

Abstract

Suicide is a global public health problem and with recent economic and societal changes, there may be emerging risk factors unrecognised by healthcare professionals. The aim of this systematic review is to update existing suicide risk factor literature applicable to emergency healthcare settings. A total of 35 articles identified from PsycINFO, CINAHL and Medline met the inclusion criteria. Results supported the significance of existing suicide risk factors and identified emerging risk factors. The review provides a high-quality update of risk factor literature that could be applied to emergency healthcare settings, however further research is needed to confirm emerging risk factors.

Keywords: suicide, risk factors, systematic review, socioeconomic factors, individual factors

Risk factors for suicide and suicidal behaviour relevant to emergency healthcare settings:**A systematic review of post-2007 reviews**

Over 800,000 people die by suicide each year (World Health Organization, 2014), and research in the United Kingdom (UK) found that 6.1% of men and 8.7% of women had experienced suicidal ideation within the past year (Spiers et al., 2014). This demonstrates the need to investigate causal factors underlying suicide that may aid in identifying individuals at risk. McLean, Maxwell, Platt, Harris, and Jepson (2008) conducted a systematic review of reviews between 1996 and 2007 exploring suicide risk factors in all populations. A total of 23 reviews identified varying risk factors, including: mental illness; prior suicidal behaviour; health behaviours, such as substance misuse; physical health problems; genetic predisposition; unemployment. The review identified gaps in the literature including: being affected by the aftermath of suicide; bereavement; children, especially looked after children; HIV/AIDS; homelessness; being lesbian, gay, bisexual or transgender (LGBT); isolation; the media; older people; those who have been abused; deprivation; and individuals with physical or learning disabilities. Although results demonstrated that many risk factors have been identified, some are little researched, or not empirically assessed.

Since 2008 there have been societal changes that may be relevant to suicide risk. Barr, Taylor-Robinson, Scott-Samuel, McKee and Stuckler (2014) found evidence linking suicide increases in England with the 2008 global recession. Furthermore, there have been technological changes in society, and research has found that cyberbullying is more strongly related to suicidal ideation compared with traditional bullying (Van Geel, Vedder, & Tanilon, 2014). According to recent findings, risk factors such as bullying are being overlooked in emergency room suicide risk assessments (Alavi, Reshetukha, & Prost, 2015). Therefore, additional research is needed to identify further evidence for risk factors such as cyberbullying, which may have recently developed. Furthering understanding of current risk factors could assist healthcare staff, as

research has found staff in emergency departments being negative or ambivalent toward suicidal individuals. Additionally, patients are subjected to stigmatisation and a lack of empathy, which can decrease quality of care. The research further emphasises the need for protocols, guidelines and education for emergency staff (Pompili, Girardi, Ruberto, Kotzalidis, & Tatarelli, 2005). By updating the risk factor research, this can contribute to further understanding of suicide, reducing stigmatisation amongst healthcare staff, aiding the development of efficient protocols.

Research investigating risk factors is essential to improve and develop risk assessment screening measures. Recently, the Swedish Council on Health Technology Assessment (SBU) (2015) conducted a systematic review examining evidence for the use of suicide risk screening tools in assessing risk of future suicidal behaviour. A total of 13 screening tools that assessed the risk of subsequent suicide attempts, and nine screening tools that assessed the risk of suicide were identified. Not one provided evidence to support sufficient accuracy to predict future suicide. Identifying current and emerging risk factors may support the development of more accurate screening tools in the future.

Aims & Objectives

The aim of this research is to provide a high-quality update of existing literature post-publication of McLean et al.'s (2008) review, of suicide risk factors that can be applied and are easily detectable and feasible to assess in UK emergency healthcare settings, as risk needs to be identified quickly in these settings. The review will include papers drawn from contexts which are not solely focused on UK emergency healthcare settings, for a number of reasons. First, through focusing on only UK emergency settings, there would be a risk that the review would fail to identify potentially relevant but previously unidentified/unapplied risk factors within the emergency healthcare setting. Second, as there is currently no clear pathway through which people seeking support or help for suicide-related admissions exists in the UK setting, with

emergency settings being one such route through which any individual can enter, it is essential that wider populations than simply 'known patients within emergency settings' are considered and included when identifying and discussing potentially applicable and assessable risk factors within these settings. The review aims to fill gaps in the literature, so that new findings can inform practice and be adopted into future suicide risk assessment, as recently identified risk factors may be overlooked in emergency settings (Alavi et al., 2015). The current review is concerned only with research involving suicide and behaviours with suicidal intent; and will not include self-harm where suicidal intent is not present.

Method

The methodology and presentation of results followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Moher, Liberati, Tetzlaff, Altman, & The PRISMA Group, 2009).

Data Searches

Three databases (PsycINFO; CINAHL; Medline) were searched via EBSCOhost between January 2007 and December 2014. The search screening process is displayed in Figure 1. The search terms used were: suicid* AND risk factor* OR self-harm* OR attempt* OR relative risk OR attributable risk OR personality OR cogniti* OR risk cu*. Further articles were sought using a hand-search of the reference lists of quality assessed included papers.

Inclusion & Exclusion Criteria

To identify current risk factors for completing suicide, suicidal ideation and suicidal behaviours such as suicide attempts that can feasibly be assessed in UK emergency healthcare settings, high-quality systematic reviews and meta-analyses published in peer-reviewed journals in the English language, for all age groups were explored. Only reviews published from 2007 to

2014 were included, as McLean et al.'s (2008) review covered research prior to these dates.

Reviews identified via the database searches were excluded using the following criteria:

- Risk factors which could not be assessed in emergency healthcare settings e.g., gene or neurotransmitter abnormalities
- Either irrelevant or with no application to healthcare settings in the UK e.g., research exploring indigenous populations and risk outside the developed world
- Risk factors for suicide in confined settings e.g., in prisons or care homes
- Suicidal behaviours such as self-harm, when not explicitly linked with suicide intent
- Assisted suicide or euthanasia
- Reviews of interventions for suicidal behaviour
- Non-systematic literature reviews and primary research studies
- Grey literature
- Those published in a language other than English

Screening and Data Extraction

Data were exported from each database and de-duplicated. Titles and abstracts were screened by one reviewer (KMcC), then independently appraised for inclusion by JM. Data were extracted by one author (KMcC) for all papers. A second author (JM) extracted data from a square root sample of papers ($N = 11$) selected at random. Data were extracted into a predefined table for consistency. Following independent data extraction, the authors met to discuss similarities and differences across the data extraction. No substantive differences existed, and agreement was therefore high. Should there have been disagreements, a third author would have been consulted to discuss the disagreement and to independently extract data for comparison.

Quality Appraisal

Articles meeting the inclusion criteria were quality appraised by assessing their adherence to the PRISMA checklist. The PRISMA checklist guides authors to report particular items in reviews and meta-analysis including but not limited to, databases with dates of coverage; a full search strategy; methods of data extraction; methods used for assessing risk of bias; number of studies screened, assessed for eligibility and included in the review; discussion of limitations at study and outcome level. Studies were categorised as high-quality, with all or most of the PRISMA checklist being adhered to; moderate-quality, where approximately half of the checklist was adhered to; and low-quality, with few items on the checklist being adhered to. A square root sample ($N = 11$) of the quality assessments were independently appraised by JM.

Data Synthesis

A narrative synthesis was undertaken and was chosen for a number of reasons. This method replicates the methodology of the McLean et al. (2008) report, and this particular review only searched for new evidence (post-2007) that was not included in their review. Also, there would likely be substantial heterogeneity due to the wide variation in type of researched suicide risk factors of suicide and populations. In addition, the papers included in the review used differing methods for example, there was a mixture of meta-analyses and papers only using a qualitative narrative synthesis. Therefore, a narrative synthesis was deemed most suitable for managing and synthesising the data in this review. The synthesis followed Popay et al.'s (2006) guidelines, and used groupings and clusters to organise studies, with included results being synthesised into themes by two researchers (KMcC & JM). Where available, odd ratios (*ORs*), the ratio of odds that suicide or suicidal behaviour will occur to the odds of suicide or suicidal behaviour not occurring; relative risk (*RR*), the probability of suicide or suicidal behaviour occurring; and confidence intervals (*CI*s) and effect sizes are reported.

Results

Study Selection

The search generated 1614 articles (PsycINFO, 303 articles; CINAHL, 255; Medline, 1056), of which 951 were duplicates. Of the remaining 663, 549 were excluded. A total of 114 articles were assessed for quality of which 34 (29.8%) met the high-quality inclusion criteria, 12 were found to be of poor quality and 68 were moderate-quality. An additional four articles were located through hand-searching reference lists of articles meeting the high-quality inclusion criteria. These four articles were assessed for quality, three were found to be of moderate-quality, and one met the final inclusion, providing a final total of 35 articles included in the review. Of the final 35 included reviews, 22 provided a meta-analysis, and 13 were systematic reviews employing a narrative synthesis.

Synthesis of Evidence

The summarised suicide risk factor results have been divided into appropriate categories (Table 1.), and some studies may appear more than once in the results section, as they include data of suicide risk factors that are relevant to multiple categories.

Health Problem Risk Factors

Mental Ill Health Risk Factors

This theme is composed of risk factors relating to mental ill health. One review identified risk factors relating to depression, four relating to mood disorders, one to anxiety disorder, and one to PTSD. Each of these sub-themes are discussed below.

Depression

Hawton, Casañas i Comabella, Haw, and Saunders (2013) explored suicide risk and depression across 28 studies including approximately 200,000 individuals. Comparing

individuals with depression who died by suicide to those who did not, suicide risk was found to be greater in males (*OR* 1.76, 95% *CI* 1.08-2.86), those with a family history of mental disorder (*OR* 1.41, *CI* 1.0-1.97), and those with a history of suicide attempts or self-harm (*OR* 4.84, 95% *CI* 3.26-7.20). Having more severe depressive psychopathology (*OR* 2.20, 95% *CI* 1.05-4.60), and feelings of hopelessness (*OR* 2.20, 95% *CI* 1.49-3.23) was associated with risk. Symptoms of anxiety (*OR* 1.59, 95% *CI* 1.03-2.45) and Axis II disorder (*OR* 4.95, 95% *CI* 1.99-12.33) was also associated with risk. Current substance misuse (*OR* 2.17, 95% *CI* 1.77-2.66), including alcohol (*OR* 2.47, 95% *CI* 1.40-4.36) and drug use (*OR* 2.66, 95% *CI* 1.37-5.20) increased suicide risk.

Mood Disorders

Palmier-Claus, Taylor, Varese and Pratt (2012) conducted a meta-analysis of 20 studies with a mixture of both clinical, non-clinical and general populations and found a significant association between mood instability and increased suicide risk, with a summary effect size of $z = 0.35$, (95% *CI*, 0.26-0.44; $p < 0.001$). Pompili et al. (2013a) found that suicide risk among bipolar disorder subjects was 20-30 times greater compared to the general population. Furthermore, Yoshimasu et al. (2008) conducted a meta-analysis based on psychological autopsy studies with a case-control design, and found mood disorders were also strongly associated with suicidal risk (*OR* 13.42, 95% *CI*, 8.05–22.37). Richard-Devantoy, Berlim and Jollant (2014) conducted a meta-analysis of results of 25 studies neuropsychological tests (Iowa Gambling Task; Stroop test; trail making test part B; Wisconsin card sorting test; category and semantic verbal fluencies, and continuous performance test) in with those with mood disorders (unipolar; bipolar). Suicide attempters had significantly lower performance than healthy controls on all tasks, all with moderate to high effect sizes.

Anxiety Disorder

Kanwar et al. (2013) analysed 42 studies and found those with anxiety, compared to patients without, were more likely to have suicidal ideations (*OR* 2.89, *CI* 2.09-4.00), with panic disorder having highest odds (*OR* 4.39, 95% *CI* 2.38-8.10). Anxiety patients were more likely to attempt suicide (*OR* 2.47, 95% *CI* 1.96-3.10), with panic disorder having highest odds (*OR* 3.96, 95% *CI* 2.13-7.35). Those with anxiety were more likely have any suicidal activities (*OR* 2.85, 95% *CI* 2.35, 3.46) or complete suicide (*OR* 3.34, 95% *CI* 2.13-5.25). There were no differences between sexes. There were associations of anxiety disorders with suicidal ideation (*OR* 3.08, 95% *CI* 1.94-4.90), and any suicidal activities in children (*OR* 2.82, 95% *CI* 1.92-4.14).

Post-Traumatic Stress Disorder (PTSD)

Pompili et al. (2013b) synthesised 18 studies of suicide risk in veterans with PTSD which included a mixture of designs for example, comparing veterans with PTSD, to veterans without; comparing military personnel who served in war to those who did not; and exploring the severity of PTSD in veterans and suicide attempts. Results found PTSD be associated with an increased risk of suicidal ideation, attempts and completed suicide in veterans.

Associations of Mental Ill Health

This theme comprised of four reviews in total, two investigating depression medication, one exploring discharge from psychiatric hospital and a further review investigating sleep disturbances in psychiatric disorders.

Depression Medication

Barbui, Esposito, Cipriani (2009) conducted a meta-analysis of eight studies that compared depressed individuals who received selective serotonin reuptake inhibitors (SSRIs) to depressed individuals who did not. SSRIs were found to significantly increase the risk of completed or attempted suicide in adolescents (*OR* 1.92, 95% *CI* 1.51-2.44), however SSRIs were found to

significantly decrease risk in adults (*OR* 0.57, 95% *CI* 0.47-0.70). Among those aged 65 and over, SSRIs had a significant protective effect (*OR* 0.46, 95% *CI* 0.27-0.79). Bridge et al. (2007) conducted a meta-analysis of 27 trials exploring suicidal behaviour in paediatric antidepressant treatment. Pooled absolute rates of suicidal ideation and attempts in patients with major depressive disorder (MDD) was 3% in antidepressant participants, and 2% in placebo groups. The pooled risk difference was 1% (95% *CI*, -0.1% to 2%, $p = 0.08$). Pooled absolute rates of suicidal ideation and attempts in patients with obsessive compulsive disorder (OCD) was 1% in SSRI-treated participants, and 0.3% in placebo groups. The pooled risk difference was 0.5% (95% *CI*, -1% to 2%, $p = 0.57$). Pooled absolute rates of ideation or attempt in non-OCD anxiety disorders were 1% in antidepressant participants, and 0.2% in placebo groups, and the pooled risk difference was 0.7% (95% *CI*, -0.4% to 2%, $p = 0.21$). Results found an increased risk difference of suicidal ideation and attempts across all trials, though pooled risk differences were not significant and there were no completed suicides.

Discharge from Psychiatric Hospital

Large, Sharma, Cannon, Ryan, Neilssen (2011) completed a meta-analysis of 13 studies and found a history of self-harm or a suicide attempt (*OR* 3.15, 95% *CI* 2.28-4.33) and depressive symptoms (*OR* 2.70, 95% *CI* 1.63-4.48) were moderately associated with post-discharge suicide within one year. Being male (*OR* 1.58, 95% *CI* 1.16-2.16); experiencing recent social difficulties (*OR* 2.23, 95% *CI* 1.40-3.53); having a diagnosis of MDD (*OR* 1.91, 95% *CI* 1.46-2.51); the presence of suicidal ideas (*OR* 2.47, 95% *CI* 1.76-3.47); or an unplanned discharge (*OR* 2.44, 95% *CI* 1.71-3.47) were significantly associated with post-discharge suicide, albeit weakly. Patients with less contact with services post-discharge, were significantly less likely to complete suicide (*OR* 0.69, 95% *CI* 0.51-0.94).

Sleep Disturbances in Psychiatric Disorders

Malik et al. (2014) compared patients with psychiatric diagnoses (depression; PTSD); panic disorder; schizophrenia; and anxiety) and co-morbid sleep disturbances, to patients without sleep disturbances across 19 studies. Patients with co-morbid sleep disturbances were more likely to report suicidal behaviours (*OR* 1.99, 95% *CI* 1.72-2.30), with significant associations between suicidal behaviours and sleep disturbance in depression (*OR* 3.05, 95% *CI* 2.07-4.48), PTSD (*OR* 2.56, 95% *CI* 1.91-3.43), panic disorders (*OR* 3.22, 95% *CI* 1.09-9.45), and schizophrenia (*OR* 12.66, 95% *CI* 1.40-114.44). Parasomnia had the greatest increased risk of suicidal behaviours (*OR* 4.69, 95% *CI* 2.58-8.51), sleep-related breathing disorder had the lowest (*OR* 2.56, 95% *CI* 1.91-3.43). Results for hypersomnia were not significant.

Self-Harm

Self-harm was classified as its own theme, and included two reviews. Carroll, Metcalfe and Gunnell (2014) explored 177 studies of rates of fatal self-harm amongst those who presented to healthcare services. Suicide risk in the 12 months after an index attempt was 1.6% (95% *CI* 1.2-2.4), 3.9% (95% *CI* 3.2-4.8) after 5 years, and 4.2% (95% *CI* 3.1-5.6) at 10 years. One year fatal repetition rates estimates for males was 2.7% (95% *CI* 1.8-4.0%) and 1.2% (95% *CI* 0.7-1.9) for females. Cohorts with average age above the median had an estimated one year repetition rate of 2.4% (95% *CI* 1.9-2.9) compared to 1.1% (95% *CI* 0.75-1.5) in those below. Cohorts with above the median proportions of patients self-poisoning, the year fatal repetition rate was 1.1% (95% *CI* 0.9-1.4%) compared to 2.0% (95% *CI* 1.2-3.2) in those with less self-poisoning. Yoshimasu et al. (2008) found across 11 psychological autopsy studies with a case-control design, that deliberate self-harm was very strongly associated with suicidal risk (*OR* 16.33, 95% *CI* 7.51–35.52).

Physical Health Risk Factors

Two reviews were included in this theme, exploring suicide risk and traumatic brain injury and Type 1 Diabetes.

Traumatic Brain Injury (TBI)

Bahraini, Simpson, Brenner, Hoffberg, and Schneider (2013) explored suicidal ideation and behaviours after TBI. Three of the five studies supported an increased risk of death by suicide. Two studies found that 7-27.3% of veterans with TBI attempted suicide. Overall, findings support an increased risk of suicide among TBI survivors.

Type 1 Diabetes Mellitus (DM-1)

Pompili et al. (2014b) reviewed 20 studies investigating DM-1 and suicidal behaviour across all ages. Results found patients with DM-1 have a higher suicide risk than the general population. Most studies found an increase in suicide and behaviours in adults with DM-1. One study found that suicidal behaviour was higher in individuals with DM-1 compared with type 2 diabetes. However, research with adolescents was less clear. Finally, two out of three studies of children with DM-1 had a higher than expected rate of suicides or suicidal behaviours.

Health Behaviour Risk Factors

A total of five reviews were included in this theme. One review explored smoking and suicide risk, the remaining four examined substance misuse.

Smoking

Li et al. (2012) studied cigarette use and suicide risk using 15 studies and found an increased risk of completed suicide for former compared with never smokers (*RR* 1.28, 95% CI, 1.00-1.64). There was an increased risk of suicide for current smokers compared with never smokers (*RR* 1.81, 95% CI, 1.50-2.19). An increment of 10 cigarettes per day was significantly

associated with a 24% increased risk of suicide for current smokers (*RR* 1.23, 95% CI, 1.18-1.27). The association between smoking and suicide was weaker for studies adjusting for alcohol consumption (*RR* 1.65, 95% CI 1.25-2.18), and mental illness (*RR* 1.40, 95% CI 1.08-1.81). Compared with never smokers, current smokers have an 81% increased risk of completed suicide.

Substance Misuse

Calabria, Degenhardt, Hall and Lynskey (2010) found three out of four studies had a significantly increased risk of suicide, attempt, and ideation associated with early onset, use and frequency of cannabis use. However, one study of general hospital admissions for suicide attempts found that cannabis use was not a risk factor for suicide attempt. Marshall and Werb (2010) found three out of four studies showed a link between either completed suicide, ideation or attempts and methamphetamine use. Results found that those who reported ever using methamphetamine were more likely to report attempting suicide; suicide attempts were more common among those diagnosed with methamphetamine induced psychosis; and a high prevalence of methamphetamine (9%) was observed in toxicological samples of suicide cases. Although, one study found that although self-reported life-time history of methamphetamine use was associated with suicidal ideation, it was not associated with attempts. Pompili et al. (2012) found alcohol misuse was significantly associated with suicidal attitudes. Early adolescent alcohol use onset was significantly associated with suicidality across gender. Also, several studies showed an association between substance use disorders and suicidal risk. Research indicated that suicide attempts are common in adolescents with substance use disorders, and that substance use is common in those seeking treatment for suicidal behaviour. Yoshimasu et al. (2008) conducted a meta-analysis of 16 psychological autopsy studies with a case-control design, and found substance-related disorders were strongly associated with suicidal risk (*OR* 5.24, 95%

CI 3.30–8.31), and risk was stronger in women (*OR* 8.34, 95% CI 2.18-31.82) than men (*OR* 3.87, 95% CI 1.85–8.13).

Biopsychosocial Risk Factors

The biopsychosocial theme comprised of 22 reviews which included, one parental suicide review, six childhood maltreatment reviews, one intimate partner violence review, one review of sexual abuse, two reviews of bullying, three reviews of internet use, two reviews of sexuality, and six reviews of employment.

Parental Suicide

Geulayov, Gunnell and Metcalfe (2012) conducted a meta-analysis of 14 studies investigating parental association of fatal and non-fatal suicidal behaviour with offspring suicidal behaviour. Compared with offspring of two living parents, children who lost a parent to suicide were at greater risk of suicide (*aOR* 1.94, 95% CI 1.54-2.45); and attempts (*aOR* 1.95, 95% CI 1.48-2.57). Compared with offspring who lost a parent to a cause other than suicide, offspring of suicide descendants were at a higher risk of suicide (*OR* 1.91, 95% CI 1.56-2.10); and suicide attempt (*OR* 1.73, 95% CI 1.63-1.83). Furthermore, offspring whose parents attempted suicide were also more likely to die by suicide (*OR* 3.40, 95% CI 2.82-4.10), and attempt suicide (*OR* 3.74, 95% CI 3.54-3.95). The evidence was mixed for maternal compared with paternal suicidal behaviours, as was male and female offspring. One study reported that offspring age at time of parental death by suicide may have an effect, with child to adolescents (0-17years) being three times more likely to die by suicide compared with offspring of two living parents, with no increase in risk if the offspring were 18-25 years at the time of parental suicide.

Abuse

Childhood Maltreatment

Devries et al. (2014) reviewed nine studies exploring whether exposure to childhood sexual abuse is associated with suicidal behaviour. Results found an overall pooled estimate for an association between exposure and suicidal behaviour (*OR* 2.43, 95% *CI* 1.94-3.05), with all but one being in the direction of increased risk. Results found no significant difference between sexes. Maniglio (2011) conducted a review of reviews and found a significant association between child sexual abuse and suicidal behaviour or ideation, with the magnitude of the relationship ranging from small to medium. Chen et al. (2010) conducted a meta-analysis of 15 longitudinal observational studies that compared individuals who had a history of sexual abuse with a control group. Results found a significant association between a history of sexual abuse and suicide attempts (*OR* 4.14, 95% *CI* 2.98-5.76). However, of the 15 studies, one explored adult sexual abuse. Norman et al. (2012) included 124 studies in a meta-analysis exploring child abuse (physical, emotional and neglect) and suicidal behaviour. Physically abused (*OR* 3.00, 95% *CI* 2.07–4.33), emotionally abused (*OR* 3.08; 95% *CI* 2.42–3.93), and neglected (*OR* 1.85, 95% *CI* 1.25–2.73) individuals had a significantly increased risk of suicidal behaviour compared with non-abused individuals. Results also found an increased risk of suicide attempts (physical abuse (*OR* 3.40, 95% *CI* 2.17–5.32), emotional abuse (*OR* 3.37, 95% *CI* 2.44–4.67), and neglect (*OR* 1.95, 95% *CI* 1.13–3.37)). Fry, McCoy and Swales (2012) found that maltreated children (either physically, emotionally, sexually, or in combination) have an increased risk of suicide ideation and attempts compared with children who have never experienced maltreatment, with sexual or physical abuse, having a median fourfold increased risk, based on 16 studies. Results found a significantly increased risk of ideation associated with maltreatment with *ORs* and *aORs* ranging from 1.06 to 8.52. Furthermore, maltreatment was found to significantly increase risk of suicide attempts with *ORs* and *aORs* ranging from 2.98 to 8.47. Weich, Patterson, Shaw and Stewart-Brown (2009) identified five studies and found that both physical abuse and maternal psychological unavailability before age five predicted suicidal ideation and attempts later in life.

Intimate Partner Violence (IPV)

Devries et al. (2013) explored IPV and suicide attempts using three studies. All showed positive relationships of IPV and attempts in women, two of which were significant (*OR* 3.2, 95% CI, 0.97-103.59; *OR* 7.97, 95% CI, 1.75-36.37; Beta = 0.12, 95% CI, 0.02-0.22). However, two studies explored IPV on men and suicidal behaviours, and found no significant relationships.

Sexual Abuse

A meta-analysis conducted by Chen et al. (2010) included 15 studies exploring sexual abuse in children ($n = 14$) and adulthood ($n = 1$) and suicide attempts. Results found a significant association between a history of sexual abuse in both child and adulthood with suicide attempts (*OR* 4.14, 95% CI 2.98-5.76).

Bullying

van Geel, Vedder and Tanilon (2014) conducted a meta-analysis of 36 studies comparing victimised children with children who had not been victimised. Results found a significant relationship between peer victimization and suicidal ideation (*OR* 2.23, 95% CI 2.10-2.37), and attempts (*OR* 2.55, 95% CI 1.95-3.34). Cyberbullying, was more strongly related to ideation (*OR* 3.12, 95% CI 2.40-4.05) than traditional bullying (*OR* 2.16, 95% CI 2.05-2.28). Due to the small number of studies, subgroup analyses for attempts could not be performed. Diane et al. (2013) also found that cyberbullying appeared to increase rates of attempted suicide for both victims and perpetrators, with rates increasing 1.9 and 1.5 times respectively.

Internet Use

Diane et al. (2013) reviewed internet use and suicide in young people and found general internet use to be a source of exposure to suicide, with 59% stating they had learned about suicide

online. Discussion forum use was significantly associated with increases in suicidal ideation, and ideation was significantly associated with searching online for information about suicide. Furthermore, 18% stated that finding a suicidal partner had relevance to them. In one study of adolescents, increased levels of internet addiction were related to increased ideation. One study found that cyberbullying appeared to increase rates of attempted suicide for victims and perpetrators by 1.9 and 1.5 times respectively. van Geel et al. (2014) included three studies in a meta-analysis and found cyberbullying more strongly related to suicidal ideation (OR 3.12, 95% CI 2.40-4.05) than traditional bullying (OR 2.16, 95% CI 2.05-2.28).

Sexuality Risk Factors

A meta-analysis of 25 studies of suicidal behaviour in lesbian, gay and bisexual (LGB) individuals found an increased risk in all LGB groups compared to heterosexuals (King et al., 2008). Attributable risk ranged from 0.03-0.25 and was higher in men than women. Women demonstrated a 1.82 times increased risk of lifetime suicide attempts in lesbians compared to bisexuals. Risk ratios for 12 month prevalence of suicide attempts ranged from 1.96 to 2.76 for both sexes. Results found lifetime suicidal ideation risk ratios of 2.04 for both sexes, and a 12 month prevalence of suicidal ideation risk ratio of 1.71 in both sexes. Pompili et al. (2014a) reviewed bisexuality and suicide, and 13 out of 15 studies found bisexuals were more likely than heterosexuals to report prior suicidal behaviour, however, two studies reported no significant differences. Evidence for differences between bisexuals and homosexuals was mixed.

Employment

Unemployment

Milner, Page and LaMontagne (2013) conducted a meta-analysis and found pooled relative risk of suicide in long term unemployed (average 7.8 years) compared to those currently

employed was 1.70 (95% CI, 1.22-2.18). Pooled relative risk less than five years unemployed was 2.50 (95% CI 1.83-3.17) compared to those currently employed. Relative risk in studies with follow up periods between 12 and 16 years was 1.21 (95% CI 1.10-1.33) compared with those currently employed. Milner, Page and LaMontagne (2014) found that the effect of unemployment was associated with a significantly higher relative risk of suicide (*RR* 1.58, 95% CI 1.33-1.83). After controlling for mental health problems, relative risk was reduced by approximately 37%, but remained significant (*RR* 1.15, 95% CI 1.00-1.30).

Occupation

Milner, Spittal, Pirkis, and LaMontagne (2013) found the highest suicide risk comprised of 'elementary' occupations such as cleaners (*RR* 1.84, 95% CI 1.46-2.33). The International Standard Classification of Occupations (ISCO) (version 2008) category 8 group, which represents machine operators had high risk (*RR* 1.78, 95% CI 1.22-2.60). There was increased risk among the ISCO category 5 (*RR* 1.52, 95% CI 1.28-1.80), which represents services such as police, and ISCO category 6 (*RR* 1.64, 95% CI 1.19-2.28) for example skilled agricultural workers. The lowest risk was the highest skill-level group of managers (ISCO category 1, *RR* 0.68, 95% CI 0.50-0.93) and clerical support workers (ISCO category 4, *RR* 0.77, 95% CI 0.64-0.92). There were significant differences by skill level, with the lowest and second lowest skilled professions being at increased risk. Platt, Hawton, Simkin and Mellanby (2010) found seven of eleven studies showing significantly that veterinary surgeon suicides were elevated compared to the general population. Veterinary surgeons in the UK are at least three times as likely to die from suicide compared with the general population. Pompili et al. (2013b) reviewed suicide risk and PTSD in veterans and found higher risk for many years after returning home, and exposure to violent episodes of war increases the rate of suicidal thoughts and attempts. Furthermore, Bahraini et al. (2013) found between 7 to 27.3% of veterans attempted suicide after TBI.

Environmental Factors

The environmental factors theme included one paper which reviewed access to suicide methods and suicide risk.

Access to Suicide Methods

Anglemyer, Horvath, and Rutherford (2014) conducted a meta-analysis of 14 studies assessing firearm accessibility and suicide and found all but one study had significantly higher odds of suicide among those with firearm access than those who did not have access (*OR* 3.24, 95% *CI* 2.41-4.40)., with *ORs* ranging from 1.38 to 10.38. Tests for interaction between subgroups (sex; age; year of publication; location of death; risk of bias) were not significant.

Discussion

The current review updates the literature of suicide risk factors that can be easily identified and feasibly assessed in emergency healthcare settings. Consistent with prior research (McLean et al., 2008), mental ill health was identified as a risk factor, and this review found increased risk for particular individuals with depression (Hawton et al., 2013). This may aid healthcare staff in the identification of suicide risk in individuals with depression. However, the majority of those studied were patients in psychiatric care, thus results may not be generalisable to individuals living in the community. Depression medication was identified as a suicide risk factor in adolescents (Barbui et al., 2009; Bridge et al., 2007). This implies that adolescents should be monitored for risk during treatment. Discharge from psychiatric hospital was also found to be a suicide risk factor in some groups (Large et al., 2011), which indicates these individuals should be assessed for risk post-discharge. The current review also found research to suggest that one in 25 patients presenting to hospital for self-harm will kill themselves in the next five years (Carroll et al., 2014). However, this research found it difficult to differentiate between

individuals displaying self-harm behaviour and those with suicidal intent and does not take into account those individuals who attempt suicide but who do not present to hospital. Future research should aim to distinguish between those who self-harm with or without suicidal intent. In addition, research would benefit from greater attempts to reach those who do not present within healthcare settings.

The current review found that physical health problems can increase suicide risk. Patients with DM-1 have an increased suicide risk and this could aid healthcare staff in risk assessment. However research with adolescents is less clear (Pompili et al., 2014a), therefore further research is needed. TBI was also found to increase suicide risk, although, this study had a moderate to high risk of bias within their results (Bahraini et al., 2013). Healthcare staff should therefore be aware that individuals with TBI may be at risk. Consistent with prior research (McLean et al., 2008), substance misuse (cannabis; methamphetamine; alcohol misuse) was associated with increased risk of suicidal behaviours (Calabria et al., 2010; Marshall, & Werb, 2010; Pompili et al., 2012). However, the cannabis use review included only a small number of studies and did not control for confounding variables (Calabria et al., 2010). Similarly, Yoshimasu et al. (2008) note that chronic alcohol dependence can promote depression, therefore, interactive effects of alcohol use and mood disorders must be paid attention.

The results of this review identified a systematic review that suggested that veterans with a history of PTSD have an increased risk of suicidal behaviour (Pompili et al., 2013b). Although this review included papers largely focusing on veterans in the United States (US), the UK has a large ex-service community estimated to be around 6.2 million people (The Royal British Legion, 2014), which their results are relevant to. Findings from the review that used UK samples noted that suicidal behaviours in veterans with PTSD seem to be associated with alienation from civilian life, which could be feasibly be assessed in emergency healthcare settings. The inclusion of this paper was therefore justifiable and applicable to the current paper's aims.

The current review found evidence to support an increased risk of suicide and unemployment (Milner et al., 2013), even when adjusting for mental health problems (Milner et al., 2014). In contrast, particular occupations may elevate risk for example veterinary surgeons in the UK are at least three times as likely to die from suicide compared to the general population (Platt et al., 2010). Although, this study notes there may have been inconsistencies in the verdict of suicide. Research by Milner et al. (2013) found that the highest risk of suicide appeared to be associated with 'elementary' occupations such as cleaners, with an elevated risk among the skilled agricultural type workers, and this increased risk may be due to availability of lethal suicide means. With regards to access to means, Anglemyer et al. (2014) found significantly higher odds of suicide among those who had firearm access than among those who did not. Although the study used data from the United States, this could still be applicable to UK settings. For example, UK farmers are significantly more likely to use firearms to kill themselves compared with non-farmer controls (Booth, Briscoe, & Powell, 2000).

Bridged Gaps in the Literature

McLean et al. (2008) identified risk factor literature gaps and the current review has begun bridging these gaps. One study found that, compared with offspring of two living parents, children who have lost a parent to suicide or who had attempted suicide, were at greater risk of attempting or dying by suicide (Geulayov et al., 2012). This shows that being affected by suicide may impact an individual's own risk. However, this study had considerable heterogeneity, did not differentiate between genetic and environmental factors, and did not account for suicide of other family members. Sexuality and suicide has thus far been under researched however the current review found an increased risk of suicidal behaviour in LGB individuals compared with heterosexuals (King et al., 2008; Pompili et al., 2014a). This indicates that these individuals should perhaps be more carefully monitored if presenting to emergency settings. However, the number of studies included were small, particularly for bisexuals, thus further research is needed.

Another gap in the literature is suicidal behaviour for those who have been abused. Of the five studies that reviewed maltreatment (physical, emotional and sexual) in childhood, all found that abuse leads to an increased risk of either suicidal ideation, behaviours, attempts, or all (Devries et al., 2014; Fry et al., 2012; Maniglio, 2011; Norman et al., 2012; Weich et al., 2009). There were limitations in controlling for confounding variables such as type of abuse or other mental conditions. In particular, Fry et al. (2012) used data from children only in East Asia and Pacific regions, which may limit UK generalisability. The current review also found that IPV significantly increases suicide attempts risk in women (Devries et al., 2013); but not in men. However, only three studies in were included and did not take into account emotional abuse, nor specified heterosexual or homosexual relationships, therefore further research is needed.

Emerging Risk Factors

An emerging risk factor the current review identified is internet use and its associations. Diane et al. (2013) found internet addiction in young people was related to increased suicidal ideation. Also, young people appear to learn about suicide and suicidal behaviour online. Cyberbullying also increases the risk of suicide attempts for both victims and perpetrators, and is more strongly related suicidal ideation than traditional bullying (Diane et al., 2013; van Geel et al., 2014). Although some research finds cyberbullying to be less frequent than other forms of bullying e.g., verbal and physical (Alavi et al., 2015; Sinyor, Schaffer & Cheung, 2014), the current review's findings have demonstrated that there is a relationship between cyberbullying and suicidal behaviours, and that risk factors such as bullying are commonly being overlooked in emergency room suicide risk assessments (Alavi et al., 2015). However, this area of research is in relative infancy as worldwide internet users has risen by a quarter between 2005 and 2014 (International Telecommunication Union, 2015). Therefore, further research should investigate the impact of internet use to establish whether this should be a factor which should be considered during risk assessment in emergency healthcare settings.

Practical Relevance

The current review updates the suicide risk factor literature post-2007, identifying risk factors which may be useful for clinicians to consider the increased risk in these individuals when presenting to emergency settings. In accordance with the both the inclusion and exclusion criteria of the current review, all of the reviews identified and included present risk factors that could easily be detectable in emergency settings. The review has identified known risk factors that could easily be assessed in UK emergency healthcare settings, such as self-harm.

It has also identified less well documented but important risk factors. To date, there has been a dearth of findings relating to LGBT individuals and suicide risk. The current review updates the literature of risk in LGB individuals which may be useful for clinicians to consider the increased risk in these individuals when presenting to emergency settings. Emerging risk factors have also been identified, e.g., internet usage and its associations such as cyberbullying.

As risk factors such as bullying are commonly being overlooked in emergency room suicide risk assessments (Alavi et al., 2015), clinicians may wish to consider cyberbullying as an emerging risk factor that could be assessed in emergency settings, as findings suggest victims are at increased risk of suicide (Diane et al., 2013; van Geel et al., 2014). Finally, although the current review may contain findings that did not directly assess individuals at risk in emergency settings, the results of the review are such that findings can be applied to these settings, as review papers exploring risk factors that could not be feasibly assessed in emergency settings (e.g., gene abnormalities) were excluded.

Future Research

Despite the current review, there are still gaps which include: children, especially looked after children; HIV/AIDS; homelessness; isolation; the media; older people; urban deprivation;

people with learning disabilities. Some of these topics were included in the screening stage, however, were not of high-quality. This shows that research should employ more rigorous methodologies and/or reporting of results to add meaningful information. The current review found high-quality risk factor research for LGB, but none for transgender individuals, and parental and offspring suicide, but not other family members. As an emerging risk factor, further research should be conducted assessing internet use and suicide. By updating the risk factor literature to align with cultural and societal changes, further development of risk assessment tools and protocols can be implemented to aid healthcare staff in identification of those at risk.

Strengths & Limitations

A strength of the review is that it provides a high-quality update of suicide risk factors that could be easily identified and assessed by healthcare clinicians in emergency settings and this may help identify individuals most at risk in the future. Furthermore, the review also highlights further areas of research that is needed for example, suicide risk in transgender individuals. A limitation of the review is that a meta-analysis was not undertaken as studies included were diverse, with high heterogeneity. Future research, with more available high-quality studies for certain risk factors could perform subgroup analyses, in order to provide statistically combined evidence. Also, primary studies were not included, to align with the earlier work (McLean et al., 2008), which could lead to a loss of relevant risk factor research in emerging areas, and a risk of publication bias.

The findings provide indications for important risk factors for use in assessing risk in emergency healthcare settings. However, the current review's findings do not suggest that risk assessment should be formulaic or simply a 'checklist' of risk factors to be tallied or counted to predict high/moderate/low risk. Indeed, the indication of high vs low risk to predict behaviour is not always effective or meaningful. The authors suggest that the current findings may be useful,

first in informing clinicians about what risk factors they should consider, but that these should be considered for the individual presenting, and second, to inform future research aiming to develop risk assessment tools or guidance for use in emergency healthcare settings.

Risk of Bias

We employed systematic and transparent methods based on previously published, high quality narrative reviews in the area (e.g., McLean et al., 2008) to synthesise the risk factors shown to be important in people presenting with suicide at emergency healthcare settings. However, as with all studies, there are limitations to the current methods employed which may introduce bias into the findings. First, the databases searched: these were selected on the basis of their high quality and likelihood of indexing relevant papers. While additional databases could have been searched, the decision to stop was made when the balance of diminishing returns (duplications) outweighed the number of new, relevant papers being found.

Only English language systematic reviews and meta-analyses were included; conference proceedings, primary studies, and grey literature were not searched. This introduces a risk of bias in our resultant sample. However, the desire was to only include high quality, peer reviewed reviews within the current study. Including grey literature which was not peer reviewed or conference proceedings would therefore have violated this inclusion criteria. Including only reviews was pragmatic and allowed the synthesis of numerous other syntheses, thereby reducing the risk of replication of research. This also means that the majority of relevant primary papers should be included in the current review, due to their inclusion in the previous reviews. However, this is not guaranteed and there is some possibility that some relevant primary papers were not included due to the inclusion criteria specifying only reviews be included.

While it is possible that the above issues may have introduced a potential for publication bias in the current review's findings, it is a necessity in reviews managing high volumes of data

and search returns to develop and maintain strict inclusion criteria, to allow reasonable and manageable data synthesis to be possible. As such, we chose to adhere to only including review papers that had been subject to peer review as a minimum quality standard.

Conclusions

Overall, the review provides a high-quality update of existing suicide risk factor literature that could be implemented in UK emergency healthcare practice in the future, to aid in the identification and assessment of suicide risk.

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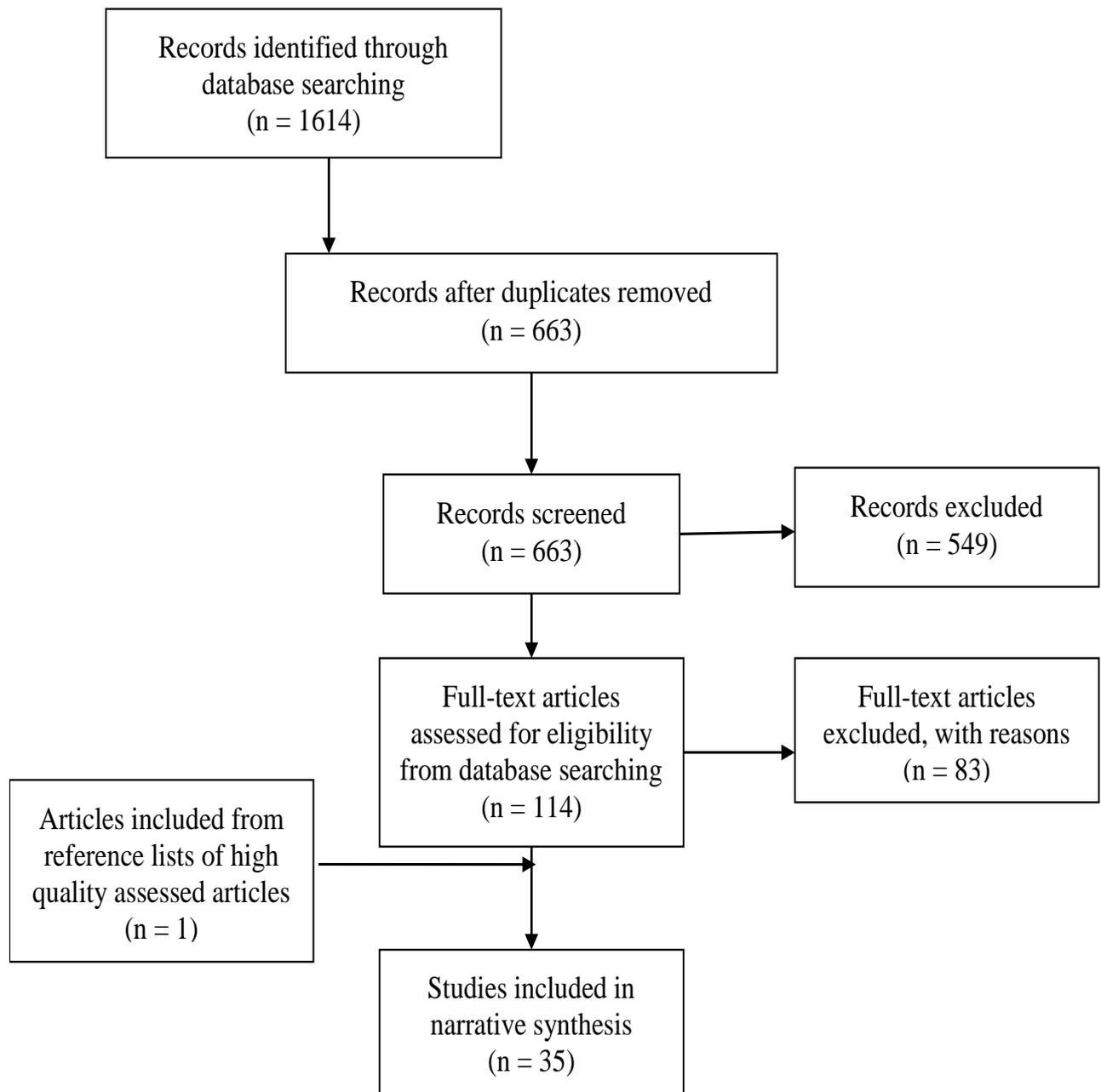


Figure 1. Flowchart of Included Studies