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Mapping the evidence of prevention and intervention studies for suicidal and self-harming behaviors in young people

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Abstract:	<p>Background: Suicide and self-harm (SSH) in young people aged 12-25 is a major cause of disability-adjusted life years. Effective interventions are of critical importance to reduce the mortality and morbidity associated with SSH.</p> <p>Aims: To canvass the extent and nature of research on interventions to prevent and treat SSH in young people using evidence mapping.</p> <p>Methods: A systematic search for SSH intervention studies was conducted (participant mean age: 6-25 years). Studies were restricted to high-quality evidence in the form of systematic reviews, meta-analyses and controlled trials.</p> <p>Results: Thirty-seven controlled studies and eight systematic reviews met the study inclusion criteria. The majority involved psychological interventions (n=31). There were 11 prevention studies, predominantly involving school-based interventions. Few studies involved young people with SSH who also had a mental disorder.</p> <p>Limitations: The map only includes RCTs, CCTs, systematic reviews and meta-analyses.</p> <p>Conclusions: There is an insufficient evidence base regarding interventions for SSH in young people, which hampers best-practice in this area. Opportunities exist to evaluate the effectiveness of both biological and psychological interventions for SSH in young</p>

	people with identifiable psychopathology, as well as internet-delivered cognitive behavioral therapy and research that 'classifies participants on the basis of their suicidal intent.
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Abstract

Background: Suicide and self-harm (SSH) in young people aged 12-25 is a major cause of disability-adjusted life years. Effective interventions are of critical importance to reduce the mortality and morbidity associated with SSH.

Aims: To canvass the extent and nature of research on interventions to prevent and treat SSH in young people using evidence mapping.

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Key words: self-injurious behavior; suicide; evidence-based practice; adolescent; intervention studies

Mapping the evidence of prevention and intervention studies for suicidal and self-harming behaviors in young people

Suicide and self harm (SSH) behaviors are recognized as a significant public health problem and the burden of self-inflicted injuries has been ranked by the World Health Organization as one of the leading causes of disability-adjusted life years (Murray & Lopez, 1996). Adolescence is a period of heightened suicide risk. A systematic review on the international prevalence of 'suicidal phenomena' found that 9.7% of adolescents had made a suicide attempt and 29.9% had thought about suicide at some stage in their life (Evans, Hawton, Rodham & Deeks, 2005). In Australia, the rate of adolescents hospitalized for deliberate self-harm has increased by 27% since 1999 and is a leading cause of death in this age group (Australian Institute of Health and Welfare, 2008). A large proportion of suicidal individuals have a mental disorder, with rates of disorder around 90% in young people who die by suicide (Marttunen, Aro & Lonnqvist, 1993; Fleischmann et al., 2005). Since many suicidal young people have been in contact with primary health care and mental health services in the year leading up to death, early detection and intervention efforts have significant potential to reduce suicide rates (Luoma, Martin & Pearson, 2002; Pfaff, Acres & Wilson, 1999).

Despite the prevalence and burden of suicidal phenomena in young people, the health system response is far from optimal.. A gulf exists between research evidence and practice, and interventions with limited evidence are often regarded as 'best practice' in clinical management (Burns, Dudley, Hazel & Patton, 2005). These include the use of 'no-suicide contracts', which are verbal or written agreements by the individual to not engage in self-harming behaviors, and emergency 'green cards', which provide guaranteed access to 24-hour clinical readmission on demand. The establishment of telephone crisis hotlines has also become widespread in developed

1 communities and there has been significant continued investment in this response,
2 despite equivocal evidence regarding any beneficial effects on rates of suicide (Burns &
3 Patton, 2000). Given the seriousness of SSH, there is a pressing need to encourage the
4 uptake of evidence-based practice (EBP), which is defined as the integration of clinical
5 expertise with “conscientious, explicit, and judicious use of current best evidence”
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7 (Sackett, Rosenberg, Gray, Haynes & Richardson, 1996, p.71) to determine the best
8 choice of treatment for individual patients.
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17 Significant barriers to the uptake of EBP are the time and resources required to
18 navigate the sheer volume of information available in a broad research area (Cabana, et
19 al., 1999). One approach to minimizing these barriers and facilitating EBP is to conduct
20 a review of the literature to collate methodologically sound research relevant to the area
21 of interest and filter out irrelevant research. ‘Evidence mapping’ is a systematic and
22 replicable process that summarizes the "extent, distribution and methodological quality"
23 (Katz et al., 2003, p.22) of the research in a particular field. The concept of evidence
24 mapping is derived from established methods of collating evidence such as those
25 performed in Cochrane systematic reviews. The key difference is that evidence mapping
26 does not restrict literature searches to answering a specific clinical question (e.g., “What
27 is the effectiveness of treatment X for condition Y?”), but instead attempts to
28 characterize the treatment findings relevant to a *broad topic* (e.g., “What are all
29 treatments for condition Y?”). The primary goal of evidence mapping is to collate and
30 summarize studies rather than provide synthesis or aggregate data (Arksey & O'Malley,
31 2005). The resulting evidence map enables identification and assimilation of the
32 available treatment literature within a field, providing a comprehensive indication of
33 what is known and exposing areas where evidence is lacking (Hetrick, Parker, Callahan
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& Purcell, 2010). This approach is not only relevant to clinical researchers, but increasingly to funding bodies that are primarily focused on innovative research.

This study sought to ascertain and present the volume and distribution of high-quality research literature on interventions to prevent and treat SSH behaviors in young people. Systematically identifying empirically supported interventions is critical to facilitating the uptake of EBP in this field. Gaps in the literature will also be identified, which will inform researchers and policy makers of areas that are a priority for research.

Methods

The evidence map of interventions for SSH behaviors in young people was conducted as part of a larger evidence mapping project within *headspace*, the National Youth Mental Health Foundation in Australia. Established by the Federal Government in 2006, *headspace* provides accessible, specialised, multidisciplinary care to young people with mental health and substance use disorders, with an emphasis on early detection and intervention (McGorry et al., 2007). Within the *headspace* framework, the Centre of Excellence in Youth Mental Health is responsible for synthesizing, appraising, generating and disseminating evidence regarding interventions for adult-type mental disorders in the youth population.

The process for constructing evidence maps has been described in detail elsewhere (Hetrick, et al., 2010). The four main steps specific to the construction of the SSH map were: (1) consultation with experts to define the research question relevant to the field of enquiry; (2) a search of the literature in this field (driven by the research question and including definitions of key variables, specification of key characteristics of studies to be mapped and ultimately, pre specified in- and exclusion criteria); (3) selection and collection of the appropriate studies relevant to the defined research

question; and (4) presentation of the literature in such a way to facilitate a clear understanding of what evidence exists, and what does not, within the mapped area. Each of these steps is outlined with details specific of the SSH evidence map below.

Defining the Research Question

Experts in youth mental health working within *headspace* (including clinical psychologists and youth workers), along with youth mental health clinicians and researchers external to *headspace* (including psychiatrists and clinical psychologists) were consulted to inform the relevant clinical questions, the scope and possible structure and presentation of the SSH map. This process revealed two areas of focus for the map, namely:

- I. What good quality evidence exists regarding the prevention of and interventions for SSH behaviors among young people?
- II. What areas are, and are not, well researched?

Defining key variables

As SSH behaviors are not a diagnosable mental disorder and do not have a definition in the Diagnostic and Statistical Manual of Mental Disorders or International Classification of Diseases, there is considerable variation in the terms used to discuss SSH. Consistent with other definitions in the field (e.g. Fortune & Hawton, 2007), we defined SSH as encompassing any form of deliberate self-injurious behavior, regardless of the outcome or intent to die. In the evidence map, however, we sought to categorize SSH behaviors into ‘suicidal’, ‘non-suicidal’, or a combination of both, as the literature suggests that non-suicidal self harm behaviors are distinguishable from suicidal behaviors in many aspects of psychopathology (Brausch & Gutierrez, 2010; Muehlenkamp & Gutierrez, 2004; 2007). As suicidal or non-suicidal intentions are

difficult to determine in the case of self-poisoning behaviors, as a rule, studies treating self-poisoning behaviors were coded as a combination of both.

Other key characteristics of the studies to be defined for inclusion in the map, based on the key questions above, were the type of study, population ('young people'), types of intervention and stage of illness (Hetrick, Parker, Callahan & Purcell, 2010), in this case, of SSH behavior manifestation.

In order to define 'good quality evidence', the map utilized evidence only from randomized controlled trials (RCTs), pseudo-RCTs, clinical controlled trials (CCTs), systematic reviews and meta-analyses of RCTs, as these are regarded as the most robust study designs for examining the effectiveness of interventions (Boutron et al., 2008). This included published and unpublished work (the latter, for example, including trials published in conference proceedings). Studies published in English after 1980 were included, predominantly as a result of resource constraints, particularly in terms of obtaining translations for non-English articles, and because recognition of youth mental health as a discrete area of interest emerged only in the last three decades (Rutter, Graham, Chadwick & Yule, 1976).

The definition of 'young people' was in accordance with the Australian Bureau of Statistics, which defines young people as those aged 12–25 years. However research involving participants younger than 12 years and over 6 years of age was also included given the focus on *prevention* and early intervention. Inclusion of a study in the map required the mean age of participants to fall between 6–25 years (inclusive). In defining the population, we also included intervention studies for populations with mental health disorders if there were SSH-related outcomes. Research has consistently demonstrated a high incidence of SSH in those with diagnosed mental disorders, with depression in particular an important antecedent of suicide in young people (AIHW, 2008; Burns &

Patton, 2000; Fortune & Hawton, 2007). The outcome measures used to assess the efficacy of interventions included both formal (e.g., suicide scales) and informal (e.g., self-reported) measurements of mortality, suicide attempts, suicidal behavior, suicidal ideation, deliberate self-harm, and suicide risk.

With regard to interventions, interventions targeting clinicians or other personnel in positions to help people with SSH behaviors (e.g., ‘gatekeeper training’ interventions to develop their knowledge, attitudes and skills in identifying those at risk) were included if SSH-related outcomes were reported. Reviews or studies on treatment-emergent suicidal events (e.g., SSH as a side-effect of antidepressant medication) were excluded, except for studies on interventions for SSH in this population with SSH-related outcomes. We also excluded studies in which the recruitment of participants was not on the basis of SSH behaviors, such as those with physiological or medical conditions (e.g., SSH in the context of a terminal physical illness).

In terms of stage of illness, in this map, ‘prevention studies’ refer to the prevention of any SSH behaviors in populations that have not yet engaged in SSH behaviors. Universal prevention refers to interventions given to the general population, and targeted prevention refers to interventions given to populations that have been identified to be at-risk of SSH (e.g., high school students at risk of dropping out). ‘Intervention studies’ refer to those aiming at preventing future SSH behaviors in populations that have previously demonstrated SSH behaviors.

Searching the literature

A broad literature search of relevant databases was conducted using MEDLINE, PsycINFO, EMBASE and The Cochrane Central Register of Controlled Trials (CENTRAL) for studies published between 1980 to January 2011. The search strategies were devised using relevant subject headings for each database (e.g., ‘self-injurious

behavior', 'suicidal behavior') with additional free text words (e.g., 'self inflicted', 'self-poisoning') also included (a full search strategy is available upon request to the corresponding author). All reference lists of included systematic reviews and meta-analyses were hand-searched to identify potential studies relevant to the map.

Screening and positioning the relevant evidence within the map (charting)

Comprehensive inclusion and exclusion criteria, based on the above key variables and characteristics, were developed to ensure the process of selecting literature for the map was consistent within the team of researchers. The set criteria were piloted on a random subset of 100 retrieved articles and consensus meetings were held with the two author/raters (LSDS & PC) to clarify any inconsistent decisions and revise search strategies or inclusion criteria where necessary. The process was repeated until the inclusion criteria were finalized and an acceptable inter-rater reliability of 0.9 (measured using intra-class correlation coefficient) was reached.

Initial screening was based on the information contained in the title and abstract. The screening at this stage was overly-inclusive in order to ensure that the entire body of literature was mapped and no relevant studies were excluded. Second-stage screening involved retrieving and referring to the full-text article to determine final inclusion.

Included studies were then coded firstly according to the *type of intervention* (psychological, biological, complementary/alternative, or service/delivery improvement), followed by the *stage of intervention* (prevention of SSH, intervention for SSH, or intervention for SSH in diagnosed mental disorders). These three categories were subsequently divided further into prevention studies as universal or targeted prevention, intervention studies according to the recruitment of participants (suicidal, non-suicidal, or both) and intervention studies for mental disorders by the type of

diagnosis. Trials were finally classified according to the specific type of intervention researched (i.e. a specific psychological therapy or class of medication).

Results

A flowchart of the number of references screened and included, based on the criteria above, is presented in Figure 1. Of 7498 references initially retrieved from the search, 58 met the inclusion criteria for the evidence map. Of these 58 publications, 37 controlled trials were included in the final SSH map (see Figure 2), as we did not include multiple publications from a single trial or multiple coding of a trial across intervention categories. Of these 37 RCT/CCTs, 31 examined psychological interventions, most commonly problem solving therapy (PST) in individual or group form, and psycho-education. Two trials examined a biological intervention (fluoxetine, and a medication algorithm), three trials examined complimentary/alternative interventions (aftercare contact in alcohol use disorder patients, emergency 'green card' and a therapeutic writing paradigm), and three examined service/delivery improvement interventions (rapid response outpatient treatment, specialized emergency room intervention, specialized hospital service).

Studies examining the prevention of SSH behaviors in young people consist of ten psychological interventions (universal prevention=6, targeted prevention=4) and one complementary/alternative intervention (targeted prevention=1). All psychological prevention studies were school-based. Four were classified as psychological education interventions, while the remaining six were prevention programs that varied considerably in their content and delivery and could not be defined according to a single intervention type. These were broadly classified as 'psychological-other' interventions. Two of the psycho-education interventions involved gatekeeper training and one of

these included training in the use of suicide contracts (“no harm agreements”) but did not evaluate the actual effectiveness of the contracts.

As previously indicted, the evidence map sought to categorize SSH behaviors into ‘suicidal’, ‘non-suicidal’, or a combination of both intentions. However, none of the included controlled studies made a precise distinction based on the intention of SSH for the purpose of patient recruitment. Therefore, this dimension is not reflected in Figure 2.

Across the types of interventions, six studies involved young people with a diagnosed mental disorder. Three of these studies considered SSH behaviors in those with a major depressive disorder, two examined interventions in young people with borderline personality disorder and one for psychosis.

The evidence map included eight published systematic reviews on interventions for SSH behaviors in young people, although only one meta-analysis has been published to date (Robinson, Hetrick & Marin, 2011). The common findings from the eight systematic reviews suggest that there is inadequate evidence to recommend any specific interventions or prevention strategies over another in the youth population. This is due not only to the paucity of primary research, but the field is also hindered to some extent by the heterogeneity of the existing research and the use of ambiguous or inconsistent terminology. Furthermore, the considerable variance in methodological quality of studies conducted to date prohibits researchers from making any recommendations. Despite these limitations, findings from the most recent meta-analysis suggest that CBT shows some promise as a treatment for SSH (Robinson, Hetrick & Marin, 2011).

Discussion

The current evidence base of interventions and models of care for SSH behaviors in young people is inadequate and high quality systematic research is scarce,

as is the case generally in the field of youth mental health (Patel, Flisher, Hetrick & McGorry, 2007). More high quality studies are needed in multiple research areas in this field, which can be guided by this evidence map that provides direction on research opportunities of high priority.

Key areas in need of research

Interventions treating SSH in young people with mental disorders. The rates of SSH in youths with a diagnosed mental disorder or subthreshold symptoms of disorders can be as high as 90%, with mood and substance use disorders being the most prevalent conditions in this population (Marttunen, Aro & Lonnqvist, 1993 ; Bridge, Goldstein & Brent, 2006; Haw et al., 2001). However, there are only six intervention studies treating SSH in young people with a mental disorder; two comparing a psychological treatment with a biological treatment and four studies investigating specific psychological treatment regimes. This may in part reflect the general lack of evidence for early intervention in young people with emerging or established mental disorders. However, we have found substantial bodies of clinical research for early intervention in depression (Callahan, Hetrick, Liu & Purcell, in submission) and psychosis (Liu et al., 2010), which suggests that the lack of early intervention studies for SSH in youth with mental disorders may be due to the exclusion of this group of young people in treatment studies, and/or the failure to measure SSH as an outcome in research (Bridge, Goldstein & Brent, 2006). It is acknowledged that there are methodological and ethical issues related to conducting clinical research in the SSH population that could explain the paucity of systematic research in this area (Fisher, Pearson, Kim & Reynolds, 2002). However, given the growth of the field of early intervention and an increasing number of youth-specific treatment services settings, e.g. in Australia, headspace offering clinical services in 30 settings across Australia, the

possibility and feasibility of conducting such trials is growing. Further, in the adult literature of SSH intervention, it has been found that even clients with severe SSH risk can benefit from such interventions in a clinical trial setting (Linehan, 1997). The provision of SSH interventions in this target population may prove to be a cost-effective way to prevent SSH in young people. We argue that there is a significant knowledge gap in our understanding the effects of commonly-practiced biological and psychological treatments for SSH in young people with emerging mental health problems and that it is logistically and methodologically possible to conduct such trials in the near future.

In terms of biological treatments, inclusion of SSH outcomes as standard practice, using the most common measurement tools, in clinical trials of psychotropic interventions for those with mental health disorders would provide valuable information, for example, as reported in the Treatment for Adolescents with Depression study (TADS) (March et al., 2004). Similarly, in terms of psychological treatments, it would be valuable if more treatment strategies are developed to specifically address SSH in youth with a particular mental disorder such as the cognitive behavioral therapy trial in early psychosis (Power et al., 2003) and the dialectical behavioral therapy trial in borderline personality disorder (Turner, 2000). Of note is the paucity of studies of the treatment and prevention of SSH in young people with substance use disorders, given these disorders are particularly prevalent in youth with SSH and more clinical research is needed in this particular population (Fleischmann et al., 2005).

Treatment for SSH without a specified psychopathology status. In terms of psychological treatment for SSH, as reflected in Figure 2, various treatment strategies were investigated in 10 studies of participants whose psychopathology status was not specified. Problem solving therapy either delivered on an individual or group basis has

received the most attention. However, results from the most recent systematic review (Robinson, Hetrick & Marin, 2011) suggest that, in the absence of strong evidence, CBT is probably the most effective intervention currently. The high cost associated with delivering CBT on an individual basis potentially prohibits the scalability of this intervention. However, new research using innovative information technology is being undertaken to examine internet-based CBT as an intervention for depression, anxiety and/or suicide-related behaviors in young people (e.g. Robinson, et al.2010; Whittaker et al., 2009). A recent review suggests that, although there is insufficient evidence to determine whether or not internet-based interventions are effective for treating or preventing mental health problems in young people, this research holds promise for the treatment of high prevalence disorders and that high priority should be given to testing the effects of these interventions in young people at risk of SSH (Titov, 2007).

Finally, there is emerging evidence suggesting that non-suicidal self-injury should be distinguished from acts of self-harm with intent to die (Brausch & Gutierrez, 2010; Muehlenkamp & Gutierrez, 2004; 2007). In their definition of non-suicidal self-injury, the International Network for the Study of Self-Injury (2007) agreed that SSH behaviors should be categorized on the basis of suicidal intent. Despite this, insufficient effort has been made in trials to date to measure suicide intent. There is an obvious need for research that classifies participants on the basis of their suicidal intent, which are treated as unique populations with different underlying psychopathology addressed with tailored treatments.

Limitations

Due to resource constraints, the search supporting this evidence map was not exhaustive, focusing only on RCTs, CCTs, systematic reviews and meta-analyses, and was limited to those published post-1980 in English. Potentially promising research at a

cohort or case-control level may have been overlooked, as well as quality program evaluations of SSH interventions. It is acknowledged that many potentially promising interventions are not amenable to evaluation by RCT designs (for example, universal preventions such as building barriers on bridges to prevent jumping deaths, or complex interventions with multiple components), which constitutes a limitation of the current evidence map.

Nonetheless, this paper has identified gaps in high-quality evidence, which is likely to be informative not only for the clinical research community, but also for funding bodies. To meet the key purpose of improving access to the relevant evidence and communicating this in a meaningful way, the navigable map is available online (<http://www.headspace.org.au/what-works>). Evidence mapping is an iterative process, so that as knowledge of the breadth of literature increases, it is likely that there will be redefinition or refinement of the searching and selection of relevant studies. With the dynamic nature of the generation of new evidence, this map will be updated annually.

Conclusion

While there are numerous prevention and treatment programs designed to respond to SSH in young people, the body of evidence has not firmly established the most effective interventions. Opportunities exist to evaluate both biological and psychological interventions for SSH in young people with identifiable psychopathology, internet-delivered cognitive behavioral therapy and research that classifies participants on the basis of their suicidal intent.

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Figure 1. The number of trials included and excluded during the screening process.

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AUD – Alcohol Use Disorder	MDD Major Depressive Disorder
BIC – Brief Intervention and Contact	MST – Multisystemic Therapy
BPD – Borderline Personality Disorder	Other – Other psychological therapies
CAT – Cognitive analytical therapy	PE – Psycho-education
CBT – Cognitive Behavioural Therapy	PST – Problem Solving Therapy
DBT – Dialectical Behavioural Therapy	SSH – Suicide and Self-Harm
FT – Family Therapy	SSRI – Selective Serotonin Reuptake Inhibitor
GT – Group Therapy	

Figure 2. The distribution of included trials into categories during second-stage screening. Numbers presented refer to the number of trials rather than the number of references (given that multiple papers can be published from a single trial). Overlap is present in the coding and a single trial might belong to multiple categories.

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