years 46.9% female	Middle School Student Mental Health Scale to measure anxiety (developed by Wang, 2006)	A positive association between time spent on SM and the level of anxiety. More than 2 hours/day and &anxiety level
Wang et al. (2018)	To examine whether rumination mediated the relation between SNS addiction and depression, and whether the mediating effect was moderated by self-esteem	Cross-sectional	365	Age 14–18 year (M_{age} = 15.96; SD = 0.69) 52% female	CES-D scale for depression (Radloff, 1977)	SM addiction and depression were positively associated. Rumination mediated this relationship and self-esteem moderated this mediation

Quality assessment

The aim was clearly stated for almost all of the studies, but generally, the methodological quality was poor to fair (Table 3). The cross-sectional design of 12 studies is susceptible to three common sources of bias: selection, information and confounding bias (Yu & Tse, 2012). Two studies (Barry et al., 2017; Wang et al., 2018) recruited by convenience sampling, which raises the risk of selection bias. O'Dea and Campbell (2011) omitted their sampling procedure. Apart from Hanprathet et al. (2015), the papers did not state or explain their intended sample size, of which two were small (Barry et al., 2017; Dumitrache et al., 2012). Five studies did not report the participant response rate. Barry et al. (2017) had a response rate of 33%, which increases the risk of bias and limits generalizability of the results.

Table 3. Quality assessment.

Authors and year of publication	Quality rating	Quality appraisal findings
O'Dea and Campbell (2011)	Poor	Cross-sectional design Demographic information was not clearly defined Exposure measure poorly defined, and no details about its validity and reliability reported Selectivity in reporting findings; researcher emphasized on the outcome of self-esteem more than psychological distress
Dumitrache et al. (2012)	Poor	Cross-sectional design Small sample size < 300, high risk of bias Measures were not clearly defined, and validity of measures was not reported
Neira and Barber (2014)	Good	Cross-sectional design Sample size was not justified
Tsitsika et al. (2014)	Fair	Cross-sectional design Sample size was not justified No standardized instrument to measure exposure was used
Hanprathet et al. (2015)	Fair	Cross-sectional design Demographics of participants were not clearly defined Inconsistent reporting of sample size, different number in the abstract (972), methods (n = 832), and results (n = 872) Time period of data collection not clearly reported
Sampasa-Kanyinga and Lewis (2015)	Good	Cross-sectional design Sample size was not justified
Banjanin et al. (2015)	Poor	Cross-sectional design Demographics of sample was not sufficiently described Sample size was not justified Relatively small sample size from one school may not represent a larger population
Frison and Eggermont (2016)	Fair	Cross-sectional design Sample size was not justified
Vernon et al. (2017)	Fair	Exposure was not measured prior to outcome measure No sample size justification
Barry et al. (2017)	Poor	Cross-sectional design Small sample size < 300, high risk of bias Lower participation rate than 50% reduces the degree to generalizability of study findings Sample size was not jutified Self-selection bias based on the parents who likely were most interested in participating in the first place and the adolescents who subsequently did so
Li et al. (2017)	Fair	Cross-sectional design Sample size was not justified Age range of the participants was not provided
Yan et al. (2017)	Poor	Cross-sectional design Sample size was not justified Validity of outcome measure was not reported
Wang et al. (2018)	Poor	Cross-sectional design Sample size was not justified Use of a convenience sample: all participants were recruited from the same middle school; the representativeness of the sample is limited

Four studies (Dumitrache et al., 2012; O'Dea & Campbell, 2011; Tsitsika et al., 2014) failed to clearly define the exposure measures and to explicitly report their validity and reliability. Almost all studies presented a clear definition of the outcome measures, which in most cases were shown as valid and reliable. Two studies (Dumitrache et al., 2012; Yan et al., 2017) briefly stated the outcome measures without providing detail on their validity. All studies administered self-report questionnaires, which is a potential source of social desirability bias (Yu & Tse, 2012). Risk of bias and procedures to reduce this were inadequately considered in most study reports. In the only cohort study (Vernon et al., 2017), participants were assessed annually over three years, but the researchers did not measure exposure at baseline.

Analysis of results

Key findings of the studies were classified into four common domains of exposure to social media: time spent, activity, investment and addiction. Time spent refers to the amount of time that users spent on social media. Activity can be defined as the quality and quantity of users' engagement and interaction with social media sites and other users. Investment refers to the act of putting effort and time into social media whereas addiction refers to the state of being dependent on social media. For each domain we discuss the relationship with depression, anxiety and psychological distress, with reference to confounding, mediating or moderating variables if measured.

Time spent

The studies produced opposing evidence on the relationship between time spent on social media and mental health problems. With an Australian sample, O'Dea and Campbell (2011) found an inverse correlation for psychological distress; no relationship between frequency of social media use and depressed mood was reported by Neira and Barber (2014) in another study in Australia, and Banjanin et al. (2015) in Serbia. By contrast, Sampasa-Kanyinga and Lewis (2015) in Canada found that daily social media use of over two hours was associated with psychological distress. A study of 10,930 adolescents from six European countries by Tsitsika et al. (2014) showed a positive relationship between heavy social media use and both depression and anxiety. Yan et al. (2017) found that time spent on social media was associated with anxiety in Chinese adolescents.

Activity

Frison and Eggermont (2016) found that both active and passive use of Facebook, in a sample of Belgian high school pupils, correlated with an increased frequency of depressed mood. In a study of 113 adolescent-parent dyads, Barry et al. (2017) found that data from parents showed correlation between adolescents' social media activities (i.e. number of accounts, frequency of checking for messages) and both anxiety and depression. However, Banjanin et al. (2015) did not find any relationship between social media activities (i.e. number of 'selfies') and depression in Serbian high school pupils.

Investment

Dumitrache et al. (2012) found a significant correlation between the number of identity-related information on Facebook profiles and depressive tendencies in adolescents. The studies by Neira and Barber (2014) and by Vernon et al. (2017), both using secondary data from the Youth Activity Participation Study of Western Australia, investigated the relationship between investment in social media and depressed mood. The cross-sectional study by Neira and Barber (2014) showed that investment in social media sites was associated with an increased depressed mood. Vernon et al. (2017) conducted a longitudinal investigation and found an association between problematic social media investment and depressed mood, with sleep disruption as a mediating variable.

Addiction

Three studies focused on addictive behaviour. Hanprathet et al. (2015) found a significant association between Facebook addiction and depression among 972 high school pupils in affluent districts in Thailand. A study of Chinese secondary school students by Li et al. (2017) showed a mediating influence of insomnia on the statistically significant relationship between social media addiction and depression. In another study in China, Wang et al. (2018) found that social networking sites addiction was positively associated with depression; rumination mediated the relationship between social networking sites addiction and depression while self-esteem moderated this mediating effect. In other words, low self-esteem compounded the impact of addiction on depression through rumination.

Confounding factors

Four studies measured the effect of gender in the relationship between social media-related variables and mental health outcomes. Neira and Barber (2014) found that social media might have negative aspects for female youth while being a positive leisure activity for male youth. Frison and Eggermont (2016) found that girls who passively use Facebook and boys who actively use Facebook in a public setting were more likely to be affected by the negative impacts of Facebook. Banjanin et al. (2015) did not find any significant effect of gender in the relationship between depression and time spent on social media. Similarly, Barry et al. (2017) did not find any change in the analysis when controlling for gender in the relationship between social media use and depression as well as between social media use and anxiety.

Two studies measured the effect of age. Tsitsika et al. (2014) found a significant effect of age in the relationship between heavy social media use and negative internalizing symptoms (anxious/depressed, withdrawn/depressed), with younger heavier social media users being more likely to experience internalizing symptoms compared to older heavier users. Banjanin et al. (2015) did not find any significant age effect in the relationship between depression and time spent on social media.

Discussion

This systematic review examined the evidence for a putative relationship between social media use and mental health problems in adolescents. In the 13 studies, depression was the most commonly measured outcome. The prominent risk factors for depression, anxiety and psychological distress emerging from this review comprised time spent on social media, activities such as repeated checking for messages, personal investment, and addictive or problematic use.

Although results of the studies were not entirely consistent, this review found a general correlation between social media use and mental health problems. However, most authors noted that the observed relationship is too complex for straightforward statements. Few studies were designed to explore this complexity although some assessed the effect of mediating and moderating factors. Insomnia and other sleep-related factors were most frequently reported as mediators of the relationship between social media use and depressed mood (Li et al., 2017; Vernon et al., 2017). Perceived social support (Frison & Eggermont, 2016) and rumination (Wang et al., 2018) were other mediating factors reported in the studies. Researchers suggested further investigation of these factors, and other factors such as personal traits (O'Dea & Campbell, 2011), socio-cultural factors that influence the roles of and expectations from adolescents in family and society, environmental factors which may affect development of adolescents and social skills (Tsitsika et al., 2014), motivations for social media use (Barry et al., 2017; O'Dea & Campbell, 2011), social comparison and peer feedback (Neira & Barber, 2014), self-esteem (Banjanin et al., 2015), contextual factors, lack of physical activity, and cyberbullying (Sampasa-Kanyinga & Lewis, 2015).

Other important findings of this review suggest that particular attitudes or behaviours (e.g. social comparison, active or passive use of social media, motives for social media use) may have

a greater influence on the symptoms of depression, anxiety and psychological distress than the frequency of social media use or the number of online friends. Although there is evidence of a relationship between time spent on social media and depression as well as social media-related activities and depression, contrary findings have also emerged. For example, Banjanin et al. (2015) found no relationship between the amount of time spent on social media and depression, or between social media-related activities such as the number of online friends and the number of 'selfies' and depression. Similarly, Neira and Barber (2014) found that while higher investment in social media (e.g. active social media use) predicted adolescents' depressive symptoms, no relationship was found between the frequency of social media use and depressed mood. Such mixed findings might be explained by confounders, mediators and moderators as discussed above.

This systematic review also sheds light on the influence of age and sex. Although some studies found that these variables had no effect on the relationship between social media use and mental health problems, other studies showed that girls and younger adolescents are more prone to depression and anxiety. Further investigation is needed to assess the effects of age and gender.

Limitations

Although the results of this systematic review contributed to the existing literature in a way of providing considerable evidence for the mental health impact of social media use by focussing on not only the symptoms of depression but also other related outcomes including anxiety and psychological distress among adolescents who are at higher risk of developing anxiety and depression. Several limitations in the evidence emerged from included studies and review process have been identified. First, 12 out of 13 studies did not answer the review question since they were cross-sectional and unable to determine a causal relationship between the variables of interest. Looking evidence emerged from cross-sectional studies, it is not possible to decide whether social media use causes depression, anxiety and psychological distress, or whether those with depression, anxiety and psychological distress are more likely to spend more time on social media; have addictive and problematic social media use behaviour; have negative interaction with social media; and invest on social media. Only one longitudinal study (Vernon et al., 2017) investigated the causal relationship between problematic social media use and change in depressed mood, but this study has also limited to show evidence whether social media use causes depressed mood in adolescents. The study did not use a control and a comparison group to differentiate those who exposed to social media sites and those who not. Therefore, it is difficult to determine whether a change in depressed mood was more in those who exposed to social media more compared to those who less or not.

Second, small sample size and the use of convenience sampling in some studies limited the representativeness of and generalizability to a larger adolescent population. Third, all studies included in this review used self-report measures which may not provide reliable outcomes because of some sources of risk of bias. Participants may show positive self-presentation by over- or under-reporting their social media-related behaviours and some mental health-related items, which may directly or indirectly lead to social desirability bias, information bias and reporting bias. Another identified limitation was that some studies made an investigation towards only Facebook use over other social media sites, which also causes a significant bias and limits the generalizability of findings to other social media sites. Finally, despite the fact that the proposed relationship between social media-related variables, depression, anxiety and psychological distress is complex, few studies investigated mediating factors that may contribute or exacerbate this relationship. Further investigations are needed to explain the underlying factors that help determine why social media has negative impact on some adolescents' mental health whereas it has no or positive affect on others' mental health.

Conclusion

The impact of social media use on incidence of depression, anxiety and psychological distress among adolescents, as examined by this review, is likely to be multifactorial. It is important to distinguish between the terms used for the relationship. It is fair to say that there is an 'association' between social media use and mental health problems, on the basis that this means a socially constructed reality. But this is not necessarily scientifically valid. Objective researchers investigate correlations rather than accepting socially assumed truths. Correlation is statistical, not phenomenal. Thirdly, there is causation, which requires directional evidence. The latter has not been adequately investigated in this topic, and we must, therefore, state that the relationship is correlational but not conclusively causative.

Key findings of included studies were classified into four categories of exposure to social media: time spent; activity; investment; and addiction. All these categories were found as correlated with depression, anxiety and psychological distress, with an acknowledgement for the complexity of these relationships. Although there are studies which investigated mediating and moderating factors that may contribute or exacerbate the proposed relationship, there are still several under-explored mediators and moderators, which may explain the direction of this relationship. We also identified gaps in literature in terms of methods, study design and sampling. Causality was unclear due to the cross-sectional study design used in almost all studies and the lack of comparison group in the cohort study. Also, the number of quantitative studies in literature is substantially higher than qualitative studies. Through this systematic review, we hope we contribute to the existing literature in the way of addressing the gaps and highlighting the importance of the phenomenon of the mental health impact of social media use on adolescents.

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References

Achenbach, T. M., & Resorta, L. A. (2001). *Manual for ASEBA school-age forms and profiles* (pp. 99–107). Burlington, VT: University of Vermont, Research Center for Children, Youth, & Families. doi:10.1080/713932693

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.

Appel, H., Gerlach, A. L., & Crusius, J. (2016). The interplay between Facebook use, social comparison, envy, and depression. *Current Opinion in Psychology*, *9*, 44–49.

Asare, M. (2015). Sedentary behaviour and mental health in children and adolescents: A meta-analysis. *Journal of Child and Adolescent Behavior*, *3*, 259.

Baker, D. A., & Algorta, G. P. (2016). The relationship between online social networking and depression: A systematic review of quantitative studies. *Cyberpsychology, Behavior, and Social Networking*, *19*(11), 638–648.

Banjanin, N., Banjanin, N., Dimitrijevic, I., & Pantic, I. (2015). Relationship between internet use and depression: Focus on physiological mood oscillations, social networking and online addictive behavior. *Computers in Human Behavior*, *43*, 308–312.

Barber, B. L., Eccles, J. S., & Stone, M. R. (2001). Whatever happened to the jock, the brain, and the princess? Young adult pathways linked to adolescent activity involvement and social identity. *Journal of Adolescent Research*, *16*(5), 429–455.

Barry, C. T., Sidoti, C. L., Briggs, S. M., Reiter, S. R., & Lindsey, R. A. (2017). Adolescent social media use and mental health from adolescent and parent perspectives. *Journal of Adolescence*, *61*, 1–11.

Beck, A. T., Ward, C. H., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry*, *4*, 561–571.

Best, P., Manktelow, R., & Taylor, B. (2014). Online communication, social media and adolescent wellbeing: A systematic narrative review. *Children and Youth Services Review*, *41*, 27–36.

Carr, C. T., & Hayes, R. A. (2015). Social media: defining, developing, and divining. *Atlantic Journal of Communication*, *23* (1), 46–65.

Chen, Z. Y., Yang, X. D., & Li, X. Y. (2009). Psychometric features of CES-D in Chinese adolescents. *Chinese Journal of Clinical Psychology*, *17*(4), 443–448.

Copeland, W. E., Angold, A., Shanahan, L., & Costello, E. J. (2014). Longitudinal patterns of anxiety from childhood to adulthood: The great smoky mountains study. *Journal of the American Academy of Child & Adolescent Psychiatry*, *53* (1), 21–33.

Deters, F. G., & Mehl, M. R. (2013). Does posting facebook status updates increase or decrease loneliness? An online social networking experiment. *Social Psychological and Personality Science*, *4*(5), 579–586.

Dumitrache, S. D., Mitrofan, L., & Petrov, Z. (2012). Self-image and depressive tendencies among adolescent Facebook users. *Revista De Psihologie*, *58*, 285–295.

Erikson, E. H. (1950). *Childhood and society*. New York, NY, US: W W Norton & Co.

Faulstich, M. E., Carey, M. P., Ruggiero, L., Enyart, P., & Gresham, F. (1986). Assessment of depression in childhood and adolescence: An evaluation of the center for epidemiological studies depression scale for children (CES-DC). *American Journal of Psychiatry*, *143*(8), 1024–1027.

Festinger, L. (1954). A theory of social comparison processes. *Human Relations*, *7*, 117–140.

Frison, E., & Eggermont, S. (2016). Exploring the relationships between different types of facebook use, perceived online social support, and adolescents' depressed mood. *Social Science Computer Review*, *34*(2), 153–171.

Goldberg, D. P., & Williams, P. (1988). A user's guide to the general health questionnaire: Windsor, berks: Retrieved from http://trove.nla.gov.au/work/18049508?q&versionId=21182576

Gore, F. M., Bloem, P. J., Patton, G. C., Ferguson, J., Jospeh, V., Coffey, C., … Mathers, C. D. (2011). Global burden of disease in young people aged 10–24 years: A systematic analysis. *Lancet*, *377*, 2093–2102.

Greenfield, S. (2014). *Mind change: How digital technologies are leaving their mark on our brains*. London: Rider.

Hanprathet, N., Manwong, M., Khumsri, J., Yingyeun, R., & Phanasathit, M. (2015). Facebook addiction and its relationship with mental health among Thai high school students. *Journal of the Medical Association of Thailand*, *98*, S81–S90.

Hetrick, S. E., Cox, G. R., Witt, K. G., Bir, J. J., & Merry, S. N. (2016). Cognitive behavioural therapy (CBT), third-wave CBT and interpersonal therapy (IPT) based interventions for preventing depression in children and adolescents. *Cochrane Database of Systematic Reviews (Online)*, *9*, 8.

Hoare, E., Milton, K., Foster, C., & Allender, S. (2016). The associations between sedentary behaviour and mental health among adolescents: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity*. BioMed Central Ltd. doi: 10.1186/s12966-016-0432-4.

Iannotti, R. J., Janssen, I., Haug, E., Kololo, H., Annaheim, B., Borraccino, A., … Roberts, C. (2009). Interrelationships of adolescent physical activity, screen-based sedentary behaviour, and social and psychological health. *International Journal of Public Health*, *54*((SUPPL), 2.

Kessler, R. C., Amminger, G. P., Aguilar-Gaxiola, S., Alonso, J., Lee, S., & Üstün, T. B. (2007). Age of onset of mental disorders: A review of recent literature. *Current Opinion in Psychiatry*. doi:10.1109/CCECE.2006.277836

Kessler, R. C., Andrews, G., Colpe, L. J., Hiripi, E., Mroczek, D. K., Normand, S. L. T., & Zaslavsky, A. M. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine*, *32*(6), 959–976.

Kessler, R. C., Barker, P. R., Colpe, L. J., Epstein, J. F., Gfroerer, J. C., Hiripi, E., … Zaslavsky, A. M. (2003). Screening for serious mental illness in the general population. *Archives of General Psychiatry*, *60*(2), 184–189.

Kim, H. H. (2017). The impact of online social networking on adolescent psychological well-being (WB): A population-level analysis of Korean schoolaged children. *International Journal of Adolescence and Youth*, *22*(3), 364–376.

Kim-Cohen, J., Caspi, A., Moffitt, T. E., Harrington, H., Milne, B. J., & Poulton, R. (2003). Prior juvenile diagnoses in adults with mental disorder developmental follow-back of a prospective-longitudinal cohort. *Archives of General Psychiatry*, *60*(7), 709–717.

Klineberg, E., Clark, C., Bhui, K. S., Haines, M. M., Viner, R. M., Head, J., & Stansfeld, S. A. (2006). Social support, ethnicity and mental health in adolescents. *Social Psychiatry and Psychiatric Epidemiology*, *41*(9), 755–760.

Krayer, A., Ingledew, D. K., & Iphofen, R. (2008). Social comparison and body image in adolescence: A grounded theory approach. *Health Education Research*, *23*(5), 892–903.

Lenhart, A., Smith, A., Anderson, M., Duggan, M., & Perrin, A. (2015). Teens, technology and friendships. Retrieved from http://www.pewinternet.org/2015/08/06/teens-technology-and-friendships/

Li, J.-B., Lau, J. T. F., Mo, P. K. H., Su, X.-F., Tang, J., Qin, Z.-G., & Gross, D. L. (2017). Insomnia partially mediated the association between problematic Internet use and depression among secondary school students in China. *Journal of Behavioral Addictions*, *6*(4), 554–563.

Lilley, C., Ball, R., & Vernon, H. (2014). The experiences of 11–16 year olds on social networking sites. NSPCC. Retrieved from https://www.nspcc.org.uk/globalassets/documents/research-reports/experiences-11-16-year-olds-social-networking-sites-report.pdf

Marino, C., Gini, G., Vieno, A., & Spada, M. M. (2018). The associations between problematic Facebook use, psychological distress and well-being among adolescents and young adults: A systematic review and meta-analysis. *Journal of Affective Disorders*, *226*, 274–281. Elsevier B.V

Maulik, P., Eaton, W., & Bradshaw, C. (2011). The effect of social networks and social support on mental health services use, following a life event, among the Baltimore epidemiologic catchment area cohort. *The Journal of Behavioral Health Services & Research*, *38*(1), 2950.

McCrae, N. (2018). The weaponising of mental health. *Journal of Advanced Nursing*. doi:10.1111/jan.13878

McCrae, N., Gettings, S., & Purssell, E. (2017). Social media and depressive symptoms in childhood and adolescence: A systematic review. *Adolescent Research Review*. doi:10.1007/s40894-017-0053-4

Mental Health Foundation. (2018). Children and young people. Retrieved from https://www.mentalhealth.org.uk/a-to-z/c/children-and-young-people

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009a). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Medicine*, *6*(7), e1000097.

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G.; The PRISMA Group. (2009b). PRISMA 2009 Flow Diagram. *PLoS Medicine*, *6*(7), e1000097.

Morgan, C., Webb, R. T., Carr, M. J., Kontopantelis, E., Green, J., Chew-Graham, C. A., … Ashcroft, D. M. (2017). Incidence, clinical management, and mortality risk following self harm among children and adolescents: Cohort study in primary care. *BMJ (Online)*, *359*. doi:10.1136/bmj.j4351

Myers, T. A., & Crowther, J. H. (2009). Social comparison as a predictor of body dissatisfaction: A meta-analytic review. *Journal of Abnormal Psychology*, *118*(4), 683–698.

National Institutes of Health. (2014). Quality assessment tool for observational cohort and cross-sectional studies. Retrieved 02 August 2018, from https://www.nhlbi.nih.gov/health-topics/study-quality-assessment-tools

Neira, B. C. J., & Barber, B. L. (2014). Social networking site use: Linked to adolescents' social self-concept, self-esteem, and depressed mood. *Australian Journal of Psychology*, *66*(1), 56–64.

O'Dea, B., & Campbell, A. (2011). Online social networking amongst teens: Friend or foe? *Annual Review of CyberTherapy and Telemedicine*, *9*(1), 108–112.

O'Keeffe, G., & Clarke-Pearson, K.; Council on Communications and Media. (2011). The impact of social media on children, adolescents and families. *Pediatrics*, *124*, 800–804.

Pew Research Centre (2015). Teens, social media & technology overview 2015. Retrieved from http://www.pewinternet.org/2015/04/09/teens-social-media-technology-2015/

Popay, J., Roberts, H., Sowden, A., Petticrew, M., Arai, L., Rodgers, M., … Duffy, S. (1995). Guidance on the conduct of narrative synthesis in systematic reviews. In J. Popay. (Ed.), *A product from the ESRC methods programme* (Vol. 22, pp. 211–219). London: ESRC. Biostats 536 (ESRC

Primack, B. A., & Escobar-Viera, C. G. (2017). Social media as it interfaces with psychosocial development and mental illness in transitional age youth. *Child and Adolescent Psychiatric Clinics of North America*, *26*(2), 217–233. doi:10.1016/j.chc.2016.12.007

Radloff, L. S. (1977). The CES-D scale: A self report depression scale for research in the general population. *Applied Psychological Measurements*, *1*, 385–401.

Reid-Chassiakos, Y., Radesky, J., Christakis, D., & Moreno, M. A. (2016). From the American Academy of Pediatrics. Children and adolescents and digital media. Council on Communications and Media. *Pediatrics*, *138*, 5.

Rosen, L. D. (2011). *Social networking's good and bad impacts on kids*. Washington, DC: American Psychological Association. Retrieved from http://www.apa.org/news/press/releases/2011/08/social-kids.aspx

Rosen, L. D., Whaling, K., Rab, S., Carrier, L. M., & Cheever, N. A. (2013). Is Facebook creating "iDisorders"? The link between clinical symptoms of psychiatric disorders and technology use, attitudes and anxiety. *Computers in Human Behavior*, *29*, 1243–1254.

Royal Society for Public Health, & Young Health Movement. (2017). StatusOfMind social media and young people's mental health and wellbeing. Retrieved from https://www.rsph.org.uk/uploads/assets/uploaded/62be270a-a55f-4719-ad668c2ec7a74c2a.pdf

Sampasa-Kanyinga, H., & Lewis, R. F. (2015). Frequent use of social networking sites is associated with poor psychological functioning among children and adolescents. *Cyberpsychology, Behavior, and Social Networking*, *18* (7), 380–385.

Seabrook, E. M., Kern, M. L., & Rickard, N. S. (2016). Social networking sites, depression, and anxiety: A systematic review. *JMIR Mental Health*, *3*(4), e50.

Stansfeld, S., Clark, C., Bebbington, P., King, M., Jenkins, R., & Hinchliffe, S. (2016). Chapter 2: Common mental disorders. In S. McManus, P. Bebbington, R. Jenkins, & T. Brugha (Eds.), *Mental health and wellbeing in England: Adult psychiatric morbidity survey 2014* (pp. 37–68). Leeds: NHS Digital.

Teo, A., Choi, H., & Valenstein, M. (2013). Social relationships and depression: Ten-year follow-up from a nationally representative study. *PloS one*, *8*(4), e62396.

Tsitsika, A. K., Tzavela, E. C., Janikian, M., Ólafsson, K., Iordache, A., Schoenmakers, T. M., … Richardson, C. (2014). Online social networking in adolescence: Patterns of use in six European countries and links with psychosocial functioning. *Journal of Adolescent Health*, *55*(1), 141–147.

Twenge, J. (2006). *Generation me: Why we expect more from technology and less from each other*. New York: Basic Books.

Vandervoort, D. (1999). Quality of social support in mental and physical health. *Current Psychology*, *18*(2), 205. Retrieved from: https://link.springer.com/content/pdf/10.1007%2Fs12144-999-1029-8.pdf

Vernon, L., Modecki, K. L., & Barber, B. L. (2017). Tracking effects of problematic social networking on adolescent psychopathology: The mediating role of sleep disruptions. *Journal of Clinical Child and Adolescent Psychology*, *46*(2), 269–283.

Wang, P., Wang, X., Wu, Y., Xie, X., Wang, X., Zhao, F., … Lei, L. (2018). Social networking sites addiction and adolescent depression: A moderated mediation model of rumination and self-esteem. *Personality and Individual Differences*, *127*, 162–167.

Wang, Y. L. (2006). A summary of the researches about the factors of family influence on the children necessary to be brought up by other people. *Progress in Modern Biomedical*, *6*, 3.

World Health Organization. (2017). Maternal, newborn, child and adolescent health. Retrieved from http://www.who.int/maternal_child_adolescent/topics/adolescence/mental_health/en/

Yan, H., Zhang, R., Oniffrey, T. M., Chen, G., Wang, Y., Wu, Y., … Moore, J. B. (2017). Associations among screen time and unhealthy behaviors, academic performance, and well-being in Chinese adolescents. *International Journal of Environmental Research and Public Health*, *14*(6). doi:10.3390/ijerph14060596

Yu, I. T. S., & Tse, S. L. A. (2012). Workshop 6 - Sources of bias in cross-sectional studies; Summary on sources of bias for different study designs. *Hong Kong Medical Journal*. doi:10.2478/v10313-012-0001-z