

# Suicide in young people: screening, risk assessment, and intervention

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Series explanation: State of the Art Reviews are commissioned on the basis of their relevance to academics and specialists in the US and internationally. For this reason they are written predominantly by US authors

## Abstract

Suicide is the fourth leading cause of death among young people worldwide and the third leading cause of death among those in the US. This review outlines the epidemiology of suicide and suicidal behavior in young people. It discusses intersectionality as an emerging framework to guide research on prevention of suicide in young people and highlights several clinical and community settings that are prime targets for implementation of effective treatment programs and interventions aimed at rapidly reducing the suicide rate in young people. It provides an overview of current approaches to screening and assessment of suicide risk in young people and the commonly used screening tools and assessment measures. It discusses universal, selective, and indicated evidence based suicide focused interventions and highlights components of psychosocial interventions with the strongest evidence for reducing risk. Finally, the review discusses suicide prevention strategies in community settings and considers future research directions and questions challenging the field.

## Introduction

Suicide in young people is a global public health problem, and improved identification, prevention, and treatment strategies are imperative. This review focuses on the epidemiology and prevention of suicide among young people, including strategies in clinical settings and schools. We begin with recent epidemiologic findings, review key risk factors, and discuss the intersectionality of these risk factors. We detail approaches to screening and assessment, followed by what is known about risk formulation and stratification. We review universal, selective, and indicated intervention strategies and consider how these strategies can be adapted culturally, for families, and within teletherapy settings. We review best practices across healthcare and community settings and make recommendations for future research.

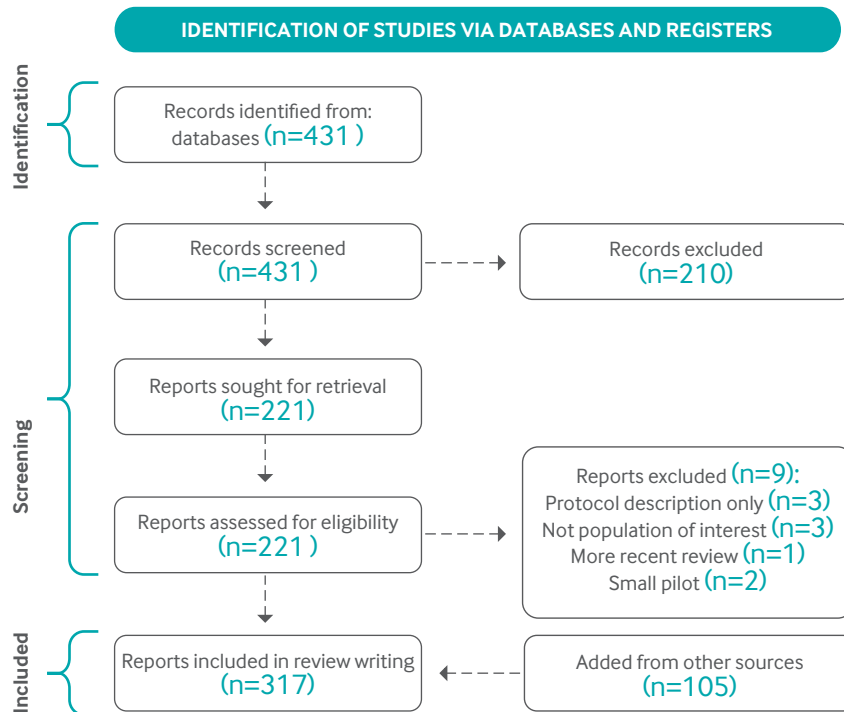
## Sources and selection criteria

This review is based on a comprehensive examination of studies published in English and cited in PubMed and PsycInfo between 1 January 2000 and 15 March 2022, as well as selected seminal papers extracted from reference lists of identified articles. We prioritized systematic reviews and meta-analyses over individual studies, randomized controlled trials (RCTs) over non-randomized controlled and quasi-experimental designs, large studies over studies with smaller sample sizes, and studies published

recently over older studies. Search terms included (“youth OR child OR adolescent OR pediatric”) AND “suicid\*” AND (“review” OR “meta-analysis”), (“youth OR child OR adolescent OR pediatric”) AND “self-harm” AND (“review” OR “meta-analysis”), (“youth OR child OR adolescent OR pediatric”) AND “self-injury” AND (“review” OR “meta-analysis”). Two authors (JLH, JAB) and two research associates did the searches. The same two authors reviewed and summarized each collected article and then determined the most relevant to include in this review, on the basis of topical relevance and clinical relevance. Articles that were within the scope of the outlined manuscript were deemed to have topical relevance; articles that reflected best practices based on existing guidelines were deemed to be clinically relevant. Another author (JPA) reviewed articles for which a disagreement about inclusion existed (n=32); an article was included if two authors deemed it relevant to the review (n=14). Although this review is focused on suicide in young people in the US, we included a discussion of international guidelines on suicide in young people published during this time period. See figure 1 for specific details.

## Terminology

Box 1 describes common suicide and self-harm terminology, as the lack of consistency with terminology and definitions can make comparing data and findings difficult.

Fig 1 | Flow diagram of included articles<sup>1</sup>

### Epidemiology

Suicide in young people is a global public health threat. Worldwide, suicide is the fourth leading cause of death among 15-19 year olds.<sup>2</sup> In the US, suicide was the third leading cause of death among 15-19 year olds (2216 deaths) in 2020 and the second leading cause of death among 10-14 year olds (581 deaths).<sup>3</sup> A recent meta-analysis using the World Health Organization's mortality database from 45 mostly high income and middle income countries identified the lowest suicide rate among people aged 10-19 years in Israel (1.31/100 000) and the highest in Estonia (9.72/100 000).<sup>4</sup> By comparison, the US had the seventh highest rate of suicide in young people (5.91/100 000) and the UK the seventh lowest (2.35/100 000).<sup>4</sup>

### Suicide methods

Hanging/suffocation is the most common method of suicide among young people worldwide, followed by jumping from a height or jumping/lying in front of a moving object.<sup>4</sup> By contrast to most other countries, firearms are the most common suicide method among young people in the US, accounting for 43.6% of all deaths by suicide among 10-19 year olds between 2016 and 2020, followed by hanging/suffocation (42.7%) and self-poisoning (6.8%).<sup>3</sup> Recent statistics document more guns than people in the US (393 million guns versus 326 million people: ratio=126 guns per 100 people), with US firearm ownership rates more than sixfold higher than the average of similar wealthy nations.<sup>5</sup> Living in a home with firearms is associated with a threefold to fourfold increased risk of suicide among young people.<sup>6</sup>

#### Box 1: Suicide and self-harm terminology

##### Suicide, death by suicide, or suicide death

Death caused by injurious behavior to the self with an intent to die

##### Suicide attempt, suicidal behavior

Non-fatal, potentially injurious behavior to the self with an intent to die; might not result in injury

##### Suicidal ideation, suicidal thoughts

Thinking about, considering, or planning suicide

##### Self-injury, non-suicidal self-injury

Purposeful acts of physical harm to the self with the potential to damage body tissue but performed without the intent to die

##### Self-harm

Term used to describe any act of harm inflicted by the self; includes suicide attempt, self-injury, and non-suicidal self-injury

### Age and sex

Suicide is rare before the age of 10 years, with suicide rates thereafter increasing with age throughout adolescence (fig 2).<sup>3</sup> Although rare, suicidal thoughts and suicide attempts have been reported in children as young as 3-7 years,<sup>7</sup> and recent evidence shows that elementary school aged children are presenting more frequently to emergency departments for self-harm.<sup>8</sup>

A gender paradox exists in that suicide rates among young males are roughly three times higher than suicide rates in females, whereas rates of suicidal ideation, suicide plans, and non-fatal suicide attempts are higher in females.<sup>9-13</sup> Recent data show a narrowing in the gap in suicide rates between the sexes,<sup>14 15</sup> particularly among children aged 10-14

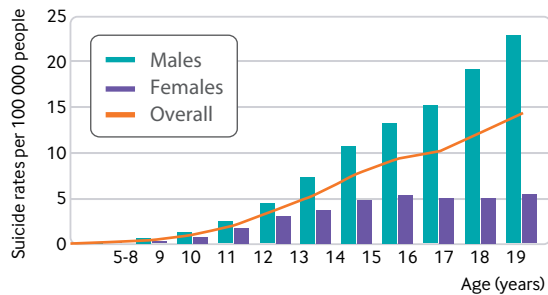


Fig 2 | Suicide rates by age and sex in young people aged 5-19 years between 2016 and 2020 in the US; no deaths from suicide were observed in children aged 5-6 years

years, with suicide rates in girls more than doubling between 2000 and 2019.<sup>15</sup>

### Race/ethnicity

American Indian/Alaska Native young people have the highest rates of suicide in the US,<sup>3</sup> with age adjusted rates for 10-19 year olds (12.9 per 100 000) that are 1.9 times the rate for young white people (6.9 per 100 000) and more than two times higher than in young black (5.6 per 100 000), Asian/Pacific Islander (5.5 per 100 000), and Hispanic/Latinx people (5.3 per 100 000).<sup>3</sup>

Several recent studies have investigated racial disparities in suicide in young people.<sup>16-21</sup> An analysis of suicide trends from 1993 to 2012 found that rates remained constant overall in children aged 5-11 years, yet increased significantly in black children, while decreasing in white children; small sample sizes did not allow conclusions for American Indian/Alaska Native and Asian/Pacific Islander children.<sup>17</sup> A subsequent study found suicide rates in children <13 years to be twice as high for black children as for white children during 2001-15, a finding observed in boys and girls<sup>16</sup>; this age related racial disparity has persisted through 2016-20 for pre-adolescents, although suicide rates remain higher in white than black young people after age 12 years (fig 3). A study of suicidal ideation and behaviors among US high school students from 1991 to 2017 found a decline

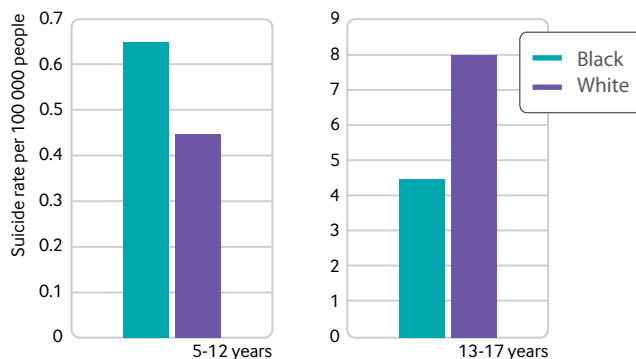


Fig 3 | Comparison of suicide rates between young black and white people in the US between 2016 and 2020, by age (5-12 v 13-17 years). Among children aged 5-12 years, the black to white incidence rate ratio (IRR) was 1.46 (95% confidence interval 1.23 to 1.73). Among young people aged 13-17 years, the black to white IRR was 0.56 (0.52 to 0.60)

in rates of suicidal thinking across all racial/ethnic groups along with a significant increase in suicide attempts by young black people, no change for young white people, and a significant decrease for Asian American, American Indian/Alaska Native, Hispanic/Latinx, and multiracial young people.<sup>19</sup>

### Sexual minority status

Young people who identify as sexual minorities—defined as having same sex attraction, orientation, or behavior—and those who are transgender (that is, do not identify with sex assigned at birth) or gender diverse (that is, identify with a gender or genders outside of male or female) are at elevated risk for suicide attempts and suicide compared with peers.<sup>22-24</sup> According to the 2019 Youth Risk Behavior Survey,<sup>25</sup> lesbian, gay, or bisexual students and students not sure of their sexual orientation were more likely to have attempted suicide during the previous year (23.4% v 16.1% v 6.4%) compared with heterosexual students; similar results were observed among students who had sexual contact with people of the same sex compared with those who had sexual contact only with people of the opposite sex (30.3% v 9.3%) (fig 4).

Some of the potential mechanisms underlying risk in sexual minority, transgender, and/or gender diverse youth include victimization/bullying, familial rejection, and internalized stigma, which may be mitigated by affirming school culture, family support, and inclusive and protective health policies.<sup>26</sup>

### Other risk and protective factors

The identification of risk factors for suicide in young people can enable early detection and tailored interventions for those most likely to engage in suicidal behaviors. A comprehensive discussion of risk factors for suicide in young people is beyond the scope of this review, but several useful reviews are available.<sup>9 11 27-35</sup>

Factors protecting against suicide in young people remain poorly understood. Family cohesion, increased access to care, faith/spiritual factors, cognitive flexibility and emotion regulation skills, and strong interpersonal relationships have been identified as conferring protection against suicidal behavior in young people.<sup>11 36-39</sup> Although negative aspects of the internet/social media have generated concern, potential positive aspects such as connection, reduced isolation, and community may prove to be protective.<sup>40</sup> Social connectedness is emerging as a potential target in assessing clinical risk and in suicide prevention strategies.<sup>41</sup>

### Intersectionality of risk factors

Intersectionality theory posits that social categories such as sex, race/ethnicity, socioeconomic status, gender identity, and sexual orientation intersect to reflect multiple individual attributes and social contexts that influence health and risk behaviors.<sup>42</sup> Distinct in its emphasis on understanding

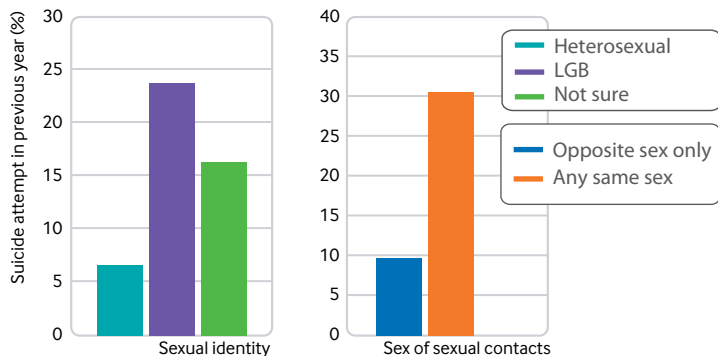


Fig 4 | Comparison of the prevalence of attempted suicide during the previous year by sexual identity and sex of sexual contacts of high school students in the US, 2019, Youth Risk Behavior Survey. LGB=lesbian, gay, or bisexual

intersectional inequalities,<sup>43</sup> it offers a framework for understanding multiple social factors that may contribute to suicide risk in young people. Opara and colleagues have integrated intersectionality and the interpersonal-psychological theory of suicide to provide a conceptual framework to guide research into preventing suicide among black children.<sup>44-45</sup> Two recent studies have used the intersectional framework to investigate how multiple marginalized identities intersect to increase suicide risk in young people.<sup>46-47</sup> A secondary analysis of cross sectional survey data (n=5058) of young people in Michigan found that those with intersecting marginalized identities (for example, female sex and racial and sexual minority) reported higher suicidality scores relative to non-marginalized peers.<sup>46</sup> Family support significantly reduced the association between intersecting marginalized identities and suicidality, framing a potential target for intervention.

#### “Boundaried settings” and high risk periods

The National Action Alliance for Suicide Prevention (“Action Alliance”), the public-private partnership for suicide prevention in the US, endorses targeting interventions at population subgroups at high risk for suicide within “boundaried settings,” essentially populations defined by a service setting or organizational function.<sup>48</sup> Examples of strategic settings identified by the Action Alliance include pediatric primary care, emergency departments, medical/surgical units, and specialized behavioral health inpatient and outpatient care settings.<sup>49</sup> The Action Alliance offers resources to prevent suicide in young people involved in the juvenile justice and child welfare systems,<sup>50</sup> groups at higher risk of suicide than those in the general population.<sup>51-52</sup>

The period immediately following discharge from an inpatient psychiatric hospital or an emergency department visit for suicidal or self-harm behavior poses an extremely high risk of suicide and repeat suicidal/self-harm behavior in young people.<sup>53-54</sup> Up to 50% of all young people who die by suicide are seen in the emergency department or psychiatric inpatient setting in the year before death.<sup>55-56</sup>

#### Public health framework suicide prevention strategies in young people

Figure 5 shows an adapted Institute of Medicine framework of public health,<sup>57</sup> as applied to prevention of suicide in young people. Population level promotion strategies include school based psychological wellbeing and skills training programs, encouragement of help seeking behavior, public awareness campaigns, and reduction of stigma associated with mental health problems.<sup>58</sup> Specific prevention, treatment, and recovery strategies are discussed in greater detail below, both in clinical settings and community settings.

Evidence based interventions for prevention of suicide in young people are organized as follows: universal strategies that target the entire population and aim to prevent suicide, regardless of the young person’s risk status; selective interventions that target specific groups not currently showing signs of suicidal behavior, but who have risk factors that could indicate future risk; and indicated interventions targeting individuals identified to be at heightened risk of suicide.

#### Strategies for prevention of suicide in young people in clinical settings

Universal strategies are directed at all young people. Examples include fostering resilience, promoting mental health and access to quality services, appropriate and safe media messaging, lethal means reduction, systematic suicide surveillance to rapidly identify changes in rates of suicide or non-fatal suicidal behavior, and suicide prevention training for adults who work with young people. In clinical settings, suicide risk screening for detection of young people at high risk can be implemented.

Screening for suicide risk involves use of an evidence based, standardized screening measure to identify young people with suicidal ideation or behavior and can be accomplished at the universal, selective, or indicated level. Clinical screening may occur in the emergency department,<sup>59-61</sup> inpatient and acute care hospital settings,<sup>62-64</sup> specialty behavioral health, primary care,<sup>65</sup> and specialty medical clinics such as sports medicine,<sup>66</sup> adolescent medicine, child abuse clinics,<sup>67</sup> and/or school based clinics or the school nurse’s office. Using a specific suicide risk screening instrument is recommended, as general mental health or depression screens often under-detect young people experiencing suicidal ideation.<sup>68-70</sup> Integrating screening with existing clinical pathways can help to clarify who administers the screen, what methods are used, how often screening takes place, cultural factors, and parent/family involvement.

Importantly, “screening” and “assessment” are two different processes that are often conflated. Screening is a rapid way to identify someone who needs further assessment. An assessment is a more comprehensive evaluation that confirms risk and guides next steps. Both are necessary elements for implementing a suicide prevention strategy.



Fig 5 | Public health model for suicide prevention in young people

Using suicide risk screening tools with strong psychometric properties is important, with an emphasis on maximizing sensitivity (true positives) and specificity (true negatives), but a risk of false positives and false negatives always exists.<sup>71</sup> Both over-detection and under-detection have consequences. Some tools allow for the customization of sensitivity and specificity.<sup>72</sup> Given that early detection of suicidal thoughts is a suicide prevention strategy, our opinion is that sensitivity may be of paramount importance, as some young people may otherwise pass through healthcare systems with undetected suicidal thoughts. To effectively mitigate the burden of false positives, young people identified as being at

risk on screens should be followed up with further assessment.<sup>73</sup> Table 1 shows commonly used screening and assessment measures.

Some measures are not reliant on self-report. A good example is the Implicit Association Test (IAT), which assesses individuals' implicit attitudes and unconscious associations that are less vulnerable to concerns about stigma and sensitivity with reporting suicidal ideation.<sup>82</sup> A version of the IAT has been developed to detect suicide risk,<sup>83</sup> the Death IAT, which measures implicit self-identification with suicide. Self-reported variables in pediatric emergency department settings were able to predict suicide attempts within three months after discharge better than the Death IAT.<sup>84</sup>

Table 1 | Screening and assessment measures

Name of measure	Screening or assessment	Age range	Administration	No of items	Sensitivity* (defined event)	Specificity† (defined event)
Ask Suicide-Screening Questions (ASQ) <sup>60</sup>	Screening	10 to adult	Clinician/self-report	4 (5 if positive)	96.9% (95% CI 91.3% to 99.4%) (elevated suicidal risk)	87.6% (95% CI 84.0% to 90.5%) (elevated suicidal risk)
Computerized Adaptive Screen for Suicidal Youth (CASSY) <sup>72</sup>	Screening	12 to 17	Self-report	5-21; average of 11 items	83% (suicide attempt)	80% (suicide attempt)
Risk of Suicide Questionnaire (RSQ) <sup>74</sup>	Screening	8 to adult	Clinician or self-report	4	98% (suicidality)	37% (suicidality)
Suicidal Behaviors Questionnaire-Revised (SBQ-R) <sup>75</sup>	Screening	13 to 18	Self-report	4	SBQ-R total score (elevated suicidal risk): 87% in adolescent inpatient sample	SBQ-R total score (elevated suicidal risk): 93% in adolescent inpatient sample
Columbia-Suicide Severity Rating Scale (C-SSRS) <sup>76</sup>	Assessment	11 to adult	Clinician/self-report	5-14	Study 1: 100% (aborted attempts); 100% (interrupted and actual attempts). Study 3: 100% (lifetime actual attempts); 94% (lifetime interrupted attempts); 93% (lifetime aborted attempts)	Study 1: 99.4% (aborted attempts); 100% (interrupted and actual attempts). Study 3: 100% (lifetime actual attempts); 99% (lifetime interrupted attempts); 99% (lifetime aborted attempts)
Concise Health Risk Tracking (CHRT <sub>u</sub> ) Scale <sup>77</sup>	Assessment	12 to adult	Self-report	14	Score of 28 (attempts): 85.7%; score of 23 (attempts): 92.8%	Score of 28 (attempts): 56.5%; score of 23 (attempts): 43.4%
Harkavy Asnis Suicide Scale (HASS) <sup>78,79</sup>	Assessment	10 to adult	Self-report	21	HASS Suicide Attempt Scale (attempts): 100%	HASS Suicide Attempt Scale (attempts): 69.8%
Scale for Suicide Ideation-Worst (SSI) <sup>80</sup>	Assessment	13 to adult	Clinician	19	Not reported	Not reported
Suicidal Ideation Questionnaire (SIQ) <sup>81</sup>	Assessment	14 to 17	Self-report	30	Not reported; reliability: r=0.97	Not reported
Suicidal Ideation Questionnaire-Junior (SIQ-JR) <sup>81</sup>	Assessment	12 to 14	Self-report	15	Not reported; reliability: r=0.94	Not reported

CI=confidence interval.

\*Probability that a person with an event will be so identified by the assessment instrument.

†Probability that a person without an event will be so identified by the assessment instrument.

### Universal versus selective screening

Debate continues about the value of universal versus selective screening. Equity may be a consideration in universal screening, as screening all patients who meet criteria set by the system eliminates clinician bias and may reduce barriers to access to healthcare. For example, black, indigenous, or persons of color (BIPOC) young people may be more likely to visit an emergency department owing to many obstacles to receiving care in other clinical settings, including exposures to structural racism and social determinants of health.<sup>85,86</sup> BIPOC young people may also be less connected to mental health treatment and be more likely to present in the emergency department with problems other than mental ill health.<sup>87,88</sup>

In February 2022, Bright Futures/American Academy of Pediatrics recommended screening for suicide risk in young people aged  $\geq 12$  years as part of its preventive care periodicity schedule.<sup>89</sup> Given that most young people who die by suicide visit a healthcare provider months, sometimes weeks, before their death, pediatric healthcare providers can use screening to begin important conversations about suicide risk via brief, evidence based screening tools.<sup>56</sup> Although primary care providers struggle with pressures and heavy patient demands, nearly 20% of all deaths in young people in the US in 2020 were from suicide,<sup>3</sup> warranting attention in the primary care setting. Some states in the US are now mandating that PCPs screen for suicide risk.<sup>90</sup>

To guide screening for and assessment of suicide risk in healthcare settings, the American Academy of

Pediatrics and the American Foundation for Suicide Prevention created the 2022 Blueprint for Youth Suicide Prevention.<sup>91</sup> This resource was developed by a multidisciplinary team of clinicians, researchers, people with lived experience, and other community stakeholders. It serves as a guide for pediatric health clinicians to implement suicide prevention strategies in healthcare settings, as well as in community venues such as schools.<sup>91</sup>

The concern is often raised that asking young people about suicide can “put the ideas into their heads.” Several studies have refuted this iatrogenic risk myth, that asking questions about suicide can cause harm.<sup>92,93</sup> Mathias and colleagues actually found that suicidal ideation declined compared with baseline after repeated assessments using the Suicidal Ideation Questionnaire-Junior in a population at risk; this suggests that screening is safe and may be helpful to teens struggling with suicidal ideation.<sup>92</sup> Moreover, previous studies describing opinions for screening show that most pediatric patients and parents/guardians support screening for suicide risk in healthcare settings.<sup>94,95</sup> To our knowledge, iatrogenic risk of asking about suicide has not been evaluated in pre-teens; caution should be used in generalizing these results to younger age groups.

### Assessment after a positive screen

Once a patient screens positive for suicide risk, a follow-up assessment is a critical best practice, as disposition based on screening alone can fail to respond appropriately to real suicide risk and result in inefficient use of resources.<sup>73,95</sup> Table 1 shows

Table 2 | Psychosocial interventions, randomized controlled trials with clinical samples (adapted from Witt et al, 2021)<sup>108</sup>

Intervention	Dose	Intervention components/ focus	Comparators	Outcomes	Odds ratio, total (95% CI); repeat self-harm at post-intervention <sup>108</sup>
Individual CBT based psychotherapy:	-	-	-	-	0.93 (0.12 to 7.24); favors CBT
Donaldson et al, 2005 <sup>112</sup>	6 individual sessions + 1 family session in first 3 months; then 3 monthly sessions	Skills based therapy (targeting problem solving and affect management)	Alternative psychotherapy (supportive relationship treatment)	No differences between groups on suicidal ideation or suicide attempt outcomes at 3 and 6 months	-
Sinyor et al, 2020 <sup>113</sup>	10 weekly sessions within 15 weeks; 3 booster sessions (6, 9, 12 months)	Brief CBT (BCBT; targeting emotion regulation and cognitive flexibility)	Supportive psychotherapy	BCBT group reported significantly fewer repeat self-harm instances than supportive psychotherapy; no suicide attempts in either group at 15 weeks	-
Dialectical behavior therapy (DBT):	-	-	-	-	0.46 (0.26 to 0.82); favors DBT-adolescent
Cooney et al, 2012 <sup>114</sup>	Weekly individual and multi-family group sessions for 6 months	Full model DBT: individual, multi-family skills group, parent meetings, family sessions, and phone coaching	Treatment as usual (TAU)	DBT group reported fewer suicide attempts than TAU	-
McCauley et al, 2018 <sup>115</sup>	Weekly individual and multi-family group sessions for 6 months	DBT, including individual, multi-family skills group, parent meetings, family sessions, and phone coaching	Individual and group supportive therapy (IGST)	DBT group reported fewer suicide attempts than IGST at 6 months	-
Mehlum et al, 2014 <sup>116</sup>	Weekly individual and multi-family group sessions for 19 weeks	DBT-adolescent (DBT-A), including individual, multi-family skills group, family sessions, and phone calls	Enhanced usual care (EUC)	DBT-A group reported fewer episodes of self-harm than EUC at 9 and 16 weeks; specific suicide attempt data were not reported, although the DBT-A group experienced significant reduction of suicidal ideation based on the SIQ-Junior	-
Santamarina-Pérez et al, 2020 <sup>117</sup>	At least one bi-weekly individual session, weekly group skills training for 16 weeks	DBT-A, including individual, skills group (separate for adolescent and parents), and phone calls	EUC	No suicide attempts in either group during the final 4 weeks of treatment	-
Mentalization based therapy:	-	-	-	-	0.70 (0.06 to 8.46); favors MBT-A
Griffiths et al, 2019 <sup>118</sup>	Weekly group therapy, 12 weeks	Mentalization based therapy for adolescents (MBT-A) group therapy (encourage emotional literacy, introduce mentalization, attachment and emotion regulation, reflect on interpersonal relationship patterns)	TAU	No difference between groups in self-reported self-harm at post-treatment, 12 week, and 24 week follow-up; specific suicide attempt data not reported	-
Rossouw and Fonagy, 2012 <sup>119</sup>	Weekly individual therapy and monthly family therapy over 1 year	MBT-A (psychodynamic psychotherapy with roots in attachment theory)	TAU	MBT-A group reported significantly lower self-harm scores than TAU at 12 months; specific suicide attempt data not reported	-
Group based psychotherapy:	-	-	-	-	1.72 (0.56 to 5.24); favors comparator
Green et al, 2011 <sup>120</sup>	6 acute phase group therapy sessions, plus booster group sessions "as long as needed"	Developmental group psychotherapy (CBT and DBT based group)	TAU	Both groups reported reduction in the frequency of self-harm at 6 months and 1 year; specific suicide attempt data not reported; no significant between group differences in suicidal ideation based on the SIQ	-
Hazell et al, 2009 <sup>121</sup>	6 acute group sessions followed by optional long term group	Group therapy (CBT, social skills training, interpersonal psychotherapy)	TAU	Group therapy group reported significantly more self-harm at 6 months; specific suicide attempt data not reported	-
Wood et al, 2001 <sup>122</sup>	4-6 acute group sessions and variable ongoing group	Developmental group therapy (assessment, acute group therapy, ongoing group sessions, individual sessions as needed)	TAU	Developmental group therapy group less likely to have repeated self-harm at 7 months; rates of repeat cutting and self-poisoning are described, but differences in these events between groups were not tested	-
Enhanced assessment:	-	-	-	-	Not applicable
Ougrin et al, 2011 <sup>97</sup>	Single 90 minute session	Therapeutic assessment (individual history and risk assessment, therapeutic intervention, letter describing findings, some family involvement)	TAU	Therapeutic assessment group more likely to attend first follow-up appointment and four or more treatment sessions than TAU	-

(Continued)

Table 2 | Continued

Intervention	Dose	Intervention components/ focus	Comparators	Outcomes	Odds ratio, total (95% CI); repeat self-harm at post-intervention <sup>108</sup>
Compliance enhancement:	-	-	-	-	Not applicable
Spirito et al, 2002 <sup>123</sup>	Single 60 minute session	Compliance enhancement intervention (review expectations for outpatient treatment, review factors that might impede attendance for treatment, make verbal contract with patient and family to attend at least four outpatient sessions)	TAU	No statistically significant group differences in number of outpatient sessions attended at 3 months; when co-varying for barriers to receiving services, compliance enhancement intervention group attended significantly more sessions than TAU	-
Family interventions:	-	-	-	-	1.00 (0.49 to 2.07); favors neither
Asarnow et al, 2017 <sup>124</sup>	12 sessions (with 1 home visit) over 3 months	Safe Alternatives for Teens and Youths (SAFETY; CBT, DBT, and family centered skills with individual, parents, and family therapy)	EUC	SAFETY group showed significantly higher probability of survival without a suicide attempt by 3 months, compared with EUC group	-
Cottrell et al, 2018 <sup>125</sup>	6-8 sessions over 6 months	Self-Harm Intervention: Family Therapy (SHIFT; systemic family therapy)	TAU	No group differences in repeat self-harm events at 18 months; specific suicide attempt data not reported	-
Harrington et al, 1998 <sup>126</sup>	1 session in hospital or at home, 4 sessions at home	Brief home based intervention (communication and problem solving techniques, family therapy) + TAU	TAU	No group differences at 2 or 6 months on a measure of suicidal ideation; specific suicide attempt data not reported	-
Remote contact interventions:	-	-	-	-	Not applicable
Cotgrove et al, 1995 <sup>127</sup>	Hospital admission	Receipt of 1 token allowing readmission to the hospital on demand + TAU	TAU	No statistical differences between groups in suicide attempts at 1 year	-

CBT=cognitive behavioral therapy; SIQ=Suicide Ideation Questionnaire.

commonly used assessment measures that clinicians can use after a positive screen. A more thorough assessment with a clinician can have therapeutic value,<sup>96</sup> particularly in engaging adolescents in treatment.<sup>97</sup> Once an assessment has been completed, the clinician must integrate the clinical information into a risk formulation and develop an action plan to manage suicide risk.

In the US, the leading hospital accreditation body, the Joint Commission, recommends determining level of suicide risk, such as low, medium, and high, and formulating a care plan to tackle and reduce risk. The Joint Commission supports three commonly used tools—the Columbia-Suicide Severity Rating Scale paired with the Suicide Assessment Five-step Evaluation and Triage or the Ask Suicide-Screening Questions Brief Suicide Safety Assessment.

By comparison, the UK National Institute for Health and Care Excellence (NICE) recommends against stratification of suicide risk into low, medium, or high to determine who should be offered treatment or discharged from hospital or to predict future individual risk of suicide or self-harm.<sup>98</sup> The NICE Guideline Committee determined that risk assessment measures cannot accurately predict risk of suicide or self-harm and that the potential harms of risk stratification outweigh any benefits, partly because of the dynamic nature of suicide risk but also because people who die by suicide often score low on these risk scores. The committee endorsed a more personalized risk formulation that is holistic,

with assessment and future treatment/intervention being needs based within the context of individual strengths and difficulties.

### Intervention

Observational studies suggest that better access to health and mental health services may mitigate suicide risk in young people at the population level, but many young people at risk for suicide receive inadequate care and fail to access evidence based, suicide focused intervention.<sup>99 100</sup> In the National Comorbidity Replication Sample Adolescents study (n=6483), of the 4% of adolescents who reported suicide attempts, 80% reported receiving some kind of mental health treatment in their lifetime, with 55% having begun treatment before the suicidal behavior.<sup>101</sup> Although this report included data from a national sample that is similar to the population of US adolescents on a wide range of sociodemographic/geographic variables, treatment was self-reported and no data were collected on the adequacy of treatment. Beyond access to care in general, these findings underscore the need for more effective interventions targeting suicide risk and dissemination of existing evidence based approaches. Increased efforts to tackle suicide risk in settings where young people frequently engage, such as pediatric primary care and schools, are vital.<sup>99</sup> This section will review specific strategies and interventions for youth suicide prevention, including selective and indicated strategies.

### *Selective interventions*

Selective suicide prevention programs are developed for groups of young people known to be at an increased risk for suicide. For example, offering an educational intervention that focuses on lethal means restriction to parents of children evaluated in the emergency department for a mental health condition presents a selective prevention effort targeting a group of young people known to be at heightened suicide risk.<sup>102</sup> This included informing parents that their child was at risk for suicide and educating parents and teaching problem solving about limiting access to lethal means. At follow-up, parents who received the education reported taking more action to limit access (for example, locking up firearms and medication) than those who did not receive the education.<sup>102</sup> Other examples of selective interventions include those developed for young people bereaved by suicide, those presenting to the emergency department with suicidal ideation or depression and substance use, and those reporting high levels of perceived burdensomeness.<sup>103</sup>

### *Indicated interventions*

Many systematic reviews of RCTs of psychosocial interventions targeting individual young people at risk for suicide have been published.<sup>104-108</sup> A recent meta-analysis of 30 RCTs of psychosocial treatments for suicide prevention in adolescents found little evidence for the effectiveness of experimental treatments compared with control conditions, with the number needed to treat for suicide attempt outcomes being 42 (95% confidence interval 24 to 149); when the experimental and control treatments were combined and compared with baseline, the number needed to treat was 11 (6 to 15).<sup>107</sup> Psychosocial treatments with the strongest evidence of reducing suicidal ideation and behavior in young people typically include coping skills enhancement, focus on behavior change, and fostering connections with supports (family and/or peer).<sup>109</sup> Because emotion focused, more avoidant coping strategies are associated with increased deliberate self-harm, problem focused coping may be protective.<sup>110</sup>

Initial management of suicide risk in young people is typically multifaceted, including elements of safety planning, optimizing environmental safety via education on lethal means restriction, crisis stabilization, enhanced monitoring, and linkage with further treatment. Inpatient psychiatric hospital admission may offer some degree of short term containment but is costly and may be of questionable benefit given that approximately a quarter of young people report readmission and/or a suicide attempt within six months of discharge and roughly one third by one year.<sup>111</sup>

### *Psychosocial interventions*

Table 2 shows interventions with evidence for reducing future suicidal behavior in young people who have attempted suicide, an important target population given the especially heightened risk

of suicide in the first three to six months after an attempt.<sup>128</sup> Dialectical behavioral therapy (DBT) for adolescents is the only intervention that meets criteria for a well established treatment, with two RCTs showing efficacy in reducing suicide risk.<sup>129</sup> DBT for adolescents includes a family training component for parents.<sup>130</sup> Common elements of effective interventions include comprehensive assessment to inform treatment, safety planning, family involvement, coping skills training to match the needs identified in the assessment, and promotion of continuity of care.<sup>131</sup>

Methodological problems and high risk of bias have made comparing interventions on efficacy difficult.<sup>104 132</sup> Large RCTs are needed, using standardized definitions of key outcomes across all conditions with similar measures and follow-up time points, active comparators, and reporting of both negative and positive outcomes. Given significant reductions in self-harm shown in active control conditions in many studies, further research into potential active elements in treatment as usual, enhanced usual care, or stepped care models seems warranted.<sup>133</sup>

The Youth-Nominated Support Team intervention is a supplemental intervention to routine care for suicidal young people during the high risk transition period as they move from inpatient to outpatient levels of care. This intervention provides psychoeducation and consultation for the parent approved adult support people, nominated by the young person; it was tested in two RCTs.<sup>134 135</sup> Secondary analysis of the Youth-Nominated Support Team version II intervention showed promise specific to protecting against mortality in an 11-14 year follow-up.<sup>129</sup>

### *Pharmacological interventions*

No RCTs of drug therapy specifically targeting suicide risk in young people have been completed.<sup>58</sup> The 2004 black box warning that selective serotonin reuptake inhibitors might increase suicidal thinking and behavior resulted in a decline in antidepressant treatment in young people.<sup>136</sup> Recommendations for young people treated with selective serotonin reuptake inhibitors for indicated conditions, such as depression and anxiety, include increased monitoring by the prescribing physician during initiation, titration, and discontinuation of these drugs, ideally with the addition of cognitive behavioral therapy.<sup>137</sup> Subsequent expanded examination of pediatric antidepressant trial data showed a statistically significant, but small, risk difference of 0.7% for suicidal ideation or suicide attempt comparing drug with placebo.<sup>138</sup> Data from more recent pediatric antidepressant trials have not shown differences between drug and placebo, perhaps because newer studies have included suicide specific measures rather than adverse event reporting alone.<sup>139</sup>

Because treatment with lithium has shown anti-suicidal effects in adults, additional research is needed in young people.<sup>140</sup> Observational data from a longitudinal study of children and adolescents

with bipolar disorder found that people taking lithium reported half as many suicide attempts and significantly less aggression than those managed with other mood stabilizing agents.<sup>141</sup> Treatment with clozapine has also been associated with decreased risk of suicide in adults with psychotic disorders,<sup>142</sup> but comparable studies in young people are lacking. Recently, ketamine has shown promise in adults and trials are ongoing in young people. Other somatic treatments that have been applied to suicide risk in young people with little in the way of controlled trials include electroconvulsive therapy and transcranial magnetic stimulation treatments such as theta burst stimulation.

#### *Selecting interventions*

Important elements in selecting interventions for young people at risk for suicide include the clinician's experience and understanding of the existing knowledge base, the patient's and family's treatment preferences, cultural considerations, treatment accessibility, and family involvement. More examinations into the effectiveness of treatment with specific young populations are needed. For example, DBT was associated with a better rate of improvement from baseline to post-treatment for adolescents who identified as Latinx, compared with their white counterparts.<sup>143</sup> Future studies should explore how current treatments can be adapted to the needs of specific high risk groups, such as American Indian/Alaska Native, black, and LGBTQ (lesbian, gay, bisexual, transgender, and queer or questioning) young people, and whether specific, tailored, and/or culturally informed interventions may be more effective for these populations. Very little has been published about the effectiveness of suicide prevention interventions in low-middle income countries internationally, with only one study evaluating suicidal ideation outcomes in adolescents.<sup>144</sup>

Applying technology to suicide prevention efforts in young people deserves additional study and consideration of how to manage risk,<sup>129 145</sup> but it is an area of opportunity given the recent increases in the use of technology to deliver mental health services.<sup>145 146</sup> For example, safety planning supported by phone and/or mobile application with personalized coping skills for young people and recommendations for parents has been piloted.<sup>129</sup> Online platforms may also be used to supplement individual psychosocial interventions, via additional skills learning and practice opportunities or by providing parents with psychoeducation about suicide in young people and strategies to strengthen family relationships and enhance support.<sup>145</sup> Technology to support transitions in care, such as with caring contacts or behavioral economic approaches (that is, "nudges") may also augment the effectiveness and generalizability of treatments.<sup>147</sup>

#### *Family involvement in interventions*

Evidence of the importance of family involvement in treatment for suicidal young people is growing,

although few studies have included specific family focused outcome variables.<sup>130 148</sup> In studies of the interaction between suicide related and family focused outcome variables, better family functioning is associated with faster improvement; greater improvements in family outcomes are related to changes in suicidal behaviors.<sup>130</sup> Parent/caregiver focused interventions include training parents in skills so that they can provide in-home coaching, skills training to enhance family communication and conflict resolution or repair family dynamics, and enhancing parents' motivation to support young people and to decrease family based barriers to care.<sup>130</sup> Family interventions may be in the form of brief parent check-ins before or after an individual session, conjoint family sessions with the young person and parents, separate parent sessions, or multi-family groups or parent groups.<sup>130</sup>

#### *Treatment course*

Many young people report persistent suicidal ideation even after treatment.<sup>109</sup> Course of treatment for this population has not been well studied. The general clinical consensus is that after acute treatment, longer term care to tackle any comorbidities or ongoing functional impairment is warranted. Because studies to guide continuation or maintenance treatment for young people at risk for suicide are not available, the length of treatment is determined by clinical judgment and the patient's and family's preferences. Given the risk of future suicidal thinking and behavior, connecting at risk young people with integrated systems of care equipped to identify and engage young people with emergent risk is important. These include but are not limited to pediatric primary care settings and school based mental health services, which provide opportunities for re-screening and early intervention.<sup>149</sup>

#### **Strategies for prevention of suicide in young people in community settings**

Universal prevention strategies are quite effective but must be implemented with a focus on sustainability or benefits will erode quickly.<sup>150</sup> Efforts to prevent suicide in young people have been integrated into community settings such as schools<sup>105</sup>; evidence suggests that a few specific school based interventions can prevent suicidal ideation and suicide attempts, with moderate confidence in the effect estimates for both outcomes in the short term.<sup>151</sup> The effects of community based interventions, such as efforts following suicide clusters and the impact of local suicide collaboratives and initiatives, are unknown.<sup>151</sup> Systematic reviews of school based programs consistently indicate improved knowledge and attitudes toward suicide, but most show no effects on actual suicidal behavior, with the important exception of three large RCTs—Signs of Suicide (SOS),<sup>152</sup> Youth Aware of Mental Health (YAM),<sup>153</sup> and Good Behavior Game (GBG).<sup>154</sup>

SOS is a universal suicide prevention program delivered in middle schools and high schools that

includes gatekeeper training for staff, education and guidance on seeking support for students, and universal screening. In multiple RCTs, SOS led to a 40-64% reduction in student self-reported suicide attempts, greater knowledge of depression and suicide, and more adaptive attitudes toward these matters.<sup>152 155 156</sup> YAM is a manualized, universal, school based mental health promotion and suicide prevention program for young people (ages 14-16), which includes an interactive lecture aimed at enhancing mental health literacy, followed by small group discussions and role play sessions aimed at perspective taking and empathy building through experiential practice of common situations that young people may encounter. The YAM intervention was evaluated in an RCT of around 11000 ninth graders conducted in 168 randomized schools in 10 European countries.<sup>153 157</sup> At the 12 month follow-up, those young people participating in YAM reported significantly reduced suicidality, including 55% fewer incident suicide attempts and 50% fewer cases of severe suicidal ideation, compared with controls.<sup>153</sup> GBG is a universal, trauma informed behavior management program, which supports the development of self-regulation skills, psychological safety, and prosocial interpersonal behaviors in children. GBG is implemented by teachers in first and second grade classrooms and has shown a sustained reduction in suicide attempts and suicidal ideation.<sup>154</sup> SOS, YAM, and GBG focus on mental health literacy and skills training, with YAM and SOS including specific information on suicide risk awareness. Gatekeeper training programs for parents and teachers show improvements in knowledge of gatekeepers but may not lead to behavior change that results in identification or referral of suicidal young people to further services.<sup>158</sup> No evidence showing effectiveness of gatekeeper training, alone without other interventions, in preventing suicidal behaviors is available.<sup>103</sup>

Regarding community prevention, the Garrett Lee Smith Memorial Act provided funding for state, territory, and tribal community grants and college campus grants for suicide prevention activities. These activities included gatekeeper training, screening, infrastructure support for improved connection to services, crisis hotlines, and community partnerships.<sup>159</sup> In a long term follow-up, counties exposed to this program during a single year had suicide mortality rates in young people estimated to be 0.9 per 100000 lower than control counties ( $P=0.03$ ) one year after the implementation and 1.1 per 100000 lower than control counties ( $P=0.01$ ) two years after the implementation.<sup>150</sup> The effects were even greater in rural counties, where the suicide rates in young people two years after exposure were estimated to be 2.4 per 100000 lower than in the absence of the program ( $P=0.003$ ).<sup>150</sup> These findings highlight the impact of comprehensive, community based programs on prevention of suicide in young people.

Sensational or graphic media depictions of suicide, especially when a celebrity is involved, can lead to

suicide contagion (that is, a temporal or location based increase in suicidal behavior following exposure to a suicide), which has a disproportionately negative impact on young people.<sup>93 160 161</sup> Of note, media reports that emphasize coping and “mastery of crisis” following adversity may lead to reductions in suicides and should be incorporated into media training.<sup>162</sup> More work is needed to understand the impact on exposure to suicide content through online platforms and communities.<sup>163</sup>

### Emerging treatments

Several innovations are under way to improve screening, risk assessment, and treatment for suicide in young people. The major challenge for the field is to develop methods of identification of risk that correspond to the rapid fluctuation in suicide states within an individual over time. The strategies that are under evaluation include ecological momentary assessment and passive data sensing that could aggregate individual patterns of risk to make personalized assessments.<sup>164</sup> With regard to development of treatment, investments in mobile, self-guided, and point-of-care solutions have begun to emerge. Given the dire need for accessible, just-in-time treatments, several mobile health technologies and tools have been developed, many of which support interventions such as safety planning and skills based coping approaches. A recent meta-analysis of self-guided mobile technologies indicated promise, but none has shown superiority over a control condition.<sup>165</sup> Similarly, technology enabled services such as Jaspr Health, which provides a digital suicide care platform, can augment services in settings that support healthcare providers in delivering evidence based practice. Large scale evaluation of both implementation and clinical outcomes are needed.

### Guidelines

National and international organizations have issued guidelines for prevention of suicide in young people. We reviewed and compared these guidelines. All guidelines included recommendations for the assessment, management, and treatment of individuals at risk for suicide. No clear consensus exists regarding approaches to assessment of suicide risk. The UK NICE guidelines recommend against stratification of suicide risk, whereas Joint Commission guidelines in the US endorse determining individuals' level of suicide risk and a plan to mitigate that risk. A recent review of policies and public guidance on suicide in young people noted that the only consistent recommendation among 35 policy documents was that suicidal children should be treated by a child and adolescent mental health practitioner.<sup>166</sup>

### Conclusions

The problem of suicide in young people is complex, and its persistence as a major cause of death across the world is tragic, but the emergence of

increasingly effective suicide prevention efforts offer hope. Meaningful progress is being made in our understanding of dynamic risk and protective factors, as well as our appreciation of the intersection of multiple social identities in populations at high risk. Best practices are evolving, along with efforts to effectively disseminate and implement screening, prevention, and intervention strategies specific to suicide in young people. The longstanding impact of the covid-19 pandemic on suicide in young people is yet to be fully understood, but early data suggest overall that the suicide rate is increasing with a disproportionate impact on minoritized young people in the US.<sup>167</sup> Grief and bereavement related to the pandemic, disruptions in routine and social engagement, and increased self-reported depression and anxiety have potential to increase the suicide risk in young people.<sup>168</sup> Initiatives to disseminate suicide prevention best practices and improve access to competent behavioral health services such as integration into pediatric primary care, schools, and other child serving community settings may help to meet the social, emotional, and behavioral health needs of young patients and families and reduce the risk of suicide and suicidal behavior.

Future directions for research include development and testing of clinical pathways to aid in triage and risk formulation. Although screening of young people for suicide risk makes intuitive sense, studying how screening might improve outcomes beyond simply increasing awareness of risk in vulnerable young people will be important. Research is also

#### QUESTIONS FOR FUTURE RESEARCH

- How can screening best be paired with intervention to reduce suicide risk in young people?
- What are the most effective ways to engage and link underserved at risk young people with suicide focused preventive interventions?
- Can the findings from the landmark ED-SAFE study,<sup>169</sup> which showed that screening in the emergency department paired with a brief intervention was associated with a 30% reduction in suicidal behavior, be replicated for young people?
- Can machine learning and predictive modeling approaches improve the accuracy of screening and risk stratification for suicide risk in young people?
- What are optimal approaches to adapting suicide focused interventions with demonstrated effectiveness in pre-adolescents, adolescents, or young adults?
- How can the intersectionality framework be best applied to frame targets for and tailoring of interventions to reduce suicide risk in young people with diverse social identities?
- What level of parent involvement in youth focused psychosocial interventions is optimal to reduce the child's risk of suicide?
- What interventions can be developed and implemented to rapidly reduce suicide risk in young patients at acute risk of suicide?

#### PATIENT INVOLVEMENT

We consulted Heather Smith, a parent and member of the Nationwide Children's Hospital Behavioral Health Advisory Council and Family as Faculty, in the development of this review, and she commented on the final manuscript. No patients were involved directly in the preparation of this article.

needed on the best ways to implement and improve screening, triage, service linkage, and follow-up, as well as developing and refining suicide specific interventions for young people at risk across all levels of prevention. Given national shortages of child and adolescent psychiatrists and other pediatric mental health professionals, developing and understanding the best models to train and support other healthcare providers and community partners in suicide prevention best practices will be an important area of investigation.

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